



Australian Air Publication
AAP 1001.4

THE AIR FORCE APPROACH TO LOGISTICS

Australian Air Publication 1001.4—*The Air Force Approach to Logistics* is issued for use by the Royal Australian Air Force and is effective forthwith.

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FOREWORD

Logistics is a key component of Air Force capability. It is integral to mounting and sustaining Air Force operations and constrains what is operationally possible.

Logistics is provided through a complex network of organic capabilities, Defence service providers, industry organisations, and international agreements. This network has undergone significant change, particularly in the degree to which Air Force is reliant upon other organisations for support. Consequently, there was broad recognition of a need to guide both organic and external logistics organisations on the unique nature of logistics support to air power. As a result, AAP 1004—*Air Force Logistics Support Concept* (AFLSC) was developed in 2004.

AAP 1001.4—*The Air Force Approach to Logistics* was developed to replace the AFLSC as there was recognition that a broader document providing the Air Force's doctrinal understanding of logistics beyond the concepts was required. Further, *The Air Force Approach to Logistics* has been updated cognisant of the 2009 Defence White Paper,¹ the associated Defence Strategic Reform Program (SRP) and a range of subordinate reviews that will introduce change over the next decade. The short-term horizon is five years, but the long-term horizon on which the White Paper and the Strategic Reform Program are based is out to 2030.

The Air Force Approach to Logistics is a broad statement of the principles that underpin the planning and delivery of logistics support for Air Force capabilities over the period 2011 to 2016. *The Air Force*

¹ Department of Defence, 2009, *Defending Australia in the Asia Pacific Century: Force 2030 – Defence White Paper 2009*, Department of Defence, Canberra.

Approach to Logistics is consistent with joint logistics doctrine wherever possible, but it describes the differentiating characteristics of Air Force logistics, and how joint doctrine is applied in a RAAF context.

Joint Logistics Doctrine² describes logistics support as being provided across two dimensions: Operations Support and Capability Support, and this construct is applied throughout *The Air Force Approach to Logistics*. In an Air Force context, the important distinction is also made between Weapon System Logistics (focused on supporting aircraft and the major systems supporting aircraft operations) and Air Base Logistics (focused on the delivery of services at air bases that facilitate air operations). These themes are developed in separate sections of *The Air Force Approach to Logistics* addressing Logistics Management, Engineering Support, Maintenance Support and Supply Support. Key enablers of logistics support, including the logistics workforce, information technology, governance and collective training, are also addressed.

The Air Force Approach to Logistics will be used as the doctrinal foundation to develop Air Force logistics policy and systems, and to influence joint logistics doctrine and policy. It will also be used as the basis for Air Force logistics training, and inform the development of Logistics Support Concepts for individual weapon systems.

The content of *The Air Force Approach to Logistics* is not intended to be immutable. It needs to be reviewed regularly to reflect developments in history, theory and technology, and feedback to the sponsor is encouraged.

² Australian Defence Doctrine Publication, Joint Logistics Doctrine Series (4.0–4-6).

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The document also incorporates many observations and findings identified by Air Commodore Andrew Kilgour as part of the Logistics Transformation Project. His efforts will contribute to the planning and delivery of logistics support to Air Force capabilities now and into the future.

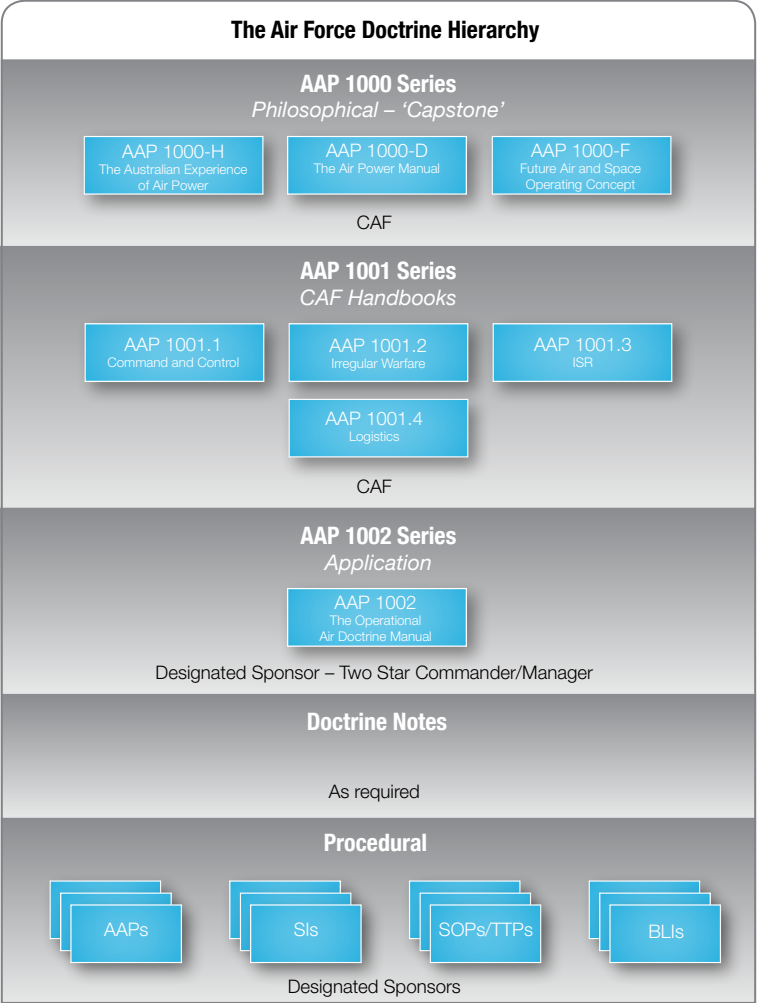
The RAAF also acknowledges the use of imagery from Air Force and Defence websites, and that provided by individuals and other agencies.

RAAF DOCTRINE HIERARCHY

1. Air Force doctrine is articulated in the Air Force Doctrine Hierarchy (see figure overleaf) that encapsulates the RAAF's philosophical, application and procedural doctrine. The hierarchy identifies five types of doctrinal publications:

- a. **AAP 1000 Series.** The AAP 1000 Series publications provide the Air Force's capstone philosophical air power doctrine.
- b. **AAP 1001 Series.** The AAP 1001 Series publications, referred to as Chief of Air Force (CAF) Handbooks, bridge philosophical and application doctrine. They are designed to articulate Air Force's perspective on key doctrinal issues.
- c. **AAP 1002 Series.** The AAP 1002 Series provides the Air Force's application-level doctrine. Publications are sponsored by two-star commanders or managers for specific functional areas. The key document is the AAP 1002—*The Operational Air Doctrine Manual*.
- d. **Doctrine Notes.** Doctrine Notes are promulgated as required on specific doctrinal issues that need to be formally articulated between major doctrinal reviews of the AAP 1000 Series.
- e. **Procedural Doctrine.** Air Force procedural doctrine is not identified in any specific series or publication as it is articulated in various tactics, techniques and procedures (TTPs), standing instructions (SIs) and standard operating instructions (SOPs) across the Air Force.

2. AAP 1001.4—*The Air Force Approach to Logistics* is a CAF Handbook and therefore bridges both philosophical and application doctrine.



The Air Force Doctrine Hierarchy

KEY DOCTRINAL STATEMENTS OF THE AIR FORCE APPROACH TO LOGISTICS

The key statements of the *Air Force Approach to Logistics* are the basic and primary doctrinal perspectives that underpin the Air Force's understanding of Logistics. They should be understood as the key takeaways from this publication.

- Logistics is integral to mounting and sustaining Air Force operations. Logistics enables operations but can also constrain operations if it is poorly planned, executed or resourced.
- Air Force logistics is generally referred to as having three main functions: engineering, maintenance (both of which include technical airworthiness), and supply support.
- The fundamental objective of Air Force supply support is to provide the right materiel and services in the right quantities, at the right place, at the right time and with the right quality and condition; and sustain that support over time.
- Appropriate regulation of engineering, maintenance and supply activities associated with technical equipment is essential.
- The characteristics of air power shape how logistics support for air operations is provided.
- Technical integrity of materiel encompasses fitness for service, safety and environmental compliance.
- Logistics support for Air Force expeditionary capabilities must be deployable and capable of operating as part of a joint and/or multinational logistics system.
- Air Force logistics capabilities must be structured for war and adapted, where necessary, for peace.

- An understanding of the distinguishing characteristics of Air Force logistics is essential to planning and delivering logistics support.
- During deployed operations, the logistics tempo is likely to be high at both forward and main operating bases.
- Logistics arrangements must be flexible enough to support changing missions, evolving concepts of operations and dynamic situations.
- Air Force must retain the capability to ensure that logistics support arrangements meet operational requirements.
- During the acquisition process, Logistics Support Concepts (LSCs) must be developed for each capability in concert with the Concept of Operations (CONOPS).

CHAPTER 1

INTRODUCTION

Throughout the struggle, it was in his logistic inability to maintain his armies in the field that the enemy's fatal weakness lay. Courage his forces had in full measure, but courage was not enough. Reinforcements failed to arrive, weapons, ammunition and food alike ran short, and the dearth of fuel caused their powers of tactical mobility to dwindle to the vanishing point. In the last stages of the campaign they could do little more than wait for the Allied advance to sweep over them

.

Dwight D. Eisenhower¹

Introduction

1.1 Logistics is a fundamental component of military capability, integral to mounting and sustaining Air Force contributions to military operations.² Logistics enables operations but can also constrain operations if it is poorly planned, executed or resourced. Logistics is also focused on assuring sustainability of both the capability and the individual platforms. Furthermore, over the life cycle of a capability, logistics support is a significant cost driver and will influence the level of capability that can be achieved within budgetary constraints.

1.2 In planning for, and providing logistics support to operations, the whole system must be considered. Decisions should not be made without consideration of their impact on the whole system and

¹ Eisenhower, Dwight D., June 1996, British Army Doctrine Publication, Volume 3, *Logistics*, pp. 1-2.

² Within *The Air Force Approach to Logistics*, 'logistics' generally refers to the components of engineering, maintenance and supply.

therefore military capability. This document recognises the importance of logistics to air operations in the joint environment, and that Air Force logistics delivery is dependent on other elements of the Australian Defence Organisation (ADO) and the wider support base.

Purpose

1.3 *The Air Force Approach to Logistics* describes the principles that guide planning and delivery of logistics support to Air Force capabilities. *The Air Force Approach to Logistics* documents current support philosophies, concepts and practices, including roles and responsibilities for logistics delivery. The Defence environment is dynamic; therefore, *The Air Force Approach to Logistics* is focused more to the next five years, but provides general guidance for the longer-term horizon of the 2009 Defence White Paper and the Defence SRP. The principles on which *The Air Force Approach to Logistics* is based are not expected to change dramatically across the long term. *The Air Force Approach to Logistics* is expected to be reviewed on a five-year cycle to ensure that the short-term horizon accurately reflects changes in global, national and strategic influences.

1.4 The purpose of *The Air Force Approach to Logistics* is to:

- Translate strategic guidance into an Air Force context.
- Translate Australian Defence Force (ADF) doctrine into an Air Force context.
- Articulate the doctrine, characteristics and principles underpinning logistics support of Air Force capabilities.
- Provide an endorsed foundation for the conduct of Air Force logistics activities.

- Inform the development of the Logistic Support Concepts (LSC) and Concepts of Operations of Air Force Capability Groupings and for individual capabilities.
- Establish planning guidance for developing logistics arrangements to support Air Force capabilities.
- Provide a sound basis for logistics training and workforce development in support of Air Force activities.

Authority

1.5 The Chief of Air Force (CAF) is the Air Force Capability Manager and the Defence Aviation Authority (DAA). *The Air Force Approach to Logistics* is issued under the authority of CAF. It is authoritative, but not directive. It articulates the 'what' and the 'why', but not the 'how'. Application of *The Air Force Approach to Logistics* will necessarily require professional mastery. It provides a flexible framework consistent with joint and Air Force doctrine, within which initiative and lateral thinking can, and should, be applied in developing logistics support arrangements for specific Air Force capabilities.

Background

1.6 Over the last 20 years Air Force's capabilities, LSCs and strategies have evolved progressively as the Air Force and the wider Defence organisation have responded to their changing operating environment. The operating environment has moved from one where Air Force capabilities were principally supported from a combination of organic logistics and Air Force managed contractor support arrangements to one where those capabilities are now principally supported by the wider Defence organisation and contractor support arrangements, managed by other Defence Service Provider Groups (SPGs).

1.7 The changes effected through the redevelopment of the Defence Materiel Organisation (DMO) as a Prescribed Agency³ under the *Financial Management and Accountability Act (1997)* and the organisational evolution of the Defence Support Group (DSG), including the implementation of the Base Accountability Model, are significant changes to the environment in which Air Force undertakes logistics. Air Force's organic logistics has been largely refocused to the support of Air Force capabilities in a deployed environment and the management of a range of support arrangements with other Defence SPGs. In turn, the other Defence SPGs establish and manage a range of contracts to deliver products and services in support of Air Force outcomes. The logistics environment is now one where military capability must be delivered within strict limitations of fiscal accountability and responsibility, and where operational effectiveness must go hand in hand with overall organisational and financial efficiency.

1.8 Over the next decade a new generation of Air Force capabilities will enter operational service; many of these capabilities will remain in service for the duration of the long horizon (up to 2030) and beyond. These capabilities will all be expected to operate within a networked joint force environment, as well as a support environment significantly reliant on global commercial supply chains, traditional military supply chains and more complex information and communications technology (ICT). The capabilities are expected to be operated globally or regionally in either a national or multinational context and will almost certainly be as part of a joint force. The LSCs and strategies underpinning Air Force's capabilities must be cognisant of these significant environmental challenges and exploit opportunities arising from the evolving

³ 'Prescribed Agency' means a body, organisation or group of persons prescribed by the regulations for the purposes of this definition.

environment to assure effective and efficient delivery of Air Force capabilities in both deployed operations and in training. In particular, challenges such as the trend for original equipment manufacturers to control intellectual property and license or control vendors must be addressed. Air Force must be able to capture performance information and operate in an informed manner when managing Air Force capabilities.

Doctrinal Framework

1.9 *The Air Force Approach to Logistics* has been developed within the context of both ADF and Air Force doctrine; therefore, *The Air Force Approach to Logistics* is to be read in conjunction with the ADDP 4.0 Logistics Series doctrine. *The Air Force Approach to Logistics* must be consistent with the framework and direction of joint logistics doctrine and policy. Equally, it must ensure effective support of the Air Force capabilities by recognising the unique requirements of the environment in which those capabilities operate. *The Air Force Approach to Logistics* is philosophical-application level doctrine and, accordingly, is a CAF Handbook.

Strategic Context for Air Force Logistics

1.10 The 2009 Defence White Paper is based on a defence policy ‘... founded on the principle of self-reliance in the direct defence of Australia and in relation to our unique strategic interests, but with a capacity to do more when required, consistent with those strategic interests that we might share with others, and within the limits of our resources. This posture entails the maintenance of alliances and

international defence relationships that enhance our own security and allows us to work with others when we need to pool our resources.’⁴

1.11 Strategic guidance provides important context for discussing logistics support for Air Force capabilities and also provides some of the fundamental assumptions underpinning the content of *The Air Force Approach to Logistics*. The relevant strategic guidance and the implications for logistics support are outlined below:

- **Act Independently.** The 2009 Defence White Paper requires that Australia must have the capacity to act independently ‘where we have unique strategic interests at stake, and in relation to which we would not wish to be reliant on the combat forces of any foreign power.’⁵ This principle is based on control of air-sea approaches to Australia and denying an adversary the ability to operate without disruption in Australia’s immediate neighbourhood, to the extent required to ensure the security of Australian territory and people. In this context, a degree of independent logistics capacity is required, or where that is not practical, secure national and international supply lines with sufficient capacity are provided for those capabilities engaged. The White Paper also implies an ability to mount and sustain operations from air bases which would themselves need to be protected. These air bases would invariably need to be expanded with the air base logistics capacity necessary to sustain operations in terms of both tempo and duration. While such capacity is likely to be initially based on organic logistics capabilities, it is likely that a mix of organic, Defence civilian employee and contractor support would be used after the first six

⁴ Department of Defence, 2009, *Defending Australia in the Asia Pacific Century: Force 2030 – Defence White Paper 2009*, Department of Defence, Canberra, p. 12.

⁵ *ibid.*, p. 48.

months, drawing heavily on national and international logistics support arrangements and commercial supply contracts.



First load for Operation PAKISTAN ASSIST II 2010 being loaded by Air Movements Section RAAF Amberley.

- **Lead Military Coalitions.** The 2009 Defence White Paper requires that Australia must be capable of leading military coalitions ‘... where we have shared strategic interests at stake with others, and in relation to which we would be willing to accept a leadership role.’⁶ This requirement is most likely to arise in regional situations, where our range and depth of capabilities exceed those of our partners. In this context it is likely that supply lines will be relatively secure, albeit that activation of one or more mounting bases may be necessary. The expeditionary focus of

⁶ *ibid.*

such operations would require a flexible and mobile force, with sufficient levels of readiness and sustainability to undertake such regional operations. It is likely that the initial surge would be met by organic logistics capabilities, with augmentation and then replacement by contracted capabilities occurring as the tempo, security and political environment permitted.

- **Make Tailored Contributions.** The 2009 Defence White Paper requires that Australia must be capable of contributing tailored capabilities to multinational military operations ‘where we share wider strategic interests with others and are willing to accept a share of the burden in securing those interests.’⁷ This requirement could arise in either regional or, more likely, a global context and by necessity implies an expeditionary focus with good capacity to sustain deployed capabilities operating at an increased tempo over an extended period. The nature of such contributions implies deployment of military capabilities augmented by a range of logistics support arrangements as appropriate to the circumstances and the environment. Australia is unlikely to control points of entry and, at any rate, security in the Area of Operations (AO) is likely to be problematic. The ADF supply chain will be necessarily controlled through an ‘agreed point’, irrespective of the source of supply. Some of the more complex capabilities, such as New Air Combat Capability, are likely to impose significant challenges for maintenance in a deployed environment, particularly where that is over an extended period. This is likely to require more flexible arrangements adapted for the circumstances, while ensuring integrity of systems and technical airworthiness requirements. The LSC for each capability should address these matters.

⁷ *ibid.*

1.12 Concurrency must be managed closely, both in terms of force structure design and capacity to undertake other tasking while committed to significant operations, particularly overseas. Policy requires the ADF to remain interoperable with the United States, while maintaining reasonable levels of interoperability with regional nations. Finally, the integration of military, civilian and contracted capabilities with a strong emphasis on strategic partnerships already apparent in normal peacetime activities is likely to extend over time into deployed operations. The way the ADF adapts to this changing support environment will be essential to the success of future deployed operations.

1.13 The implications are that logistics support for Air Force expeditionary capabilities must be deployable and capable of operating as part of a joint or multinational logistics system. Logistics support must be structured to support and sustain concurrent operations. To ensure interoperability, there is a need to have the skills, knowledge, procedures and ICT systems to operate alongside the United States and other allies. Greater integration of industry in support of Air Force operations will require strategic arrangements to ensure that industry understands Air Force's logistics needs and is in a position to provide the required level of support for those expeditionary capabilities. Greater reliance on the use of contractors in supporting deployed operations also dictates that logistics personnel must have access to appropriate contract and service delivery management skills. Responsive and precise logistics support necessary to reduce the deployed footprint requires accurate planning and information systems such as the Military Integrated Logistics Information System (MILIS) and Computer Aided Maintenance Management Version 2 (CAMM2). Additionally, the logistics system must be dynamic and capable of changing to meet the needs of the warfighter.

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Air Bases – Sustaining Air Power

During the 1999 Operation STABILISE in the then East Timor, the Forward Operating Base (FOB) at Dili was critical to the rapid deployment of forces. However, the airport infrastructure at Dili had been significantly damaged. In order to provide the basic infrastructure to conduct air operations, the RAAF's Expeditionary Combat Support Squadrons with force protection elements were among the first to be deployed. They provided the skilled personnel, deployed systems and base protection to ensure that the airlift into East Timor could be conducted safely and efficiently. The ability to create the infrastructure to conduct efficient operations is an intrinsic part of an air force and is fundamental to its ability to deliver air power that is effective and responsive.

See 'Air Bases – Sustaining Air Power', Pathfinder: Air Power Development Centre Bulletin, Issue 88, May 2008, for further information.

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Scope of Air Force Logistics

1.14 CAF, as the Air Force Capability Manager,⁸ is responsible to Chief of Defence Force for raising, training and sustaining⁹ the Air Force to ensure that it is ready for potential operations. CAF, as the DAA, is responsible for airworthiness standards and the management of the airworthiness system. Logistics is a fundamental component of Air

⁸ The Australian Defence Glossary (ADG) defines 'Capability Manager' as: Raises, trains and sustains in-service capabilities through the coordination of fundamental inputs to capability.

⁹ ADG defines 'Raise, Train and Sustain' as: The generation, preparation, and maintenance of Defence capability by designated Capability Managers at the level of capability specified in preparedness directives.

Force capability, and CAF has a direct interest in the performance of the logistics systems that support Air Force.

1.15 CAF is responsible for approving logistics arrangements for Air Force and supporting agencies, and has a direct role in ensuring that these requirements are met. Under arrangements with the DMO, CAF exercises some of his capability management responsibilities through other capability managers (eg. Chief of Army (CA) who acts as Lead Capability Manager (LCM) for land materiel).

Definition of Logistics

1.16 The ADF definition of logistics is the science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, the aspects of military operations that logistics deal with are:

- design and development, acquisition, storage, movement, distribution, maintenance, evacuation and disposition of materiel;
- transport of personnel;
- acquisition, construction, maintenance, operation and disposition of facilities;
- acquisition or furnishing of services; and
- medical and health service support.¹⁰

1.17 Air Force logistics is concerned with a subset of these functions, principally materiel support, movement, the acquisition or furnishing of

¹⁰ Headquarters Australian Defence Force, 2005, Australian Defence Doctrine Publication-4.0—*Defence Logistics*, Department of Defence, Canberra.

services, and maintenance and engineering. Personnel support services, facilities and health services are not included. Logistics is a complex arrangement of interrelated functions.

1.18 The planning, acquisition and delivery of logistics support to Air Force capabilities on both deployed operations and in training requires consideration; decisions should not be made without consideration of their impact on overall military capability. Equally, logistics support must be provided in a manner that assures compliance with workplace health and safety principles as well as operational effectiveness and efficiency. Air Force logistics must also effectively contribute to the airworthiness (both technical and operational) of the Air Force capabilities supported. While the design of the overall logistics system necessarily considers all of these influences, it is essential that the application of *The Air Force Approach to Logistics* to individual Air Force capabilities in no way compromises the overall logistics system or the principles of workplace health and safety and airworthiness. In particular, the introduction of new, replacement or modified capabilities must consider how those capabilities will be integrated into the overall support environment and ensure that necessary changes are planned and implemented as part of capability acquisition.

1.19 Air Force retains a range of organic logistics capabilities to enable Air Force units to access the logistics systems and to undertake authorised logistics activities at unit or wing level and to perform authorised logistics governance and management activities at unit or higher Command levels.¹¹ Air Force also retains a range of organic logistics capabilities to enable essential logistics support of forces in a

¹¹ Logistics governance comprises engineering, maintenance and supply governance. The governance of these functions is focused on compliance, conformance and performance to ensure effectiveness of Air Force capabilities.

deployed operations context. All of these organic logistics capabilities are designed to integrate with the overall logistics system.



A RAAF marshaller remains on standby after having marshalled an AP-3C aircraft into a parking bay in the United Arab Emirates, 2011.

Scope of Air Force Logistics Partners

1.20 Considerable logistics support for Air Force is now provided by SPGs within Defence under the Defence Business Model. As such, Air Force must clearly specify and then manage delivery of logistics support of Air Force capabilities through logistics service providers.

1.21 The Joint Logistics Command (JLC) provides wholesale storage and distribution services to Capability Managers, and is responsible for joint logistics policy, doctrine, procedures and governance. JLC is also

responsible for the development and management of a range of national and international logistics support arrangements.

1.22 The Chief Information Officer Group (CIOG) is responsible for providing the corporate communications and logistics information systems that underpin asset visibility, asset management and maintenance management for the military logistics inventory.

1.23 Joint Health Command (JHC) within VCDF Group is the designated LCM for Health within the ADF and Commander Joint Health (CJHLTH) is also the Surgeon General of the ADF (SGADF). JHC provides garrison health care capability in its own right on behalf of the Services and ensures the health preparedness of ADF personnel for operations. JHC is responsible for strategic health policy, provides strategic level health advice and exercises technical, materiel and financial control of JHC units. In the role of LCM, JHC manages the Materiel Support Agreement between the DMO and VCDF and draws together the materiel support requirements (current and future) of the Services and monitors health supply chain performance and effectiveness.

1.24 The Capability Development Group (CDG) is responsible for the development of capability requirements with Capability Managers and the management of major projects from initiation up to acquisition.

1.25 The DMO provides acquisition and through life materiel support through Systems Program Offices (SPOs) within Aerospace Systems Division (ASD), Electronic Systems Division (ESD), Maritime Systems Division (MSD), Land Systems Division (LSD), Major Projects Group (MPG) and Explosive Ordnance Division (EOD) against capability requirements specified in Materiel Acquisition Agreements (MAAs) (with CDG) and Materiel Sustainment Agreements (MSAs) (with Capability Managers). Importantly, the DMO also provides the

acquisition and through life materiel support for Defence's logistics information systems through Logistics Information Systems Branch.

1.26 The DSG provides administrative, personnel, facilities and a range of air base logistics support services at Defence bases within Australia against capability requirements specified in the Air Force Customer Supplier Agreement (CSA) and in the individual Base Support Agreements (BSAs).

1.27 For operations, Headquarters Joint Operations Command (HQJOC) and JLC are responsible for providing a joint distribution system, which amongst other things, will define the joint supply chain arrangements, the agreed point(s) for consolidation of assets prior to movement into an AO, asset management requirements within an AO, and any limitations on movement to, from and within the AO. The use of joint arrangements at the agreed point(s) are expected for all assets sourced under DMO-contracted global commercial supply chains, other military logistics and other commercial supply arrangements to assure asset management within the AO and effective movement control.

1.28 Air Force's organic logistics capability must be integrated with the support provided by other agencies and operate within joint logistics support arrangements both in operations and training. Air Force provides experienced staff to the SPGs to assist in fulfilling their roles, where skills are directly transferable to Air Force roles. As a rule, Air Force does not develop skills for the sole benefit of SPGs.

Looking a Gift Horse in the Mouth

World War I ended abruptly when an armistice halted fighting in November 1918. Until then, Allied planners had been expecting that German resistance would prolong hostilities into 1919, possibly even 1920. In Britain, industrial output supporting the war effort had accordingly continued at full pace, which meant that there was suddenly a vast accumulation of surplus war stocks. The Royal Air Force (RAF) alone had more than 22 000 aircraft on strength; many more were in storage awaiting delivery.



Surplus RAF D.H.9s in Britain, part of the Imperial Gift.

It was in this climate that, in June 1919, the Imperial authorities offered a gift of 100 aircraft (sufficient for four Service squadrons) to the governments of Britain's dominions—India, Canada, South Africa, Australia and New Zealand—to assist each in establishing a viable air force of their own.

During negotiations, Lieutenant Colonel Richard Williams suggested that aircraft on their own were of little value without the spares and other equipment needed to actually form units. Williams' argument was

accepted, with the result that what became known as the Imperial Gift of 1920 ended up entailing a huge array of items valued at £1 million (perhaps \$35 million at today's value).

Among the gift equipment were actually 128 aircraft, the additional machines being replacements for aircraft purchased through public and private subscription in Australia and donated to the war effort. There is no doubting the value of the Imperial Gift to Australia, or that the RAAF, which came into being during 1921, was kept supplied with machines until nearly the end of the decade. This not unreasonably raises the question: would there have been a RAAF without the Imperial Gift? In fact, it is clear that Australia was intent on maintaining some form of air arm within its defence forces long before the end of the war, and such a development would probably have occurred irrespective of whether the Imperial Gift was ever made.

Ref: 'Looking a Gift Horse in the Mouth', Pathfinder: Air Power Development Centre Bulletin, Issue 25, June 2005.

Perspectives of Air Force Logistics

1.29 Logistics is a complex arrangement of various interrelated functions. The following views are presented to aid understanding of how logistics is considered within an Air Force context.

1.30 **Support View.** ADF logistics doctrine describes logistics support in two dimensions. Figure 1–1 depicts these dimensions, which are described as follows:

- **Capability Support.** Capability Support is focused on sustainment over the life cycle of the equipment. Capability Support encompasses the logistics of acquiring and determining the logistics arrangements required to support a particular capability

and includes management of the capability to affect its ultimate disposal. The outcome of the Capability Support dimension is prepared capabilities.

- **Operations Support.** Operations Support focuses on the logistics required to support operations. It encompasses the support needed to prepare, deploy, sustain and redeploy a force tailored to meet a particular operation. The outcome of the Operations Support dimension is that missions have received the level of support required for them to be successfully completed.

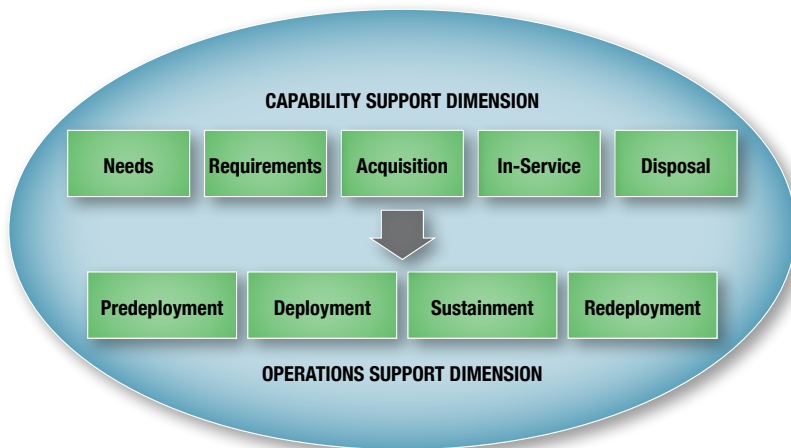


Figure 1–1: Support Dimensions

1.31 Figure 1–2 provides a summary of the agencies supporting the delivery of Air Force capabilities across both the Capability Support and Operations Support dimensions, and across the major categories of logistics services and commodities.

	Capability Support		Operations Support		
Acquisition Projects	DMO (ASD, EOD, ESD, LSD, MSD, LOGIS, GMP)	Air Force	DMO (ASD, EOD, ESD, LSD, LOGIS)		Air Force
Capability In Service Support	DMO (ASD, EOD, ESD, LSD, MSD, *), JHC, JLC	Air Force	DMO (ASD, EOD, ESD, LSD, MSD, *), JHC, JLC, Host Nation or Other Forces		Air Force
Distribution Systems	JLC	Air Force	JLC	JOC	Air Force
Air Base Logistics Services	DSG	Air Force	DSG	Host Nation or Other Forces	Air Force

(* – Contractor run supply chains)

Figure 1–2: Logistics Support to Air Force

1.32 Air Force Capability View. Air Force projects and sustains air power through the combat units within its Force Element Groups (FEGs); Air Combat Group (ACG), Air Lift Group (ALG) and Surveillance and Response Group (SRG) provide the combat flying capabilities. SRG also provides a range of ground-based surveillance and control capabilities that support air operations. Combat Support Group (CSG) is responsible for the air base capability from which other FEGs conduct operations. Aerospace Operational Support Group (AOSG) provides specialist intelligence, aviation development and support services to other FEGs and Services. Air Force Training Group (AFTG) provides the *ab initio*, initial employment training and postgraduate professional education and training for the Air Force workforce as well as a range of training support services.

1.33 The Air Force capability view of logistics reflects that air power is fundamentally dependent on the availability and capability of air and major systems supporting air operations, and air bases and their support elements. The Air Force capability view of logistics consists of the following two dimensions:

- **Capability Logistics.** Capability logistics is focused on supporting air and major systems and has a strong technical orientation. Consistent with Air Force terminology, the term includes ground-based aviation combat systems and space-based combat systems such as surveillance and battlespace management systems.
- **Air Base Logistics.** Air base logistics is focused on the delivery of logistics services at air bases that enable the conduct of air operations. It is a subset of the Air Force capability grouping of Combat Support, and is one of the responsibilities of CSG. At Defence bases within Australia, air base logistics requirements will normally be coordinated by the Air Base Executive Officer (ABXO), with service delivery by a combination of organic resources, SPGs and contractors. Air base logistics at other than Defence bases within Australia may be delivered by a combination of specialist contracts (arranged by Air Force or an SPG), or national support arrangements and international logistics support arrangements arranged by JLC. Where Air Force units or elements are deployed on operations outside Australia, air base logistics requirements will normally be coordinated through the deployed Expeditionary Combat Support Squadron (ECSS) or Combat Support Element (CSE) as appropriate, with service delivery by a combination of organic, multinational, host nation, SPGs and contractors. In all cases, Combat Support Requests (CSRs) initiated by Air Force units or other aviation elements will articulate what is required to support a planned activity or task and allow supporting agencies to identify how requirements can or cannot be met from available resources.

1.34 Distinctions between Capability Support and air base logistics include an emphasis on different commodities and services and significant differences in support arrangements and supply chains. For example, capability logistics has an emphasis upon repairable commodities and technical items, and their associated maintenance and engineering services. The emphasis of air base logistics is upon a much wider range of commodities and the provision of services that enable operations to be conducted from air bases, including combat supplies, ground support equipment, catering (including in-flight catering), messing and transportation services. Figure 1–3 combines the support view and the Air Force capability view.

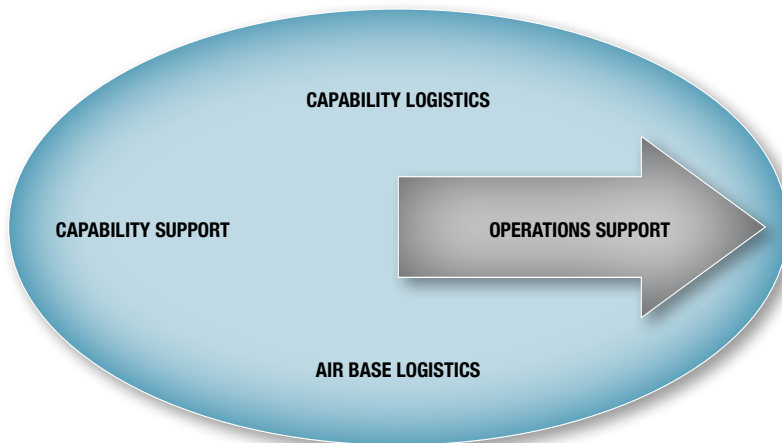


Figure 1–3: Support and Capability Views Combined

1.35 **Functional View.** Air Force logistics is generally referred to as having three main subsets, or functions: engineering (including technical regulation), maintenance and supply support.

- **Engineering Support** – the purpose of which is to manage the design of aviation materiel (including aircraft, aeronautical product and technical equipment that directly supports aviation) and some land materiel (such as general purpose trucks), to keep it fit for service. Most engineering support to Air Force is delivered by the DMO, and is regulated by Director General Technical Airworthiness (DGTA) for aircraft and aviation materiel, and Director Technical Regulation - Army (DTR-A) for land materiel.
- **Maintenance Support** – the purpose of which is to keep equipment fit to perform its designated function, to prolong equipment life and to minimise capability costs.
- **Supply Support** – the purpose of which is to provide the right support at the right place, at the right time, and sustaining that support over time. A major component of supply support is supply chain management; supply support comprises the functions of supply, transport, movement, catering and messing. The supply function includes requirements determination, procurement, inventory management and control, warehousing and distribution, and disposal.

1.36 There are some differences between the Air Force functional view of logistics and that presented in joint doctrine. This is due to the Air Force view being built around the Air Force structure whilst joint doctrine is primarily based upon an Army structure, although this is gradually changing with each review of joint doctrine. An example of this is the inclusion of Personnel Support Services as a joint logistics function; however, this is managed by Director General Personnel - Air Force (DGPERS-AF) outside of the logistics area for Air Force. The nine logistics functions included in joint doctrine, together with a comparison with the Air Force functional view, are listed below.

- **Supply.** Supply is identified as a logistics function in both joint and Air Force doctrine.
- **Transport and Movements.** Air Force includes this function as a subset of supply as it is the means by which supply is effected.
- **Materiel Engineering and Maintenance.** Because of its technical focus on aircraft and other systems, Air Force distinguishes engineering and maintenance as separate, stand-alone, logistics functions. Both equipment maintenance and engineering directly contribute to effective capability delivery and achievement of essential airworthiness standards.
- **Infrastructure Maintenance and Engineering.** Air Force does not consider infrastructure management as a subset of logistics, rather treating it as a higher level function that stands alongside logistics.
- **Personnel Support Services.** Air Force does not consider this as a function of logistics, rather treating it as a higher level function that stands alongside logistics. Joint doctrine includes catering and messing under this function; however, Air Force considers catering (including in-flight catering) and messing to be a sub-function of supply.
- **Integration and Configuration Management.** This includes the management of engineering logistics and related activities during acquisition and sustainment of Defence capabilities.
- **Managing and Understanding the Logistic System.** Understanding, managing and evaluating logistics as a system, incorporating the effectiveness of governance, organisational structures, reporting lines, doctrine, policy, information systems and proficiency of logisticians.
- **Planning.** Planning in relation to capability acquisition and sustainment, and planning in support of operations.

- **Developing Policy and Processes.** Development of logistics policy and processes incorporating development of the logistics system and doctrine.



A warehouse full of history – pallets of F-111 aircraft paperwork ready for archiving fill a warehouse at RAAF Base Amberley.

1.37 Support Categories View. In the ADO, logistics organisations exist to support the raising, training and sustainment of combat capabilities. These capabilities are adapted to support operations. There are also logistics capabilities that exist purely to support combat and other capabilities during operations, including ECSSs and CSEs. Joint doctrine identifies that support capabilities can be arranged within the following categories:

- **Integral Support.** These are the logistics capabilities necessary to provide unit viability, regardless of the assigned mission. These are squadron or unit level maintenance, supply or air base support organisations including personnel and equipment that a task element requires to enable air operations.
- **Close Support.** These are ‘tailored’ logistics capabilities to provide responsiveness and balance to link manoeuvre force elements to either general or national support and to extend or supplement their viability. From an Air Force capability logistics view, a range of logistics capabilities will be retained at wing level to provide support across subordinate squadrons, units or elements, to retain the required technical mastery, and to provide a workforce able to sustain combat operations. From an air base logistics perspective, close support is coordinated or provided by CSG.
- **General Support.** These are the capabilities, resources and assets that require deployable infrastructure in order to provide a critical mass of support and services to the entire force. General support includes the logistics support provided by Army Force Support Battalions (FSBs), Army Combat Service Support Battalions (CSSBs) and Navy Logistics Support Elements (LSEs). Whilst Air Force has no designated logistics general support organisations, in some cases elements of an ECSS could provide limited general support to other ADF elements in theatre, such as catering and accommodation for units located on or near an air base.
- **Mounting Support.** Where the deployment and sustainment of a force requires a logistics bridge, mounting support provides for the ‘ramp’ to control access and manage the links into the national and international support base. Air bases in Australia are often used as mounting support bases (or part thereof), with mounting base support operations normally being conducted as joint activities. Air Force specialist capabilities, such as air terminal operations, provide important support to mounting bases. Mounting bases

may be 'agreed points' in a joint supply chain established for an operation, thereby providing a key linkage between deployed logistics capabilities and the national or international support base. As such they could be designated as an 'agreed point' for equipment and assets subject to global commercial supply chain arrangements.

- **National Support.** This is the support provided from the national or international support base. This support is much more permanent in nature, but can still be flexible if required. Within the Australian context, this support will normally be provided under contracted or strategic arrangements, albeit the support may entail a limited fly-away service into an AO, with reachback into the national or international support base. This could include engineering and some specialised maintenance support.



An Air Force technician marshals in a Royal Thai Air Force (RTAF) Airbus 310 jet at RAAF Base Darwin, carrying RTAF members and cargo, in preparation for Exercise PITCH BLACK 2008.

1.38 Fundamental Inputs to Capability View. The Fundamental Inputs to Capability (FIC) (Figure 1–4 refers) construct is the standard ADF means for consideration of what is required to generate capability. The FIC are to be used by all ADO agencies and are designed to ensure that all agencies manage and report capability using a common set of management areas. The eight FIC are Organisation, Collective Training, Personnel, Major Systems, Supplies, Facilities, Support, and Command and Management. While a majority of the eight FIC, as they apply to logistics support for Air Force, are discussed generally throughout *The Air Force Approach to Logistics*, two are particularly important and warrant more detailed discussion. These are ‘Personnel’ (reflecting significant changes in logistics workforce) and information systems as a component of the ‘Support’ FIC (reflecting the significant changes being introduced under projects such as Joint Project 2077 (JP2077)).

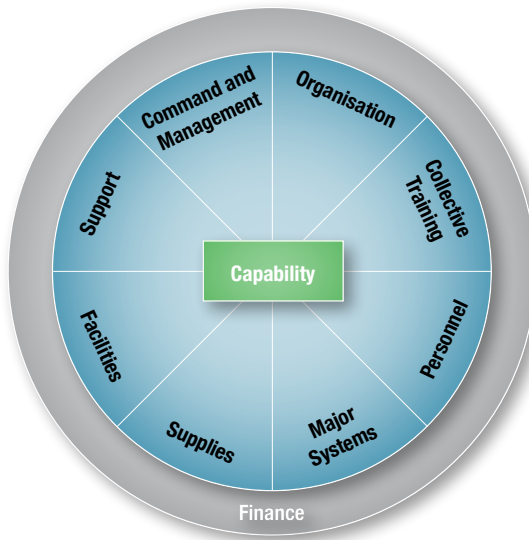


Figure 1–4: Fundamental Inputs to Capability

CHAPTER 2

THE NATURE OF AIR FORCE LOGISTICS

2.1 The characteristics of air power are outlined in AAP 1000–D—*The Air Power Manual* (Figure 2–1 refers). These characteristics shape the manner in which logistics support for air operations is provided. This section outlines the Air Force Operations Support Model, which is the organisational basis upon which logistics for Air Force capabilities is delivered. It also outlines those distinguishing characteristics influencing the logistics arrangements supporting Air Force capabilities.

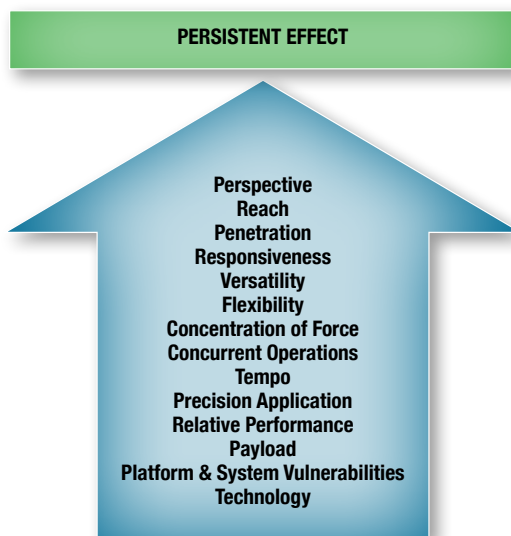


Figure 2–1: Characteristics of Air Power

The Characteristics of Air Power and Logistics

2.2 The following points demonstrate how the characteristics of air power can be used in terms of logistics capability:

- **Perspective and Technology.** The perspective of air power describes how a force physically views the battlespace. Air Force capability logistics has a strong technical orientation and provides operational perspective by supporting major hi-tech aviation combat systems (eg. Airborne Early Warning and Control (AEW&C) surveillance and battlespace management).¹
- **Speed.** Aircraft can operate at greater speed than land or seaborne platforms. Airlift capability can move personnel, stores and equipment quickly and within accurate time frames.
- **Reach.** Reach is the term used to describe the ability to project military power over great distances unconstrained by barriers anywhere across the globe. Air Force logistics provides reach through ECSSs, sustainment of AEW&C and air to air refuelling (AAR) platform operations, utilisation of strategic airlift capability, and facilitation of 'reachback' sourcing of support from outside the AO.
- **Penetration.** The combination of perspective, speed and reach enable air power to penetrate the adversary's battlespace in ways that land and maritime operations can not. Airborne supply operations can deliver vital stores and equipment to forces operating well inside an adversary's territory without any support requirements on the ground.

¹ Royal Australian Air Force, 2007, Australian Air Publication 1000-D—*The Air Power Manual*, 'Characteristics of Air Power', Air Power Development Centre, Canberra, p. 79.



Members of the Mobile Air Load Team (MALT) of No 1 Airfield Operations Support Squadron (1AOSS), work to unload the weekly sustainment flight C-130 at the air base in Multan, Pakistan.

- **Responsiveness.** Responsiveness involves the application of air power quickly, adeptly and decisively. Tailored packages of aircraft, personnel and support systems can be deployed into a theatre very quickly and be ready to undertake air operations almost immediately. Whether operating as a Forward Operating Base (FOB), Forward Mounting Base (FMB) or a Main Operating Base (MOB), an Air Force base can also respond as a Point of Embarkation (POE) or Point of Disembarkation (POD)² in support of air and land-based elements. Air Force logistics also responds

² Headquarters Australian Defence Force, 2005, Australian Defence Doctrine Publication 3.0–15—*Airbase Operations (Provisional)*, pp. 1–8.

rapidly to humanitarian disaster through the employment of strategic airlift and specialised air terminal support capability.

- **Versatility.** Versatility is the ability to create and effectively apply air power effects across the full range of military and military supported operations. Air Force supports this effort through the employment of robust logistics support with a focus on simplicity to maximise a seamless transition from peacetime to contingency operations across the full spectrum of conflict.
- **Flexibility.** The flexibility of air power is its inherent ability to divert quickly and effectively from one target or role to another in response to changing priorities and aims, providing the commander with the ability to conduct concurrent operations. Operating as a FOB, FMB, MOB, POE or POD³ in support of air and land-based elements, an Air Force base is a strategic asset which has the inherent logistical flexibility to support multiple operations concurrently.
- **Dependency and Vulnerability.** Air power is inherently dependent on air bases and a supporting system. Air bases provide the platform for the training of, and the operational springboard from which air operations can be launched, sustained, managed and recovered. An air base is an operational entity or system that comprises mission-critical enablers such as people, maintenance, barracks, fuel, weapons, infrastructure, and Command and Control (C2) that will allow air operations to be conducted. Aircraft and air bases are vulnerable and valuable targets. Air Force logistics supports air power through the ECSSs capability to establish and sustain deployed air base support to operations and protection of air assets and infrastructure.

³ *ibid.*, p. 24, para 1–8.

- **Impermanence.** Impermanence is the ability of air power to create enduring effect without an unnecessarily protracted physical presence. Air Force's expeditionary combat support in a foreign location can provide sustained support to air operations and be drawn down or removed rapidly if required.
- **Payload.** In a peacetime contingency, an expeditionary air logistics element facilitating the correct payload delivery quickly and precisely can be of more value in stabilising a crisis than a larger payload delivered after the crisis has matured. Conversely in conflict, a deployed air logistics force can provide the capability for air assets to return to a base, re-arm, refuel and return to re-engage targets, consistently and with lasting effect.

Air Force Operations Support Model

2.3 Logistics support for Air Force operations is based on supporting expeditionary combat elements in forward locations, and aims to provide that support required by AAP 1000-F—*The Future Air and Space Operating Concept*, as modified by the 2009 Defence White Paper. It recognises that operations will probably always be joint and/or multinational, and that initial operations are likely to be under austere and potentially hostile conditions. Further, the logistics footprint will be constrained by many factors including limited access to strategic transport assets. It also recognises the dependence of Air Force combat elements on the support provided by agencies and contractors external to Air Force. It is important to note that the operational support model requires support for home base locations concurrent with supporting forward locations.

2.4 The Air Force is a relatively small, highly capable and technical force that emphasises extracting maximum effect from its force structure. This force structure will probably always be austere, so effective doctrine and training, technical mastery and innovation

are key factors in delivering air power capability. Comparisons with other modern Air Forces (such as the Royal Air Force (RAF) and the United States Air Force (USAF)) are of limited utility as they operate on different scales with different resource levels where their doctrine and strategy reflect this.

2.5 Australia's geographic situation also means that potential avenues for adversary threats are more likely to eventuate from or through the distant northern parts of the continent and their maritime surrounds. Therefore, Australia's military forces must be able to deploy and conduct operations in these areas to counter such threats. The ways in which the Air Force contributes to national security are directly influenced by the enduring character of our geo-strategic environment.

2.6 Logistics support for Air Force operations is based on a model comprising five elements:

- Operational units each with an organic logistics capability to provide operational flexibility that is designed to meet the unit role and function.
- Tailorable and scalable ECSSs or CSEs providing air base operations, logistics, health and personnel support for deployed Air Force combat elements and other deployed units located on the air base.
- Uniformed maintenance and supply support elements within wings and FEG headquarters providing close support to operational units.
- A responsive support base including industry to sustain Air Force operations. This may include services provided by the DMO (through its SPOs), JLC (through its national storage and distribution or supply arrangements), the Defence Science and Technology Organisation (DSTO) and DSG (within Australia),

as well as contracted support (global commercial supply chains, foreign military supply contracts and standard commercial supply contracts). Contracted support could also include fly-away engineering and specialised maintenance services with reachback capability, as well as embedded military positions to facilitate technical mastery of uniformed personnel in engineering, maintenance or supply functions.

- Governance arrangements that ensure effective and efficient logistics performance.

2.7 Squadrons and units are the core tactical elements around which the Air Force operates. Each unit is organised to operate and maintain its equipment from forward locations, and employs appropriate operational and maintenance personnel for these purposes. In addition, combat units employ their own supply personnel whose task is to obtain the materiel support for their unit's operational and maintenance effort using Defence information systems and other arrangements established for individual capabilities. Combat units should either hold operating stocks of technical spares and consumables in their Fly-Away Kits (FAKs) or be capable of constituting a FAK to meet operational demands as and where necessary, sufficient to sustain operations at a nominated rate of effort for a designated period without resupply (that is, for the Operational Viability Period (OVP)).

2.8 Deployed Air Force units draw their materiel support, other than for technical equipment, and other air base logistics requirements, from a collocated ECSS or CSE, or from joint, multinational or host nation support arrangements. Resupply of deployed units (including the ECSS or CSE) will be through a supply chain established to support the operation. For operations, such supply chains will normally be established and managed as a joint responsibility by JLC and JOC.

2.9 Uniformed maintenance and supply elements exist within wings and/or FEGs to effect good governance outcomes and may be utilised to supplement the organic logistics support embedded within Air Force operational squadrons and units. The use of these elements depends on the tempo, duration and nature of support arrangements available in an AO. They provide the flexibility to modify logistics arrangements to meet the type of operation as well as to react to more immediate operational support needs. Additional uniformed logistics personnel are located in other Air Force units and with other elements of the ADO (including SPGs and higher headquarters). These personnel may be called upon to supplement squadron/unit and FEG capability depending on the specific requirements of each operation, and provide the technical mastery to support operations. They provide Air Force with necessary rotation forces for extended operations and are an essential element in the long-term wellbeing of the force.

2.10 Air Force is supported by other ADOs, particularly other Services and by SPGs. It is supported by the Australian industrial base as well as by overseas commercial designers and manufacturers under arrangements managed by the DMO. It can also receive support from the military forces of other nations, and through host nation support arrangements access specified general support to the deployed Air Force elements.

2.11 Linking the preceding logistics organisations are the governance arrangements, systems and processes that contribute to assuring effective and efficient logistics support to meet Air Force operational requirements. These arrangements are essential in ensuring that the complex support arrangements (Figure 2–2 refers) meet Air Force requirements.

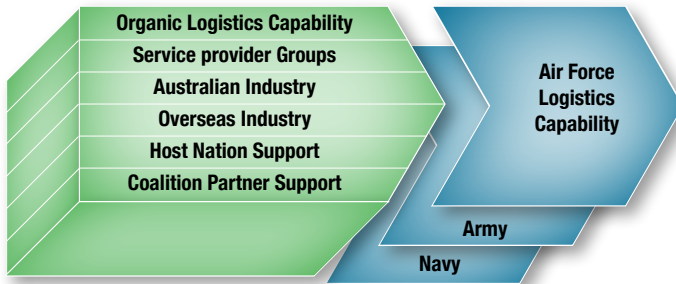


Figure 2–2: Overview of ADF Support Capabilities

Logistic Constraints on Operations – The German Luftwaffe in North Africa 1941

Some 520 Luftwaffe aircraft were sent to North Africa in January 1941 to support Erwin Rommel's Afrikakorps, but even before offensive operations started aircraft availability was down to only 66 per cent. Sand adversely affected all moving parts, reliability was significantly reduced and maintenance requirements sky-rocketed when compared with the Luftwaffe's experiences in Europe. In accordance with German doctrine, Rommel planned a manoeuvre campaign, a blitzkrieg, across the Libyan desert to decisively expel the British from North Africa. In practice, however, Rommel's desert blitzkriegs were limited to only a few days each before they degenerated into static battles over defensive positions. Despite their professionalism and reputation for efficiency, the German logistics system was incapable of sustaining such offensives for their expeditionary forces in North Africa. The major constraint on the Afrikakorps was supply. A mere 100 transports were available for the constant materiel requirements of the entire army. Most of the supplies had to be flown in – including aviation fuel and drinking water – since the Germans did not control the sea lanes across the Mediterranean. This led directly to fuel shortages for

the Luftwaffe aircraft supporting the Afrikakorps, and in early 1941 the Luftwaffe in North Africa was restricted to only 100 sorties per day.

Rommel's operations in North Africa between 1941 and 1943 remain famous because of his resourcefulness and leadership at the operational and tactical levels. But it was all for naught. At the strategic level the German effort in North Africa was doomed to fail due to the massive logistic constraints that prevented the Afrikakorps from achieving anything like a decisive victory.



Luftwaffe Ju-52 transport aircraft resupplying an airfield in North Africa 1941

Ref: Pavelec, S. Mike, 2010, *The Luftwaffe, 1933–45*, Amber Books, London.

Characteristics of Air Force Logistics

2.12 An understanding of the distinguishing characteristics of Air Force logistics is essential to planning and executing logistics support by JOC and Joint Task Forces (and assigned elements), and in making strategic decisions impacting on Air Force logistics force structure and preparedness. The following paragraphs describe some of the distinguishing features of Air Force operations and the logistics support for those operations.

2.13 **Air Power Capabilities and Associated Support Systems.** Air power capabilities comprise complex items of equipment involving a large number of systems that employ modern technology to achieve combat advantage. This highly technical and sophisticated environment comes at a cost. These platforms and supporting systems are very expensive to acquire, maintain and operate, and they require expensive infrastructure. Increasingly, the acquisition of air power capabilities involves international partnerships of operating nations that allow sharing of research, development and upgrade costs. Invariably, these acquisition arrangements involve in-service support that relies on the benefits of global commercial supply chains where such arrangements offer value for money. Proposals to adopt global commercial supply chains need to be subject to a Business Case Analysis and agreed to by the CM.

2.14 Air Force capabilities are generally retained in service for many years, with support costs and logistics complexity increasing as platforms age. Supportability is a major factor in deciding upon midlife platform upgrades, as is the cost of replacement and programming such replacement in the Defence Capability Plan (DCP).

2.15 The foregoing comments and considerations also apply to ground-based aviation combat systems such as wide area surveillance systems, tactical air defence radar systems, training and simulation

systems, to non-platform materiel such as Ground Support Equipment (GSE) and test equipment, and to other complex items such as Precision Guided Munitions (PGMs).

2.16 Air Operations. One of the great advantages of air power is the flexibility it provides through its ability to be 'packaged' in various ways. Logistics arrangements must be able to support deployments ranging from single aircraft to multi task group level, and potentially concurrent deployments whilst supporting operations and training from home air bases. Operational concepts will provide guidance as to the nature of such operations for each Air Force capability. For example, fighter aircraft would normally deploy in flights or squadrons, while ISR and air mobility aircraft frequently deploy individually or as small detachments.

2.17 Support arrangements will vary from operation to operation, so logistics capability must possess the ability to design, decouple and reconstitute supply chains. In most operations, logistics support for Air Force will be provided as part of a wider joint or multinational supply chain. Air Force is likely to always contribute air transport and air terminal capabilities as part of joint movements and distribution arrangements.

2.18 Military aircraft require shared operational functionality to maximise military effect. An example is combat aircraft endurance being extended by air to air refuelling. Another example is the effect gained from being networked with other military capabilities and the battle management systems directing the application of combat power to achieve desired tactical effects. This all affects configuration management, technical records, and training for aircraft and their associated systems.

2.19 A key advantage of aircraft is that they can be rapidly reconfigured on the ground to undertake alternative roles. However,

this versatility often comes at a cost in terms of logistics support to provide and maintain the alternative mission equipment, as well as the cost of deployment of this equipment for operations.



1AOSS MALT IOC watches as the sustainment flight C-130 arrives at the air base in Multan, Pakistan.

2.20 An important consideration for Air Force operations is its time critical nature. Aircraft and crews have limited mission endurance, and targets are often transitory and they require responsiveness and concentration of force. This time criticality is reflected in an Air Force emphasis for the on-line and mission readiness of its capabilities, and the priority assigned to all the logistics activities needed to ensure that this readiness is achieved.

2.21 Air Force operations will normally be conducted as part of a joint or multinational force. Logistics support for such operations must be integrated or at least coordinated across all agencies providing support, including organic logistics capabilities, SPGs, host nation or

multinational support provided under logistics support arrangements, civilian sources of support and, of course, industry.

2.22 As defined in AAP 1000–F—*The Future Air and Space Operating Concept*, the use of space and near-space platforms will support the concept of ‘centralised control and decentralised execution’ through ‘an increased ability to remain in contact with, and control all air elements in the battlespace through the network’. As the importance of space operations and ADF space capability further develops, the nature of logistics support of these capabilities may change. Air Force senior leadership will need to focus on changes in future logistics support concepts and arrangements as the capability requirements develop.

2.23 **Technical Airworthiness.** Air operations are temporal and unforgiving of failure. System, component, or operator failures can result in the total loss of platforms and crews, and a disproportionate reduction in the Air Force’s operational capability. When considered with the technical complexity of air power platforms, appropriate regulation of engineering, maintenance and supply activities associated with technical equipment is essential. Regulation is only as good as the compliance assurance program that monitors compliance within certified organisations. Ultimately, safety is dependent on the right culture within operational, technical and support organisations.

2.24 The *Chicago Convention 1944* requires the state to be responsible for the airworthiness management and self-regulation of state aircraft.⁴

⁴ The *Convention on International Civil Aviation*, also known as the *Chicago Convention*, established the International Civil Aviation Organization (ICAO), a specialised agency of the United Nations charged with coordinating and regulating international air travel. The Convention establishes rules of airspace, aircraft registration and safety, and details the rights of the signatories in relation to air travel.

As the DAA, CAF is responsible for defining the airworthiness requirements applicable to all ADF aircraft. Airworthiness is a concept; the application of which defines the condition of an aircraft and supplies the basis for judgment of the suitability for flight of that aircraft, in that it has been designed, constructed, maintained and is expected to be operated to approved standards and limitations, by competent and approved individuals, who are acting as members of an approved organisation and whose work is both certified as correct and accepted on behalf of the ADF.

RAAF Aviation Safety in the 1920s and 30s

The RAAF of the 1920s and 30s has been described as having a 'flying club' mentality. Although there developed a sound pool of experienced and competent airmen, supported by a sound, if immature, infrastructure, there remained a certain willingness amongst RAAF airmen to accept excessive risks. The RAAF's safety record was criticised by the media and some sections of the Parliament. Fatalities attracted most attention and shaped public perceptions of Air Force efficiency, but statistically they were misleading. Aviation safety in the RAAF, then as it is now, was a very complex situation. Over the 18-year period, 1921–37, there were 37 fatal Air Force crashes resulting in the deaths of 56 occupants and injury to another 16. But, the statistics show that the number of fatal accidents were only a tiny proportion of all accidents occurring in any one year. Each fatal accident was thoroughly investigated and the likely causes identified—pilot error, structural failures, bad weather, acts of indiscipline, and ground accidents—however, many believed that the safety problems were systemic. Newspapers suggested



**Marshal of the RAF
Sir Edward Ellington**

it was due to the failure of those in authority to strictly enforce regulations, and the RAAF's top leadership was targeted.

In June 1938, Marshal of the RAF Sir Edward Ellington arrived in Melbourne to inspect the RAAF. The Australian Government had invited the RAF to send a senior officer to report on the state of the Air Force, especially regarding flying training practices after a spate of fatal accidents in late 1937. The Air Board had not been consulted about the decision to bring Ellington out to Australia. When Ellington's report was made public on 31 August, the Air Board countered with a report of its own disputing his findings. The Air Board produced statistics that demonstrated that the levels of safety achieved by the RAAF were on par with those of the RAF, but its response did not provide the whole truth. For example, conversion training for RAAF pilots on the Hawker Demons was only 35 minutes, after which pilots 'just got in and flew off'. The 'can do attitude' had to be tempered by professional judgement and evaluation of the associated risks. The Ellington report provided a vehicle for changing the RAAF's high command, which the Government implemented in January 1939.

Ref: Coulthard-Clark, C.D., 1991, *The Third Brother: The Royal Australian Air Force 1921–39*, Allen & Unwin, North Sydney, pp. 315–350.

2.25 Logistics support arrangements with SPGs and external agencies must be consistent with the required capability and ensure compliance with airworthiness requirements. In-service airworthiness is managed within the context of the operational and technical airworthiness frameworks. Those organisations responsible for operational and technical airworthiness must interact to ensure an appropriate balance between capability and safety. This includes both uniformed and contractor organisations.



Flight line maintenance crew of No 37 Squadron performing routine maintenance on a C-130J Hercules aircraft at RAAF Richmond, 2007.

Centrality of Air Bases

2.26 Fixed-wing aircraft depend on air bases and the support they provide to conduct and sustain air operations. Air bases are the mounting location for both operations and the training necessary to maintain Air Force capabilities. Air bases provide the necessary infrastructure and services to flying squadrons, other Air Force units and other ADF elements. Within Australia, the ABXO at each air base is responsible for coordinating air base capabilities on behalf of CAF; noting that many of the services underpinning these capabilities are provided by SPGs. On operations outside Australia or domestic operations away from fixed air bases, the coordination of air base capabilities and requirements for deployed ADF elements is normally undertaken by the supporting ECSS or CSE. The dependence of air power upon air base support has significant implications for logistics. Occasionally, individual aircraft will operate from or transit non-ADF airfields. In these instances services such as fuel and in-flight catering support will be obtained using contract arrangements established by Air Force or SPGs.

- Because of their sizeable area, security of air bases is difficult and demanding of both security technology and manpower. Their high value makes them a focus of enemy intelligence and a focal point for attack, either directly or through interdiction of the supply chain or supporting logistics information systems.
- A major challenge for the logistics system is the need to support deployed combat operations at FOBs while continuing to support operations and training activities at home bases. Operational tempo, and hence support requirements, are likely to be high at both locations.
- Air bases may also act as a supply node or point in the ADF physical distribution system, noting that generally supply nodes are likely to be outside an air base perimeter at other locations

in Australia. Air bases can be used to pre-position equipment before and during deployments, and can act as an Air Point of Disembarkation (APOD) in the AO.

RAAF Base Butterworth

Formerly a RAF airfield, the base was handed over to the RAAF in 1955 on free loan from the British Government, which then administered Malaya as a colonial possession. During the Malayan Emergency of 1948–60, the base went onto an operational footing and hosted a variety of RAF units launching attacks against communist terrorists in their jungle camps as part of Operation FIREDOG.

In the mid-1950s Britain, Australia and New Zealand agreed to set up a 'Commonwealth Strategic Reserve' on the Malayan peninsula with the primary aim of countering a growing communist threat across South-East Asia.

The importance of Butterworth emerged in the 1960s. It provided aircraft and maintenance personnel in support of the deployment of No 79 Squadron to Ubon in Thailand, along with medical and transport support facilities during the Vietnam War (in which No 2 Squadron was also committed from 1967). The base became especially crucial between 1963 and 1966, during the period of 'Confrontation' with Indonesia over the creation of Malaysia. Not only did it give both the RAAF and RAF the capacity to conduct air defence operations, it would



Mirages overfly service housing near Butterworth

have been essential in the mounting of offensive operations against Indonesia had that become necessary.

On 31 March 1979 the base was transferred to the Royal Malaysian Air Force, however it remains an important forward operating base for RAAF deployments to the region under the Five Power Defence Arrangements (FPDA).

Ref: 'Butterworth: The RAAF's Only Overseas Base', Pathfinder: Air Power Development Centre Bulletin, Issue 35, November 2005.

Technical Equipment Management

2.27 Air power is realised using aircraft and other major systems supporting air operations. Comparatively large numbers of personnel and other resources are dedicated to keeping a relatively small number of air power capabilities and other major systems operational. Consequently, logistics effort is strongly influenced by the management of technical equipment.

- Current air power related capabilities have limited commonality with respect to spares and, in general, logistics arrangements are organised on a capability basis. This impacts on the level of resources required for logistics.
- The high cost of major components and subassemblies combine to make the management of Repairable Items (RIs) a critical component of effective logistics support for air power operations. Logistics economy is achieved by minimising the number of RIs procured, and maximising the velocity and efficiency of the RI repair pipeline. Repair level analyses conducted by the DMO to determine the number of RIs required and the optimum

maintenance arrangements are essential in optimising the repair pipeline.

- It is increasingly important for aircraft availability that unserviceable RIs enter the repair pipeline with minimal delay. The management of repair pipelines includes the rapid evacuation of unserviceable items from the point of failure to a repair venue (reverse logistics). This is particularly the case with the advent of global commercial supply chains, the increased reliance on contracted maintenance and the necessary imposts of joint supply chains for operations, such as controlling distribution through 'agreed points.' The prompt return of unserviceable RIs is a critical Air Force requirement that has implications for joint agencies responsible for establishing and maintaining distribution systems for operations.



A RAAF Supplier working in the No 381 Expeditionary Combat Support Squadron warehouse.

2.28 The logistics arrangements supporting both air and ground systems through MAAs, and then through MSAs and CSAs must be effective, responsive, and accord with the approved planned operating requirements of each capability. This means that Air Force must understand the capability development processes, CAFCDs and Operation Orders, and ensure that Air Force operating requirements are rigorously applied at all stages. Air Force must also understand the MSA and CSA development and product schedule review processes, ensuring that Air Force operating requirements are appropriately supported.

2.29 It is equally imperative that the management framework underpinning the in-service logistics support of each Air Force capability meets the needs of the Air Force Capability Manager. While there are many causes of failure (eg. cost and workforce issues), failure in this area can prejudice good technical equipment management and, indeed, the effectiveness of the actual capability itself. In particular, MSAs and the associated management arrangements for non-platform materiel, where a number of CMs are coordinating their requirements with the DMO, must clearly reflect Air Force requirements and be allocated agreed resources at all times.

Aviation Industry Support

2.30 The Australian Government promotes Australian industry in supporting ADF capabilities through a program called the Australian Industry Capability (AIC) Program. The program provides industry incentives during both project and in-service phases of the capability life cycle. From a strategic perspective, optimising Australian industry capability potentially shortens supply chains and provides some insurance against interruption to those supply chains. That said, features of the Australian aviation industry include relatively low volumes, limited production capability and high qualification and set-



An Aircraft Life Support Fitter with No 77 Squadron, makes repairs to the main earpiece of a pilot's helmet during Exercise THAI BOOMERANG 2011.

up costs. In many cases, therefore, it is uneconomical to develop and retain indigenous capability to support systems and components.⁵ These features translate into the following:

- High cost for aviation components, as well as long lead times for supply of spares.
- Capability Support for Australian military air power capability is heavily dependent on international support.
- Decisions on sources of overseas support need to consider Australia's strategic relationship with parent countries, as support risk increases as we move outside core alliance partnerships. Such decisions also need to consider the risks associated with increased dependence on overseas sources of support, including the impact upon Australia's ability to act independently.
- Support activities need to be cognisant of the complexity of the supply chain and the interrelationships of many suppliers, vendors, distributors and the associated contractual arrangements. In particular, the implications to operational effectiveness of the advent of global commercial supply chains with advanced capabilities need to be understood in establishing such arrangements.

⁵ *The Australian Defence Aerospace Sector Strategic Plan* (2003) identified the limitations of Australia's aviation sector, particularly given the volume and variation in the ADF's requirements. The 2009 Defence White Paper, *Defending Australia in the Asia Pacific Century: Force 2030*, reaffirms these limitations within a context of facilitating industry support where feasible.

PRINCIPLES OF LOGISTICS

2.31 The nature and characteristics of logistics leads to a number of enduring principles that should be used to guide logistics activities. For the ADF, these logistics principles are contained in the keystone doctrine publication ADDP 4.0—*Defence Logistics*. The principles, together with any relevant Air Force unique interpretations, are discussed below.

2.32 These principles must be applied by the logistics practitioner in interpreting the Air Force Operations Support Model, in guiding the evolution of both the Model and this logistics support concept, and in making assessments and decisions as to how logistics support will be provided to Air Force capabilities. This latter point is particularly important for SPGs and supporting industry partners and contractors.

Responsiveness

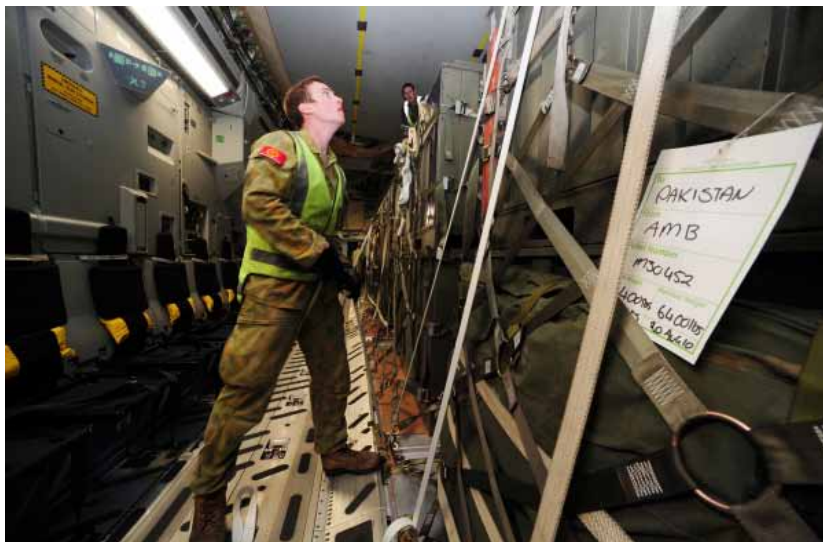
2.33 Responsiveness is the ability of the logistics system to provide the right support, at the right time and place in the right quantities, and in the right condition to meet the commander's needs. Air power can respond quickly to sudden changes in prevailing strategic or operational circumstances.⁶ Since air power is expected to be a highly responsive element of the force, able to deploy at short notice and over long distance, the logistics support of the force must also be highly responsive.

⁶ AAP 1000-D—*The Air Power Manual*, 'Characteristics of Air Power', p. 84.

Simplicity

2.34 Simplicity is avoiding unnecessary complexity in preparing, planning and conducting logistics operations. Logistics is a complex discipline, and it becomes much harder to conduct when impacted by the fog and friction of war.

- Any tendency towards unnecessary complexity in logistics planning, organisation, direction and control must be avoided.
- Air Force logistics capabilities must be structured for operations across the spectrum of conflict, while being delivered as efficiently as possible.
- C2 arrangements, supporting systems and processes should transition seamlessly from peacetime to contingency operations across the full spectrum of conflict.



Air load personnel tie down equipment inside a RAAF C-17 Globemaster deploying an ADF team in support of Operation PAKISTAN ASSIST II.

Flexibility

2.35 One of the characteristics of air power is its flexibility; offering operational commanders the ability to concurrently conduct a variety of operations. Flexibility is about adapting logistics support to changing conditions. Some capabilities are rapidly configurable to perform a variety of roles. Logistics arrangements and systems must be flexible enough to support changing missions, evolving concepts of operations, and the dynamic situations that characterise Air Force operations.

Economy

2.36 Economy is providing effective support using the fewest resources, and is a key principle underpinning the 2009 Defence White Paper and the associated SRP. A natural tension exists between effectiveness and efficiency. Judgments on what represents the best balance must ultimately be based on the impact on operational effectiveness, not economy or even the important notion of cost-effectiveness.

2.37 Over time, the application of techniques such as 'Lean'⁷ to routine logistics business should reduce the tension between effectiveness and efficiency by reducing unnecessary waste. Economy is achieved when the logistics system is as efficient as it can be in supporting the operational elements. The nature of conflict (uncertainty, friction and violence) and the requirement to support potentially concurrent operations at high tempo in hostile and geographically distant locations mean that certain

⁷ The Defence Budget Audit 2009 identified significant potential for deep reform of maintenance, inventory management and supply chain management activities undertaken by Defence. The Strategic Reform Program has directed a range of reviews by capability and across JLC supply activities to apply Lean techniques to the normal conduct of Defence business.

inefficiencies in the provision of logistics support must be tolerated in order to provide a level of redundancy and reserve capacity. The catastrophic consequences of failure in military logistics must also be considered (ie. failure of operation or mission, or loss of life).

Sustainability

2.38 Sustainability means providing logistics support for the duration of the operation, as well as assuring long-term viability of the capability. Operational sustainability requires that minimum essential materiel levels are provided over the duration of the operation. The challenge is to accurately estimate likely activity levels and usage rates, while maximising reachback for support outside the AO. Sustainability is influenced by the effectiveness of the movement of materiel into and out of the AO. It is increasingly important for aircraft availability that unserviceable RIs enter the repair pipeline with minimal delay, and serviceable RIs are returned to the pipeline in a similarly expedient manner.

2.39 If support planning is effective, then the in-theatre logistics footprint will be minimised, which reduces the vulnerability to attack and potentially minimises the overall operational costs. Equally, it is imperative to ensure that the operational utilisation of a capability does not compromise the long-term cost-effective sustainment of the capability. Sustainment includes the appropriate and necessary engineering support to authorise the use of the materiel (including documentation and training) and maintenance support to facilitate its installation via maintenance or modification activity (including personnel of appropriate skill levels and task authorisation). Sustainment of the capability across the life cycle requires close management of in-service support, capability utilisation and long-term effective management of the workforce supporting the capability.



A supplier from Tanker Section RAAF Base Edinburgh checks fuel levels on a fuel tanker.

Survivability

2.40 Survivability is ensuring that the logistics infrastructure prevails in spite of degradation and damage. Logistics support units, installations, lines of communications, and transportation nodes are high-value targets that must be protected by both active and passive force protection measures. The dispersion of operating and reserve stocks, development of alternative sources of supply, and phasing of logistics support all contribute to survivability. In addition, a degree of decentralisation, redundancy and use of reachback techniques all contribute to survivability.

Foresight

2.41 Foresight is the anticipation of future logistics needs and is central to Air Force logistics. Training of personnel and acquisition of air power capabilities and many of their components have lead times measured in years. There is a limit to the effectiveness of rapid acquisition undertaken prior to and during an operation; including the obvious impact that legacy equipment will have on Air Force capabilities during and following an operation. This means that for most contingencies, Air Force commits to an operation with what it has. Accurate inventory forecasting and constant monitoring of mission system requirements (including failure rates, fatigue monitoring and supply and repair pipeline performance) is therefore critical to air operations and is a key Air Force requirement to ensure that potential risks imposed by a higher operational tempo are known and planning of mitigation strategies undertaken. Personnel and equipment modelling capabilities are essential to address the complexities of air power logistics support.

Balance

2.42 Balancing competing logistics requirements is a critical principle. Logistics principles seldom have equal influence; usually, only one or two dominate in a specific situation. At times, the principles may seem to make conflicting demands, depending on the situation. For example, a need for absolute responsiveness may require actions that are not economical. The principles of logistics are meant as a guide for planning and analysis, not as a checklist. Correctly identifying the principles that must take priority in a specific scenario is crucial to effective support, and influences the development of support plans at the operational level. In the Capability Support sense, an appropriate balance needs to be struck between the principles of responsiveness, survivability and flexibility and economy.

Humanitarian Assistance – Operation SUMATRA ASSIST: An Air Operations View

On Boxing Day 2004, an earthquake measuring approximately 9.2 on the Richter scale occurred in the Indian Ocean north of Simeulue Island, off the western coast of the Indonesian island of Sumatra. This caused a series of tsunamis that resulted in the death of some 230 000 people. The greatest loss of life and damage to infrastructure occurred in coastal areas around Banda Aceh, on the north-west tip of Sumatra.



In response to this crisis, the Australian Government instructed the Australian Defence Force to immediately provide humanitarian assistance to the affected area. Operation SUMATRA ASSIST was quickly launched. The ADF deployed the following force elements: Air Force—air lift, an Air Operations Centre (AOC), aero-medical evacuation and air load teams ...

Initially, four C-130 Hercules transports from 36 and 37 Squadrons were assigned to the operation ... The RAAF C-130s accounted for the majority of cargo and passenger transportation between Medan and Banda Aceh, and by the end of the operation had delivered a total of 1200 tonnes of stores.

... An ADF leased, civilian-crewed Dash 8 aircraft was based at Butterworth from early February 2005 and primarily used to move personnel between Butterworth, Medan and Banda Aceh. This proved to be a cost effective

measure that released the C-130 aircraft for use in relief operations. Such use of contracted aircraft, integrated at the operational level, was a new development for the ADF.

The Australian forces involved in Operation SUMATRA ASSIST operated as Joint Task Force (JTF) 629. The size, disposition and structure of the JTF remained in a continual state of change to meet the dynamic operational needs and the environmental challenges ...

The operational challenges encountered during this operation demanded innovative solutions ...

... The ADF and RAAF were major players in this relief effort, providing direct and indirect humanitarian assistance that undoubtedly saved many lives.



Banda Aceh Apron - AUS, UK and Contractor Airlift

Ref: 'Humanitarian Assistance – Operation *Sumatra Assist*: An Air Operations View', *Pathfinder: Air Power Development Centre Bulletin*, Issue 67, May 2007.

CHAPTER 3

LOGISTICS MANAGEMENT

3.1 Several important concepts provide an overarching framework for the management of Air Force logistics activities. This chapter of *The Air Force Approach to Logistics* will also address the issues of logistics governance and planning across both the Capability Support and Operations Support dimensions.

Capability Logistics Support Concepts

3.2 The majority of significant through life support decisions are made during the acquisition of new capabilities. During the acquisition process, a range of analyses are conducted that contribute to the development of an LSC for each air power capability. The development of an LSC must consider the Operational Concept Document (OCD) of the new capability, together with the guidance provided in this document.

3.3 Draft LSCs that outline the proposed support arrangements for each capability are prepared by CDG; however, LSCs can and often are written by the DMO Project Office. It is essential that Air Force review and contribute to the development of these documents, particularly in the definition of organic maintenance and supply support requirements and the logistics management and support arrangements being established to support its operational capabilities. This interest extends across all Air Force capabilities and not solely on an individual capability basis. CAF, as the Air Force Capability Manager, must approve the LSCs for all Air Force capabilities.

Capability System Management Plans

3.4 As part of the capability management process, Air Force uses Capability System Management Plans (CSMPs) to manage the development and support of capabilities. These CSMPs are supported by a number of subordinate plans that include logistics plans, covering operational logistics support and various integrated logistics support elements, and a workforce plan. The Integrated Logistics Support Plan (ILSP) developed by the DMO for each Air Force capability informs the relevant CSMP. The workforce plan defines current and future workforce requirements (both structure and skill sets) needed to support the capability.

EQUIPMENT ENTITLEMENTS MANAGEMENT

3.5 DMO support of equipment for the three Services is based on a system of entitlements. Air Force dispensed with entitlements-based equipment management in the early 1990s, although it continued to utilise complex techniques for requirements-based modelling such as OPUS 10 and the Advanced Inventory Management System (AIMS) for repairable items and associated spares. As a result of decisions taken since 2004, Air Force is progressively re-establishing entitlements for equipment for land-based materiel, based on the Defence approved entitlements policy, that will facilitate support provided to each Air Force capability under applicable MSAs. Equipment entitlements are an expression of the equipment required to support a capability at its specified level of operation. Just as a number of aircraft are specified for delivery to support the capability requirement, there is also a requirement to identify and articulate the required non-platform materiel, and establish an equipment entitlement to such, prior to introduction into service of the capability. This is done through the Air Force Materiel Entitlements System (AFMES).

3.6 AFMES must be an integral component of the Air Force Capability Management System (AFCMS) to ensure that entitlements are clearly linked to capability requirements and can be managed effectively in capability terms.



A RAAF member from No 381 Expeditionary Combat Support Squadron prepares for a day's refuelling during the East Coast Air Defence Exercise (ECADEX 09).

THROUGH LIFE SUPPORT

3.7 Through Life Support (TLS) is a whole-of-life management methodology that integrates all support and services for the Mission System and the Support System of a capability. TLS ensures timely and appropriate consideration of cost-effective supportability issues in the Defence Capability Systems Life Cycle, and facilitates a seamless transition of TLS related management activities from one phase of the materiel life cycle to the next. TLS embraces the disciplines of Systems Engineering, Integrated Logistics Support (ILS), Logistics Support Analysis (LSA), Life Cycle Cost Analysis, Configuration Management, Reliability Availability and Maintainability, and Materiel Standardisation. Application of TLS across a Defence materiel system's life cycle is designed to enable:

- significantly decreased materiel system support costs;
- accurate TLS requirements determinations realising cost-effective materiel systems selection, repair and replacement;
- improved reliability, availability and maintainability of materiel systems realising improved readiness and sustainability;
- reductions in total ownership cost; and
- improved interoperability with allied forces.

INTEGRATED LOGISTICS SUPPORT

3.8 Air Force uses and contributes to the DMO's integrated approach to the development of logistics support throughout the equipment life cycle. ILS management ensures that logistics activities are properly integrated to achieve effective and efficient life cycle logistics support

for weapons systems and support systems at optimum Life Cycle Cost (LCC). An ILSP is developed for each capability and support system as part of the acquisition process. The ILSP explains in greater detail how those key aspects of the LSC are to be delivered.

3.9 The principles and practices of ILS are to be applied to all logistics management activities through all phases of a capability life cycle to achieve preparedness requirements, unless such application is clearly not cost-effective.

LOGISTICS GOVERNANCE

3.10 The aim of Air Force logistics governance is to achieve the highest standard of management of all activities associated with technical and non-technical equipment in order to meet preparedness and operational requirements within the assigned resources, while ensuring the inherent integrity that enables the equipment to be operated safely for both the long and short term. Figure 3–1 is a graphical illustration of the Air Force Logistic Governance Model.¹ The two objectives of governance are performance and compliance. The logistics governance framework is the mechanism for ensuring those objectives are achieved.

3.11 **Performance.** First and foremost, Air Force logistics elements aim to deliver the required performance articulated in CAFCDs and Operation Orders, that is assessed on the ability to prepare for and conduct operations. To assure that the required performance is achieved, a system must be in place that clearly articulates the required outputs, evaluates performance and enables informed decisions to be made.

¹ CAF Directive 02/08, *Air Force Logistics Governance Policy*, 21 December 2007.

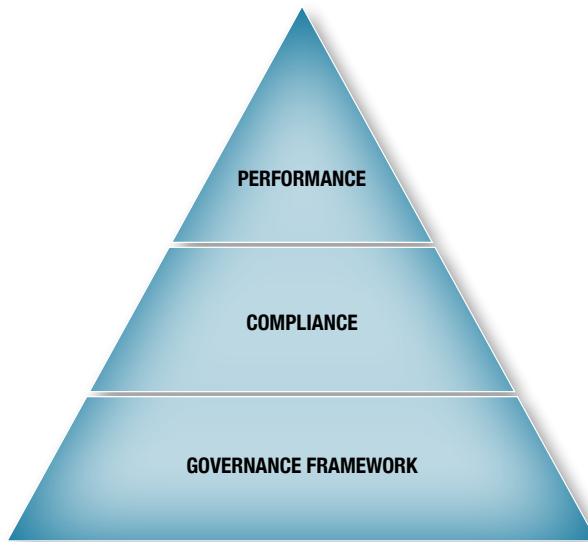


Figure 3–1: The Air Force Logistics Governance Model

3.12 **Compliance.** Achieving the Air Force’s required performance must be accomplished in a compliant manner; that is, not ‘at all costs.’ All logistic support activities must comply with extant Government, Defence and Air Force legislation, policy and direction. Areas that require compliance arrangements include financial, personnel, safety, supply and technical.

3.13 **Governance Framework.** While performance and compliance are the two key objectives of governance, there must be a robust governance framework that enables these objectives to be achieved. The main elements of the framework are leadership, ethics and culture, stakeholder relationships, risk management, information and decision support, articulation of accountability and function, and the regular review of governance arrangements.

3.14 Since 2004, Air Force has strengthened the governance processes for its logistics responsibilities. Much of this governance framework was unintentionally weakened under Defence reforms undertaken during the 1990s. A range of initiatives across Air Force's supply functions have been implemented under the Air Force Logistics Campaign. Likewise, a range of complementary initiatives across Air Force's maintenance activities are being progressed as part of implementing the Air Force Maintenance Management and Governance Review (AFMMGR).

3.15 The governance arrangements for supply activities are articulated in the *Electronic Supply Chain Manual* (ESCM) and the *RAAF Supply Chain Supplement* (RSCS). The RSCS also outlines the organisation, performance and compliance requirements and arrangements for all logistics entities at the strategic, operational and tactical levels within the Air Force Group.

3.16 The technical regulation arrangements for maintenance and engineering are contained in the *Technical Airworthiness Management Manual* (TAMM)² and the *Technical Regulation of ADF Materiel Manual - Land* (TRAMM-L). The *ADF Aviation Maintenance Management Manual*,³ the *Surveillance and Control Equipment Maintenance Management Manual*,⁴ and the TRAMM-L represent the ADF corporate best practice guide to compliance with technical regulation for aircraft and ground systems respectively.

² Royal Australian Air Force, Australian Air Publication 7001.053(AM1)—*Technical Airworthiness Management Manual*. 2010

³ Royal Australian Air Force, Australian Air Publication 7001.059(AM1)—*ADF Aviation Maintenance Management Manual*. 2012

⁴ Royal Australian Air Force, Australian Air Publication 7001.065—*Surveillance and Control Equipment Maintenance Management Manual*. 2005

LOGISTICS PLANNING

3.17 The aim of any military organisation is to produce the most effective combat power with the resources available, and planning is a critical factor in achieving this. Air logistics planning is conducted to provide specialist input into the broader staff planning effort.

3.18 Planning will be conducted to cover the participation of Task Elements (TEs) in the following tasks:

- **Operations.** In general, planning for operations will be led by HQJOC. Single Service input from Headquarters Air Command (HQAC), including the Air and Space Operations Centre (AOC), will be requested from HQJOC to ensure specialist air planning guidance and input is included in the Joint Military Appreciation Process (JMAP).
- **Exercises.** Planning for exercises can be led by various elements depending on the scope, scale and purpose of the exercise. Multinational and joint exercise planning will be led by HQJOC or HQAC.⁵ Within Air Force, exercise planning can be led by HQAC, or a wing or squadron. Air Force will also be requested to support exercises led by other Services, such as Mission Rehearsal Exercises (MRE). Air Force will also provide planning support to unilateral exercises being conducted by foreign forces.
- **Other activities.** Other activities include air shows, visits, trials and support to other Defence agencies (such as DMO and DSTO). Planning for such activities will be coordinated by the lead agency and will require various levels of Air Force participation.

⁵ HQJOC will lead the planning for combined and joint exercises such as TALISMAN SABRE. HQAC will lead the planning for single Service combined exercises such as PITCH BLACK.

Planning Process

3.19 Properly prepared, deployed and employed logistics support is capable of increasing the level of combat capability deployed forward. Furthermore, effective planning can enable the logistics footprint to be reduced, improve logistics effectiveness, and reduce the amount of airlift and other transport required to provide support.

3.20 Within the ADF, planning for operations is categorised as either immediate or deliberate depending on the time available to undertake planning before execution.

- **Deliberate Planning.** Deliberate planning is conducted at all levels of command and is 'planning for the possible'. Deliberate planning will normally be assumption based and is characterised by long lead times.
- **Immediate Planning.** Immediate planning is situation-specific and is 'planning for the likely or certain'. The immediate planning process must be flexible and will normally be time sensitive due to the nature of tasks.⁶

3.21 Operations Support planning primarily involves the development of plans to meet operational requirements. It also identifies the sustainability requirements of preparedness and to support Australian Operational Concepts (that is, contingency planning). This is a deliberate planning process wherein plans based on approved scenarios are progressively developed in advance of potential operations.

⁶ Headquarters Joint Operations Command, 2006, Australian Defence Doctrine Publication 5.0—*Joint Planning (Provisional)*, Defence Publishing Service, Canberra pp. 1–2.



A Supply Clerk from 1AOSS compiling a C-17 load plan and weight and balance clearance on the aircraft that helped transport supplies during Exercise JABIRU 2008.

3.22 Preparedness planning is focused on developing plans to meet specific preparedness requirements. These plans are developed by the FEG commanders as part of CAF's capability management responsibilities. Operational commanders at all levels must ensure that Operational Logistics Plans (OPLOG Plans)⁷ exist and appropriate

⁷ *RAAF Supply Chain Supplement (RSCS) V100S01C09 – Logistics Capability Planning.*

arrangements are in place to meet stated preparedness requirements for their capabilities.

3.23 Immediate planning will always be required to meet the needs of specific operations. Ideally, immediate planning should use prepared deliberate plans and adapt these to meet the current operation. The ADF has a defined process for development of the plans for specific operations at the strategic and operational levels.

Joint Military Appreciation Process

3.24 To be effective in joint or multinational operations, Air Force logisticians must understand the Joint Military Appreciation Process (JMAP). The JMAP is a structured process designed to assist commanders to make decisions and to guide staff planning activity at all levels of command. It is designed to facilitate the analysis of a situation, develop options to address the situation and provide an overarching framework to shape detailed operational planning. The process requires ongoing commander's guidance and will form the foundation of key planning products. JMAP is supported by the Joint Intelligence Preparation of the Battlespace (JIPB) process to ensure that planning is conducted within the context of the operating environment and threat picture. Decisions made using the JMAP will be based on a mix of known information and assumptions.

3.25 The JMAP should be used as the foundation of air logistics planning. As a specialist functional area, logistics planning must inform, shape and support the JMAP at all stages. It is critical that air logistics planners consider the support requirements of the Operations Support Cycle (OSC) phases when conducting planning at both the operational and tactical levels.

3.26 Logistics Preparation of the Operating Environment (LPOE).

The LPOE provides the operational context required for logistics support decision-making. It is an ongoing process that supports the JMAP and provides critical situational awareness for staff involved in the logistics planning process. An effective LPOE process will identify key aspects of the operating environment that may facilitate, inhibit or deny the ability of logistics to sustain air operations.

3.27 Air Logistics Estimate (ALE). The ALE represents the collaborative ongoing efforts of air logistics planning staff based on facts, assumptions and professional mastery. The ALE is one of the key products from the LPOE process and is updated as the planning context changes. The ALE is used to provide specialist input into Mission Analysis (MA) activities and is used as a key reference for Course of Action (COA) development.

3.28 The ALE process is ongoing and the estimate content will be refined and updated as the appreciation process continues and can be used for different tasks. The ALE also provides the baseline required by logisticians to ensure that support arrangements remain aligned with the commander's intent

Operations Support Cycle

3.29 The OSC provides an overall framework of the key phases that must be addressed by air logistics planners to support air operations. As shown in Figure 3–2, the OSC provides the foundation for a structured approach to air logistics planning and is designed to ensure that deployed forces are formally prepared, sustained and reconstituted for future employment.

- **Mount.** This phase ensures that TEs are trained and equipped to meet operational employment requirements. Logistics planning

at all levels is required to support the preparation of TEs and ensure that demands for kitting and equipment are submitted and processed. Logistics Information Systems (LOGIS) training is also a key aspect of the mounting process. Logistics planners must consider the implications of mounting and deployment priorities in terms of limited specialist equipment that may be required for force preparation and also required for use on the operation.

- **Deploy.** Deployment planning is focused on developing the movement plan and preparing personnel and equipment for deployment. Issues covered during deployment planning include the directed Order of March (OOM), the personnel and equipment that need to move, the assets available and the capabilities and capacity of the APOD or Point of Entry (POE).
- **Integrate.** Integration planning is designed to ensure that the deployed TEs can complete the Reception, Staging, Onward Movement and Integration (RSO&I)⁸ process as quickly as possible to commence operations. Logistics integration may require planning for Host Nation (HN) support or preparing international logistics agreements and arrangements to provide multinational support.
- **Sustain.** Sustainment planning is focused on the supply chain to and from deployed TEs for the duration of the operation. Sustainment planning is linked to the arrangements considered as part of the integration phase, to ensure that logistics support is enduring and that alternative sustainment options are considered. The reverse supply chain is a critical aspect of air logistics planning.
- **Transfer/Transition.** Transfer planning considers the requirements to hand over accounts and holdings to a follow-on-rotation. The aim is to ensure an effective and comprehensive Logistics

⁸ Headquarters Joint Operations Command, Australian Defence Force Publication 3.0.3—*Mounting Operations*, Defence Publishing Service.

Transfer of Management (LOGTOM)⁹ is achieved. Air logistics planners must ensure that the process and compliance structures for accounting are in place to support the commander. Transition planning will consider the requirements of handover to HN military or civilian elements, international organisations such as the United Nations (UN) and the North Atlantic Treaty Organisation (NATO) or another multinational military force. Transition will include the drawdown of ADF support arrangements and closure, gifting and disposal requirements and procedures.



Australian and local ground crews work together in Islamabad to unload pallets of aid for flood-affected Pakistan.

⁹ CA Directive 25/08, *The Management of Land Materiel in Support of ADF Operations*, 24 October 2008.

- **Redeploy.** Redeployment planning should be conducted as part of the overall movement plan. Redeployment activities will be shaped by the conduct of the operation and changes in operating environment. Movement planning for redeployment will also include Customs, Immigration and Quarantine (CIQ) requirements for TE entry back into Australia. The documents and process required for the redeploy phase will be similar to the deploy phase.
- **Reconstitute.** Planning for reconstitution is focused on ensuring that the deployed TEs can return to the Directed Level of Capability (DLOC) as quickly as possible. TEs must be reconstituted in a structured and coordinated manner to achieve readiness requirements for future employment. Reconstitution will be conducted as detailed in relevant FEG, wing and squadron level SIs.

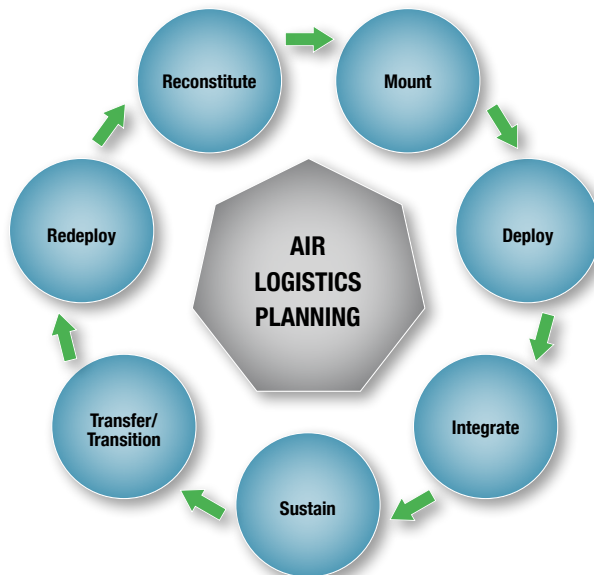


Figure 3–2: Operations Support Cycle

Sources of Deployed Support

3.30 While logistics support arrangements for home base activities are well defined, logistics planners must recognise that joint and multinational expeditionary operations are likely to require some changes to routine logistics support arrangements.

3.31 **Organic Logistics Support.** An important source of support for deployed operations is Air Force's organic logistics capability and workforce. These personnel are combatants acting under the Law of Armed Conflict (LOAC), and contribute to the protection of the air base. Organic uniformed support is available under well-understood C2 arrangements, and is generally well practised in working with the combat force it supports. Uniformed organic support is generally able to provide a significant measure of self-protection and has fewer limitations than other sources of support.¹⁰ Uniformed logistics support can be organic to Air Force, provided by SPGs, or provided by Army or Navy as part of a joint operation.

3.32 **International Support.** Other sources of deployed logistics support for Air Force operations are other military services including alliance and multinational partners, host nation support, and from commercial sources. The Air Force obtains support from other nations through a variety of arrangements with overseas government and commercial sources. Government to government arrangements include US Foreign Military Sales (FMS), Acquisition and Cross Servicing Agreements (ACSA) and Implementing Arrangements (IA). With the exception of FMS, these arrangements are reciprocal in nature. Commercial support can be obtained through agreements between the Australian Government and overseas commercial organisations, or through agreements between Australian commercial and overseas

¹⁰ Joint Logistics Command, Australian Defence Force Publication, 2004, 4.2.1—*Civilians in Support of Australian Defence Force Operations*, p. 2–1.

commercial organisations. Air Force logistics planners must understand the type and nature of support available to their particular capability.

3.33 Civilians in Support of Deployed Operations. One of the potential sources of support for deployed operation is the use of civilian personnel, including contractor staff. ADF doctrine and policy guidance is that civilians can be deployed in support of ADF operations at any threat level, provided they can be protected from the likely threat.¹¹ However, there are a number of circumstances where the use of civilian personnel to support deployed operations may not be either possible or practical. These circumstances include those where threat levels are unacceptable, the protection requirement has an unacceptable impact upon the logistics footprint, or where the risk or location are not acceptable to contractors. The implication is that, in low-threat environments, significant use of civilian and contractor support is possible. However, at higher threat levels use of civilians is likely to be restricted. It is also possible that host nation requirements may limit or preclude the use of foreign contractor staff on their territory. Therefore, Air Force planning must include the possibility of operating for a period without deployed civilian support.

Capability Support Planning

3.34 Logistics planning is also undertaken in the Capability Support dimension. Logistics planning undertaken during the concept and acquisition phases establishes Air Force organic maintenance and support arrangements that underpin Capability Support across the life cycle of the equipment and contributes to sustainment of technical mastery. Additionally, CSMPs are used by Air Force as part of its

¹¹ *ibid.*, p. 2–4; and DI(G) OPS 05–3—*Civilians in Support of Australian Defence Force Operation*, p. 1.

capability management process to guide the development of upgrades and to manage supportability issues of the capability.

LOGISTICS INFORMATION MANAGEMENT

3.35 Defence has a significant investment in its corporate logistics information systems and in a range of computerised tools that facilitate logistics governance, asset visibility, inventory management and maintenance management. The planned upgrade of the MILIS over the short-term horizon will significantly improve system functionality in logistics, maintenance and engineering support, as well as improving financial management through the Materiel Logistics Financial Framework and Defence's corporate finance system (ROMAN).

3.36 Operations conducted over the past decade have relied on the use of corporate systems by deployed forces. The improvements in the available functionality and the flexibility of the District structure in MILIS under JP2077 are expected to further enhance the deployability and utility of MILIS for deployed forces. In addition, these enhancements will better support logistics governance and materiel management by DMO SPOs supporting those deployed forces.

3.37 The supply chain into and within the AO must be supported by Defence corporate logistics information systems to provide the operational commander with the necessary situational awareness and control of materiel in the AO. The use of the Defence corporate logistics information systems is required for each Air Force capability unless specifically exempted by CAF; such exemptions should not be assumed. Such exemptions would normally be sought through the LSC for an individual capability, including how proprietary systems could interface with Defence corporate systems. The LSC must also address arrangements for interface development and meeting the training liability.



Staff of the Logistics Ground Support Equipment Section (LOG GSE) ensure that spare parts are available when required at Kandahar Airfield in 2008.

ENGINEERING SUPPORT

3.38 Engineering involves the careful and knowledgeable use of scientific principles, physical materials, and disciplined design techniques to produce devices, systems and services. In common language, this translates to ‘ensuring that the fitness for purpose of a technical product or service is delivered and maintained throughout its life’. Engineering therefore involves control of the design, manufacture, configuration, performance, maintenance, testing and modification of a product.

3.39 Air Force capabilities comprise complex items of equipment involving a large number of systems that employ modern technology to achieve combat advantage. Air Force therefore places great value in the quality of its engineering support, since it is instrumental in the maintenance of technical integrity of Air Force materiel in general, and the maintenance of airworthiness specifically for aircraft.

3.40 Organisationally, Air Force is principally reliant on the DMO for engineering support. In an acquisition sense, DMO Project Offices are responsible for performing Design Acceptance certification for new equipment, as well as obtaining initial Australian Military Type Certification (AMTC) and Service Release for new aircraft. These processes ensure that capabilities delivered to Air Force are fit for purpose, in that they provide the required level of safety and reliability and meet the operational requirement. DMO SPOs are further responsible for sustaining Air Force weapon systems throughout life of type. In doing so, capabilities are both maintained to appropriate standards as well as upgraded over their life to meet changes in the operational requirement. SPOs are either directly responsible for engineering support described below, or indirectly responsible due to the use of contractors for engineering support.

3.41 Engineering support is conducted under a technical regulatory system for which the degree of regulatory rigour is determined according to the level of risk associated with the weapon system. Technical airworthiness regulations require the highest level of rigour for aircraft and aeronautical product, while other systems are subject to technical integrity requirements of varying rigour, according to the level of risk. Regulations are based on the requirement to assure that technical equipment is designed, constructed and maintained to approved standards, by competent and authorised personnel, working as part of an approved organisation, whose work is certified as correct and accepted on behalf of Air Force. The Technical Regulatory

Authority for aircraft and aviation materiel is Director General Technical Airworthiness, and for land materiel is Directorate of Technical Regulation - Army.

Engineering Support for Raise, Train and Sustain Activities

3.42 Engineering support provided to Air Force capabilities undergoing raise, train and sustain activities requires an appropriate balance between mission generation and asset preservation aspects. This is necessary to ensure an appropriate balance between required operational capabilities and reduction in TLS costs.

3.43 SPO engineering support includes prescribing maintenance policy for the applicable capability or equipment, as well as issuing modification, substitution and deviation instructions. SPOs also sponsor relevant technical publications, which for aircraft are referred to as Instructions for Continuing Airworthiness. These products contribute to technical integrity by ensuring that aircraft or ground systems continue to conform to the approved configuration (which for aircraft is also known as the Type Design).

3.44 Changes in operational and logistic support requirements periodically drive changes to the approved configuration, which in turn generate modification and upgrade activities to the physical assets. Design changes must satisfy relevant airworthiness and other environmental standards, that are mandated as a function of technical regulation by either DGTA or DTR-A as appropriate.

Engineering Support for Operations

3.45 Operations are characterised by a shift in the balance between mission generation and asset preservation, as well as an increased

likelihood of damage, either as a direct result of combat or indirectly as a result of the operating environment. Deployed maintenance elements are ordinarily required to continue to follow prescribed maintenance policy and other engineering support instructions issued by the SPO, unless contingency maintenance is authorised as described in the following paragraphs.

3.46 Contingency maintenance is an alternative maintenance policy that is approved by the SPO and is designed to expedite maintenance to allow aircraft or ground systems to meet compelling operational requirements, while preserving an acceptable level of technical integrity or airworthiness. Contingency maintenance is only authorised during an approved contingency operation.

3.47 As a subset of contingency maintenance, battle damage repair procedures may be used to expedite the repair of damaged aircraft or equipment, to facilitate a rapid return to operations or, for aircraft, a one-time ferry flight to a major repair facility. Some battle damage repair procedures are also pre-approved by the SPO.

3.48 At the end of operations, deployed capabilities are reconstituted and de-assigned from operational command to their parent organisations. As part of this process, the SPO must consider the implications of contingency maintenance and battle damage repair conducted during operations, and prescribe any remediation activities (including penalty maintenance) to restore the aircraft or equipment condition to a state suitable for raise, train and sustain activities.

MAINTENANCE SUPPORT

3.49 Maintenance of Air Force capabilities covers replenishment, inspection, servicing, repair, overhaul, calibration, reclamation, modification, monitoring, testing, recovery and salvage. Maintenance management includes the planning, control, execution, recording and coordination of maintenance activities. Due to the complex nature of modern Air Force capabilities and the increasing costs associated with their support, maintenance is dependent upon a highly skilled and experienced workforce. This is essential not only for conducting maintenance, but also in the management of maintenance to achieve the best capability outcomes while making the most economic use of the available workforce, spares and support equipment.

Maintenance Objective

3.50 In similar fashion to engineering support, the objective of maintenance is related to both mission generation and asset preservation activities. In a maintenance context, the objective is to keep equipment in a condition that enables it to perform its intended function, while ensuring that equipment will retain its capabilities over its expected life and aiming to reduce the costs of ownership wherever possible.

Maintenance Philosophy

3.51 Maintenance philosophy is influenced by the nature and design of the aircraft and other equipment to be operated, how it is to be operated, the locations where operations will be conducted, and the interval and duration of operations. Maintenance requirements (in terms of required quantities of serviceable assets and their required mission capabilities) are set according to the required operational capabilities for each mission.



A Technician performs a magnetic particle inspection of a Hornet armament extractor housing under an ultraviolet light.

3.52 System Design. Modern aircraft and equipment are designed to high standards of both reliability and maintainability, with routine replenishment and servicing activities able to be conducted *in situ*. Major system components are designed to be rapidly interchangeable using the minimum amount of tools and support equipment. A ‘repair by replacement’ approach is usually adopted for these major system components. This approach is intended to minimise the time taken to service and repair assets, as well as keeping the workforce and equipment footprint small, while maximising the asset’s availability for operations. This approach is dependent upon an adequate and timely supply of spares, consumable items, tools, support equipment, and trained personnel. The ever-increasing reliability of modern systems may also require innovative or novel approaches in the design of maintenance training (such as the use of simulation) to ensure sufficient currency and competency on infrequent maintenance tasks.

3.53 Classes. Maintenance is classified as either preventive or corrective.¹² Preventative maintenance is carried out proactively to preserve the condition of an aircraft or system. Corrective maintenance is conducted in response to a fault or failure of a component. Preventative maintenance activities are grouped together to form servicings. All scheduled servicings are documented in the applicable Technical Maintenance Plan (TMP).

3.54 Servicing types. For aircraft, there are four servicing types: operational, routine, special and storage. Operational servicings comprise those maintenance activities required to prepare an aircraft for, and to service an aircraft after, operational use. Routine servicings are scheduled maintenance activities that are necessary to preserve

¹² Joint Logistics Command, Australian Defence Doctrine Publication, 2006, 4.5—*Materiel Engineering and Maintenance*, pp. 1–21 – 1–22.

an aircraft's inherent level of safety and reliability. They are normally performed at a fixed period based on usage (eg. flying hours) or calendar life. Special servicings comprise a series of maintenance tasks that are independent of the operational and routine servicings and are required as a result of specific events, such as a landing gear inspection following a heavy landing. Storage servicings cover specific activities for aircraft and components to prepare for, maintain while in, and recover from storage.

3.55 Maintenance on Deployed Operations. Maintenance at deployed locations is characterised by an increased operational tempo, a higher likelihood of battle damage, adverse environmental conditions, enemy action (or the threat of such action), and sub-optimal or ad hoc facilities. The maintenance footprint for deployed operations is also constrained by a number of factors, including limitations on air transport, tarmac space, local infrastructure (eg. mobile cranes, hangars, secure storage and accommodation), and the administrative costs of supporting deployed personnel.

3.56 Maintenance support to initial deployments will be organic due to short notice readiness and security requirements. Initial maintenance support will deploy with sufficient spares, consumables and support equipment to support an initial period of operations without resupply, known as the OVP. Aircraft and ground systems are carefully selected to avoid the need for major servicings during this period. Subsequently, the maintenance footprint may be enlarged to sustain a longer-term deployment, and contractors may be part of this enlarged footprint providing the security situation allows for their adequate protection.

Maintenance Capability Planning

3.57 Contemporary capabilities rely on a mix of uniformed and contracted maintenance. Historically, this mix has been distributed according to the classifications of Operational and Deeper Maintenance respectively, which in turn was a legacy of the rules of market testing under the Commercial Support and Defence Reform Programs of the 1990s. Allocation of maintenance responsibility between contracted and organic organisations is not arbitrary, and needs to be assessed for each weapon system, after accounting for all considerations discussed in this section, and then documented clearly to eliminate confusion.

3.58 Planning maintenance capabilities for organic and contracted maintenance support of a weapon system occurs during the acquisition phase of the weapon system life cycle. It draws on the LSA process driven by the CONOPS and the LSC, as well as previous operational experience. It also relies on a good understanding of the system design and maintenance needs.

3.59 Initially, a high-level maintenance and life cycle costing analysis is used to develop the weapon system maintenance support concept. Subsequently, a more detailed Failure Modes, Effects, Criticality Analysis (FMECA) is used to identify what maintenance is required to achieve the specified level of operational capability. Repair Level Analysis is then used to select appropriate maintenance levels and support arrangements. Iterative testing is used to validate the outputs of this analysis. The results of this process are formalised in the Logistics Support Analysis Record (LSAR), which is then used to develop TMPs and guides the development of other management plans for the weapon system.

3.60 Maintenance capability planning encompasses technical workforce, holdings of repairable items, spares, consumables, support equipment and tooling entitlements, facilities, and technical data.

Generic support requirements, such as ground power units, air conditioning units, trailers, etc must be considered as well as capability-specific support requirements.

3.61 Specialised Air Power Capabilities. While each capability has maintenance support arrangements tailored to meet its specific requirements, an additional consideration in maintenance planning is overarching organic and industry capabilities required to ensure critical support and skills exist to support Air Force into the future. Aerospace sector planning is principally the responsibility of the DMO. Nonetheless, in approving any maintenance support concepts for new Air Force capabilities and to assure itself of the support arrangements to sustain existing capabilities, Air Force must maintain a watching brief on the aviation industry.

3.62 Ageing Aircraft and Aviation Systems. Early in the life cycle of the weapon system, establishment of maintenance venues is a prime consideration. However, maintenance requirements vary across the life cycle of the capability. As platforms age, component reliability can deteriorate, and age and usage related factors can increase the maintenance requirement. For example, over time fatigue and corrosion considerations are likely to increase the content of scheduled servicings. Because these ageing factors are likely to affect prime system availability and have significant resource implications, a longer-term view encompassing future needs must be taken when planning maintenance arrangements for Air Force capabilities. Additionally, there is a need to undertake periodic maintenance engineering analyses to ensure that existing servicing schedules and maintenance lives are both efficient and adequate to ensure safety and availability. These analyses require resourcing and the development of specialised capabilities within industry as well as the DSTO.

3.63 Capability Role. Generally, a range of maintenance tasks will be performed by uniformed personnel where the capability has a warfighting role (either direct combat or combat related role) that could be deployed within an AO Aircraft and ground systems that do not have a warfighting role (such as training aircraft, flight simulators and fixed ground radar systems) may be subject to higher levels of contractor maintenance, providing a number of criteria are satisfied:

- Use of contracted maintenance must be shown to be cost-effective.
- The degree of retained organic maintenance responsibility must be sufficient to retain appropriate technical skills and technical mastery across all possible maintenance tasks and events likely to be faced by organic maintenance.
- The Air Force maintenance organisation must provide sufficient respite positions for the future expected level of deployed operations; in the past, non-combat weapon systems have provided a significant proportion of respite opportunities.

3.64 Capability Design. The design of the equipment determines its inherent reliability and maintainability. In turn, these qualities determine the frequency, extent and duration of maintenance activities, and the support equipment required to undertake maintenance tasks. In general, organic maintenance performed at deployed locations will be those activities required to prepare the capability for operations and meet the stated operational requirements. Maintenance activities undertaken at forward locations should be limited in duration, and should not require large numbers of personnel or extensive quantities of GSE or facilities. Scheduled maintenance activities that do not meet these criteria should be planned and managed as part of aircraft or capability rotations to be performed at the home maintenance base or a more suitable alternative location.



Technicians from No 3 Squadron begin to prepare for an engine run after a fuel tank change during Exercise BERSAMA PADU 2010.

3.65 Technical Mastery. Skill retention within the Air Force technical workforce is vital for effective maintenance support. Without sufficient technical skills, rapid diagnosis and repair of more complex unserviceabilities is problematic with consequential operational impacts. Furthermore, inadequate skilling can lead to wider impacts on cost and operational availability if components are removed unnecessarily because of poor diagnostic techniques. The required level of technical mastery is a function of the complexity of the maintenance work undertaken and will therefore vary. Air Force recognises that technical mastery is a product of training and experience. Air Force will generate the required level of technical mastery by a considered combination of training, education and experience, based upon the effectiveness of each and the total cost of the resulting maintenance arrangements. As such, Air Force *may* choose to perform some non-warfighting maintenance activities for reasons of technical mastery, development of technical and managerial competencies, and to provide a workforce able to sustain combat operations.

3.66 Workforce Structure. In addition to its technical mastery requirements, Air Force may undertake some maintenance—including maintenance training—in house to provide an appropriate organisational structural overlay for career management and development of its engineers and technicians.

Repairable Item Maintenance

3.67 The availability of aircraft and major aviation systems depends critically on timely supply of repairable components or subassemblies, collectively termed Repairable Items (RIs). A distinguishing feature of Air Force maintenance support is the emphasis placed on the off-equipment maintenance of RIs and the management of repair pipelines for these items. Air Force reliance on RIs requires well-

organised maintenance arrangements supported by efficient evacuation, sophisticated predictive tools, and rapid distribution.

3.68 Planning associated with developing the RI pipeline is a crucial activity. It establishes the quantities of RIs acquired and determines where maintenance should be undertaken. Repair pipelines must be flexible to support expeditionary operations and carefully managed to meet availability requirements cost-effectively.

3.69 Determination of RI quantities required to support operations is normally based on inherent component reliability and standard evacuation and repair times. Modelling against operational scenarios is required to ensure that the quantity of RIs acquired is adequate and that planning assumptions are achievable. Additionally, maintenance planners need to consider that battle and other damage is more likely during operations, and that interdiction may disrupt the lines of communication. This is particularly important as RI acquisition lead times invariably exceed the readiness notice.

3.70 Lastly, the reliability of the RI and the performance of the RI pipeline must be monitored over time. Any deterioration in inherent reliability increases the direct costs associated with repairs, at the same time imposing additional managerial and maintenance workload on operating units. Similarly, if the repair pipeline is not meeting planned turnaround times, then the number of RIs in the pipeline may be inadequate and equipment availability may be reduced.

The RAAF at the Battle of Milne Bay

The Battle of Milne Bay, fought between Allied and Japanese forces in August–September 1942, was an important victory for the Allies. It was the first time that Japanese forces had been defeated on land, shattering the myth of Japanese invincibility built up after a succession of victories across South-East Asia. One of the main characteristics of the battle was the close liaison between the Army and RAAF, each arm contributing key capabilities to the eventual victory.



The Japanese intent in attacking Milne Bay was to establish an advanced operating base that could support their thrust along the Kokoda Track to Port Moresby and defend against Allied air and maritime forces operating in the regions of the Solomon and Coral Seas.

Of great significance to the air effort was the work carried out by the ground crews. Despite suffering attacks by Japanese aircraft, the work of the maintenance and support personnel at the Milne Bay airfields was magnificent. Repair and maintenance work was a continuous round-the-

clock operation, rectifying damage caused not just by the enemy, but by the persistent rain that found its way into fuel systems and electrical systems, and mud that tore away undercarriage components and damaged flight controls during landings.

Over the night of 6-7 September the last of the Japanese troops were evacuated under the cover of a naval bombardment. They had failed in their attempt to take the Australian positions ... The RAAF and Army had combined into an effective joint force that dealt a decisive blow on an enemy that had never before tasted defeat.



Armourers of 75 Squadron fixing a bomb to a Kittyhawk at Milne Bay

Ref: 'The RAAF at the Battle of Milne Bay', *Pathfinder: Air Power Development Centre Bulletin*, Issue 108, March 2009.

MAINTENANCE GOVERNANCE

3.71 Air Force maintenance is performed within a governance framework as described in DI(AF) LOG 3–117—*Governance of the Air Force Maintenance Capability*. The governance framework is broadly based on three desired outcomes that contribute to an end-state of confidence in the maintenance function:

- **Compliance**, whereby the maintenance systems comply with technical integrity regulations and other legal and legislated requirements;
- **Conformance**, whereby maintenance units conform to the compliant maintenance management systems; and
- **Performance**, whereby maintenance is organised and managed to efficiently meet the demands placed upon it in terms of tasking and preparation for future sustainment.¹³

3.72 Systems for the management of compliance and conformance are well established under the technical integrity regulatory systems managed by DGTA for aviation materiel, and DTR-A for land materiel (noting that some land materiel is maintained by Air Force maintenance units). They assure that only competent individuals perform and manage maintenance, in accordance with approved procedures, as part of approved organisations. These technical regulatory systems deliver outcomes that contribute and support the objectives of the maintenance governance framework. The following paragraphs address required performance outcomes.

¹³ Defence Instructions (Air Force), LOG 3–117—*Governance of the Air Force Maintenance Capability*, p. 2.



An aircraft technician performs an inspection of a pneumatic starter.

Performance

3.73 Maintenance that conforms to a compliant management system is key to preserving the technical integrity of materiel, yet, in isolation, is insufficient in meeting required levels of capability, asset availability and efficiency. The third outcome of the governance framework—performance—requires the following elements:

- foundation elements of resources, process and policy that establish an appropriate organisational environment;
- a leadership team committed to performance within the Safety and Airworthiness framework;
- a carefully selected set of primary and secondary performance measures; and

- a measurement, analysis and reporting regime that drives performance improvement and is integrated with the daily activities of the unit conducting maintenance.¹⁴

3.74 Note that these requirements leverage many of the key features of an effective quality management system. The implementation of a quality management system is good management practice and provides a framework for managers to lead their organisation to improved performance. For the purposes of managing performance, the quality management system requires the following:

- a system of quality performance indicators that describe the overall performance of the organisation;
- documented procedures;
- management review of processes, procedures and audit findings with respect to the performance of the organisation as a whole; and
- an internal audit/performance assurance program that considers the effectiveness of the unit in meeting performance targets, as well as the effectiveness of corrective and preventative actions.¹⁵

¹⁴ *ibid.*, pp. 2–3.

¹⁵ *ibid.*, p. 3.

Performance Foundations

3.75 Role of Directors of Logistics Capability (DLCs). Performance foundations assist in establishing an organisational environment that is conducive to continual improvement in the maintenance outcome. DLCs are responsible for advising and assisting the chain of command in implementing and reinforcing the foundations outlined in the following paragraphs.

3.76 Role of Command. One of several command responsibilities vested in the Commanding Officer (CO) of a unit conducting maintenance is the authority to direct the performance of maintenance.¹⁶ A unit conducting maintenance is accountable for the maintenance conducted, through the chain of command, to CAF, who, as CM, is the ultimate source of authority for the conduct of maintenance. Arrangements for maintenance may be affected by operational deployments as described in DI(AF) LOG 3–117—*Governance of the Air Force Maintenance Capability*.

3.77 Chain of Command. The chain of command also has an important role to play in reinforcing the principles of performance management. In simple terms, the level of interest expressed by commanders in the performance of their organisation will be reflected down the chain of command; if commanders are actively involved then their subordinates will naturally tend to perform better.

3.78 Importance of Effective Leadership. Good leadership at all levels from HQAC to the trade supervisor is essential for the management of maintenance performance. In recognition of the importance of leadership in the maintenance environment, a formal

¹⁶ Note that this authority is distinct and separate from the maintenance unit's recognition as an Approved/Accredited Maintenance Organisation (AMO).

selection process has been implemented for key leadership positions within units conducting maintenance.

3.79 Culture. The desired maintenance culture is a combination of several aspects. These include a focus on capability generation, balanced against the need to maintain conformance with compliant management systems; the treatment of maintenance incidents and accidents in a balanced and just manner; the cost conscious use of resources, where waste and rework are minimised; and the maximum use of training and other opportunities to enhance skills and gain experience. Ultimately, the focus must be on continual improvement in the maintenance outcome, in terms of greater safety, efficiency, and productivity.

3.80 Stakeholder Relationships. Maintenance is one important aspect of a broader logistics organisation supporting operational capabilities. Excellent maintenance outcomes rely on the mutual understanding and teamwork within all elements of logistics, and a close working relationship with aircrew and system operators.

3.81 Risk Management. In maintenance, risk management involves *appropriately qualified and authorised* personnel making *sound decisions* at the *appropriate level* based on *adequate information*. Situations will arise that do not fit neatly within the documented maintenance processes and procedures, and innovative solutions may be necessary. The desire to maintain or improve maintenance performance must be balanced against the technical risk and operational need.

Performance Management

3.82 Primary Performance. The products (goods and services) that are delivered within and outside a maintenance organisation need to be identified and primary performance indicators developed. Primary performance indicators are, by nature, lag indicators that report what has been delivered and they provide no assurance of ongoing performance. For example, within a typical maintenance organisation, their primary performance indicators could be:

- unscheduled maintenance sections providing repaired equipment to the maintenance release point within the planned rectification time frame;
- scheduled maintenance sections providing serviced equipment to the maintenance release point within the planned servicing time frame;
- supply sections providing materiel (consumables and repaired items) within the agreed time frames; and
- maintenance release sections providing mission capable and serviceable equipment on time to meet the tasking program.

3.83 Secondary Performance. Secondary indicators provide a measure of the health of the organisation. These indicators, once analysed, can be used by management to assess the sustainability of the primary output and to predict performance trends.

3.84 Performance Analysis and Reporting. Performance measurement is a mechanical process that achieves nothing without analysis. Where the actual performance falls outside set targets, analysis is used to determine the reasons behind the variation, and either initiate improvements or elevate issues through the chain of command. Performance is also reported through section, unit, wing, FEG and Command levels, to both provide the operational customers

with appropriate visibility of maintenance performance, and to inform appropriate levels of the chain of command where action is required.



An aircraft technician with No 2 Squadron inspects the compressor blades of a Wedgetail AEW&C aircraft engine at RAAF Base Tindal during Exercise TALISMAN SABRE 2011.

SUPPLY SUPPORT

3.85 Supply support focuses on the timely, effective and efficient acquisition, allocation and distribution of materiel and services to meet the operational and support roles of the Air Force. Supply support is a subset of logistics. It comprises the functions of supply, transport and movement, and catering and messing. Air Force requires a range of integral and close supply support capabilities within operational units. Supply support for Air Force is provided by a combination of organic, joint, commercial and international sources.

3.86 During operations, supply support involves both deployed and non-deployed forces. Activity levels during the work-up before deployment can exceed that during operations. In many cases, supply support activities in rear support areas will increase significantly to support deployed operational requirements.

SUPPLY OBJECTIVE

3.87 The fundamental objective of Air Force supply support is to provide the right materiel and services in the right quantities, at the right place, at the right time and with the right quality; and sustain that support over time. Given the high cost involved in supporting Air Force operational capabilities, economy will always be a significant factor in supply support planning. However, whilst the importance of economy must be recognised, decisions must ultimately be made on the basis of operational effectiveness. Since air power is expected to be a highly responsive element of the force, able to deploy at short notice and over long distance, the logistics support of the force must also be highly responsive.

SUPPLY PHILOSOPHY

3.88 Providing optimal supply support for Air Force capabilities is a complex endeavour. It requires synchronisation of the activities of many agencies including organic logistics elements, the network of joint agencies, industry and international sources. Supply arrangements for both air base and weapon system support change significantly from operation to operation, and may change during an operation. Conduct of supply support activities becomes more difficult when subjected to the fog and friction of war.

3.89 The philosophy underpinning management of the complex supply support arrangement for Air Force capabilities is based on optimising the performance of supply chains to provide effective support at optimal life cycle cost. The concept of Supply Chain Management (SCM) is a fundamental component of the Air Force supply philosophy. A supply chain is defined as ‘the process of planning, implementing and controlling the efficient and effective flow and storage of goods, services and related information from point of origin to point of consumption for the purpose of conforming to customer requirements.’¹⁷

3.90 It is important to note that Air Force does not, and does not need to, control most components of its supply chains. Air Force does, however, need to retain an understanding of the volatility of supply chains and how they can be designed, disaggregated and recoupled on a continuous basis.

¹⁷ ADDP 4.3—*Supply*, p. 1–10.



A member of 1AOSS loads a pallet on to a C-17 before its departure to Pakistan during Operation PAKISTAN ASSIST II.

SUPPLY

3.91 The supply function is responsible for a range of activities associated with the management of stores and equipment. These areas include inventory management, provisioning, acquisition, storage, requisitioning, distribution and equipment accounting.

3.92 **Precision Sustainment.** Precision sustainment is a key principle for supporting deployed operations that involves providing the commander with the right amount of support at the right time. As described throughout this document, the logistics footprint for operations, especially for initial deployments, is likely to be heavily constrained. Logistics planning, therefore, relies on sustainment flights

to replenish FAKs and to supply items not carried within a FAK. The logistics footprint for deployed operations can be reduced by providing users with reliable and predictable delivery of mission-critical parts. Precision sustainment and its application to Air Force operations is an evolving concept.

3.93 Reverse Logistics. An important feature of supply chains for deployed Air Force operations is reverse logistics. Reverse logistics refers to the evacuation of equipment from the AO. Air Force operations are critically dependent on the supply of regenerated assets from repair facilities. Resupply through maintenance activities requires that those components identified as repairable be evacuated to their designated maintenance venue in a timely manner.



USAF and RAAF staff frying up eggs for members deployed to Darwin in support of Exercise TALISMAN SABRE 2009.

No 77 Squadron at the start of the Korean War 1950

In June 1950, No 77 Squadron was at Iwakuni, Japan, about to go home after completing occupation duties. Instead they entered the war over Korea as part of a United Nations force helping South Korea resist the Communist North Korean invaders. With the squadron scheduled to go home, the RAAF supply 'pipeline' had been turned off and stocks of items like flying clothing had run out. Pilots flew in whatever they could beg, borrow or trade throughout the early months of the war. By some accounts, extensive illegal trade of things like slouch hats and Australian beer prevented a flying suit crisis and plugged other logistics holes as well. Maintenance supplies, thankfully, were less affected as stocks in hand were good when resupply from Australia ceased. Also, food and the like could still be bought through local purchase. This meant that operations from Iwakuni were reasonably autonomous but those from Korean airfields relied entirely on the USAF for fuel, most rearming, some spares and most domestic items.



Ground crew from No 77 Squadron make the most of the harsh wintery conditions during the Korean War.

The logistics situation turned critical when No 77 Squadron's Mustangs moved to Hamhung, in Korea's far north, in November. They were confronted by an early winter far worse than any the Australians had previously experienced. They lived in tents surrounded by mud. Bare hands stuck to exposed metal on aircraft and tools, while aircraft brakes froze overnight, requiring engine runs or removal of the wheels each morning to free them. RAAF issue clothing proved totally inadequate and a crisis was only averted by local purchase of US cold weather outfits, signed for on the spot by Dick Cresswell, the CO. It was a combination of such strong leadership, adaptation and innovation, along with American goodwill, that kept No 77 Squadron in the fight throughout the Korean War.

Ref: Hurst, Group Captain Doug Hurst, (Retd), 2009, 'No 77 Squadron RAAF in Korea – 1950–53', in Brent, Wing Commander Keith, *Air Expeditionary Operations from World War II until Today: Proceedings of the 2008 RAAF History Conference*, Air Power Development Centre, Canberra, pp. 17–30.

TRANSPORT AND MOVEMENT

3.94 Transport and movement are identified in joint doctrine as separate logistics functions rather than a subset of supply. The transportation and movement function involves the collection, transportation and delivery of personnel and equipment. Within Air Force, movements involves the planning, organising, directing and controlling of the movement of personnel and materiel, whereas transport involves the physical movement that includes mode operation and planning, as well as terminal operations. During deployed operations, transport and movement activities within the air base are the responsibility of CCG.



Air movements personnel from RAAF Base Townsville and airfield defence guards from No 1 Airfield Defence Squadron assist No 36 Squadron personnel with tasks involved on Exercise PRECISION RED 01/11.

3.95 1st Joint Movements Group (1JMOVGP) is responsible for planning, implementing, controlling and monitoring the movement of ADF forces and other approved elements associated with joint, combined and single Service activities. This entails movement from the home base to and within an area of operations and then back to the home base. During the sustainment phase of an operation, 1JMOVGP supports Commander Joint Logistics (CJLOG) management of the supply chain by coordinating movements support of sustainment stores, equipment and personnel along the lines of communication. 1JMOVGP responsibilities are executed at the strategic, operational and tactical levels; they are delivered in both Australia and on deployed operations.

underpinning air terminal operations is that they provide the link between the aircraft, the air terminal and the air base and its infrastructure. Air terminal services are often provided in support of joint movement agencies or CJLOG for mounting base support in Australia.

CATERING AND MESSING

3.98 Catering and messing services include cookery (food preparation), accommodation management, rationing (ration administration, provisioning, accounting and storage) and cleaning of kitchen and dining areas. A key responsibility is the maintenance of nutritional and hygiene standards.

3.99 The provision of catering and messing services for deployed operations is a tactical function that is part of the delivery of air base support. The concept underlying base catering arrangements is centralised kitchens using large-scale cooking equipment and techniques to feed large numbers of personnel in central dining halls. It also includes the capability to support dispersed consumption where mass movement of personnel to a central location is either undesirable due to threat or inefficient. Whilst the majority of catering and messing services at main operating bases have been outsourced to commercial organisations over recent years, arrangements need to be maintained to provide uniformed catering staff with appropriate employment and training during peacetime operations. Good catering and messing can be a significant factor in the maintenance of good morale.



Staff in the Airmen's Mess at RAAF Base Darwin conduct final preparations to the lunchtime meals prior to serving the influx of military personnel during Exercise TALISMAN SABRE 2011.

CHAPTER 4

WORKFORCE MANAGEMENT

4.1 The logistics workforce supporting Air Force capabilities is a combination of Air Force uniformed personnel from the Logistics and Technical Employment Groups; Defence APS employees; and contractor personnel. To be effective, this workforce needs general and specific training and ongoing development relevant to its contribution to the capabilities and consistent with Defence Security and Information Management policies. An appropriately trained logistics workforce is essential to the delivery of Air Force capabilities, both in training and operational contexts. Furthermore, the training requirement for the logistics workforce must be periodically reviewed to ensure that the logistics workforce remains effective during transition activities linked to technological and operational change. This is evidenced by the unique situation experienced by Air Force with the planned withdrawal and introduction of multiple aviation platforms in the near term.

4.2 This section will focus on the Air Force uniformed component of the logistics workforce. Director General Personnel - Air Force (DGPERS-AF) is responsible to CAF for the overall direction and performance of the Personnel FIC and has appointed Employment Group Sponsors to advise and facilitate workforce requirements development and to monitor the overall health of their assigned Employment Groups. The Logistics Employment Group (LEG) Sponsor, covering the Logistics officer specialisation and the Cook, Supply, Movements and Reserve Motor Transport Driver musterings, is the Director of Supply Capability - Air Force (DSC-AF). The Technical Employment Group (TEG) Sponsor, covering the Aerospace Engineering officer specialisations and the Technical Trade musterings, is the Director of Technical Capability - Air Force (DTC-AF).

4.3 Since 1990, the logistics workforce has undergone significant review and rationalisation. This period has been characterised by transfer of functions and tasking to Defence SPGs or outsourcing to contractors, restructure of the uniformed workforce, failure of regulation and governance (and the need to reconstitute these), and significant challenges for the training, education and professional development of the workforce. In recent years, Air Force has invested in regaining the focus of the workforce on supporting Air Force capabilities and this will need to continue.

LOGISTICS WORKFORCE

4.4 The Logistics Sustainability Project commenced in 2001 with the aim of improving the human resource and personnel management arrangements underpinning the LEG. The resulting improved focus on training, career management and professional development provided an important baseline for the future.

4.5 In principle, the LEG is now much better structured and trained to meet the capability requirements of current and emerging Air Force capabilities. The demands and impacts of ongoing reform, the training needs arising from the introduction of emerging capabilities and the implications of an enduring high operational tempo will continue to require close monitoring by DSC-AF to ensure that the LEG remains appropriately positioned to support Air Force capabilities into the future. The focus will continue on procedural efficiency and effectiveness, safety, technical mastery and long-term health of the LEG.

Restructure of the RAAF Logistics Employment Group.

The most recent changes for the LEG resulted in the disbandment of the Steward (STWD) mustering and the focus of a restructured Cook mustering on deployed operations; a reinvestment in supply governance and the equipment management system; and a range of significant structural reforms of the other Supply musterings under the auspices of the Supply Trades Restructure (STR) project post October 2006. The STR entailed the dissolution of the Supplier (SPLR) and Clerk Supply (CLKSPLY) musterings, and the establishment of Supply (SUP) and Movements (MOV) musterings. The STR resolved duplication and redundancy issues within the SPLR/CLKSPLY training regimes and in a number of the roles being performed within these musterings. Further, the restructure enabled a more focused response to the significant impacts of new platforms and technologies. These impacts include the introduction into service of the C-17 and KC-30A, and the new ADF Logistics Information System (ie. MILIS) under JP2077. The SUP mustering includes the supply and distribution roles of the CLKSPLY and SPLR musterings, while the MOV mustering includes all the air movement, road movements and aircraft refuelling roles of the SPLR mustering.

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4.7 LEG training is supported by HQAC (A7) in the definition of training requirements, and AFTG in the design of training courses and in the delivery of those courses. AFTG works closely with the LEG Sponsor, DGPERS-AF staff, and training schools (both Air Force and joint) to ensure that the training requirement and training delivery meet the needs of the Air Force CM. This training will continue to be complemented by structured experiential training in the workplace. Monitoring and evaluation of both formal training and experiential training must continue to be an important feature of the training system.

4.8 The training of LEG personnel will need to continue to be complemented by sponsored graduate and postgraduate education intended to equip selected personnel with the professional skills that such education delivers. This education program will always augment tertiary education acquired by personnel on an individual basis. The Air Force requires its logistics officers to develop a high level of business acumen and therefore education, logistics training and professional development should be targeted at business skills.

4.9 All LEG mustering personnel will undertake Initial Employment Training (IET) where they receive the basic knowledge and skills to perform core functions in the workplace from the day of graduation. Throughout their career, members will also be required to undergo a supervised period of consolidation of the training received on IET and postgraduate career courses. Completion of consolidation training is documented in individual mustering Competency Logbooks and, in certain circumstances, must be completed as prerequisites for career advancement in skill grade or rank.

4.10 The LEG Sponsor must continue to promote professional development opportunities for Employment Group personnel. These opportunities must be packaged in a structured program

that contributes to the professionalisation of the LEG. The principal objectives of training, education and professional development must be to assure maintenance and attainment of technical mastery targeted to the needs of Air Force capability.

4.11 Finally, the LEG Sponsor and Air Force senior leadership have a responsibility to ensure that the structural health and effectiveness of the Employment Group workforce are adequately considered in reviews that deliver organisational efficiency.

TECHNICAL WORKFORCE

4.12 A number of reviews since 2003 have highlighted the unintended degradation that outsourcing and civilianisation has caused to Air Force's technical workforce in terms of reliability, technical mastery and sustainability. Air Force capability is reliant on a reliable, effective, safe and well-regulated technical workforce. Rectification of underlying problems revealed in these reviews and the 2007 AFMMGR will take some time to effect workforce sustainability. Nevertheless, rectification of TEG matters will require sound leadership to be exercised at all levels, appropriate resources and effective consideration of technical workforce issues in the introduction of future organisational and capability change.

4.13 The AFMMGR provided a sound understanding of the long-term organisational systemic deficiencies, reinforced the contribution of the TEG workforce to Air Force capability, and provided a roadmap for the recovery over time of maintenance management standards and other systemic deficiencies. The Air Force Maintenance Governance Model has been developed to ensure effective maintenance management and governance activities across the Air Force and all of its supporting agencies undertaking maintenance for and on behalf of Air Force. The

Model brings together the three main components of Performance, Compliance and Governance Framework and sits at the centre piece of recovery.



An Aircraft Technician from No 1 Squadron inspects the leading edge of the wing for damage as part of the pre-flight checks on F/A-18F Super Hornet A44-204 at RAAF Base Amberley.

4.14 The role of effective leadership in the recovery process and long term in sustaining the TEG workforce is essential. Leadership must occur at the organisational level (ie. AFHQ, HQAC, FEG, units and in the SPGs), as well as at the individual level amongst aerospace engineering officers and NCO/SNCO technical airmen.

4.15 The TEG Sponsor and Air Force's senior leadership have a responsibility to ensure that the structural health and effectiveness of the TEG workforce are adequately considered in reviews that deliver organisational efficiency. The sustainability of the workforce in the long term hinges on training, education and experience opportunities to develop and grow skills necessary to create appropriately qualified aerospace engineering officers and senior technical airmen.

4.16 The Air Force Maintenance Governance Model clearly emphasises the importance of maintenance performance management in the effective delivery of Air Force capability. As the SRP develops over the decade, the performance management of technical effort as an input to the SRP and capability management in general will be essential.

4.17 TEG training and development is supported by HQAC (A7) in the definition of training requirements, and AFTG in the design of training courses and in the delivery of those courses. AFTG works closely with the TEG Sponsor, DGPERS-AF staff, and training schools to ensure that the training requirement and training delivery meet the needs of the Air Force Capability Manager. This training will continue to be complemented by structured experiential training in the workplace. Monitoring and evaluation of both formal training and experiential training must continue to be an important feature of the training system. In particular, the role of units in post-IET and development for technical personnel cannot be overstated, for aerospace engineers, fitters, technicians and in NCO/SNCO technical skilling. Furthermore, units remain responsible for progressive task authorisation to ensure fitters are productively employed and deliver effective capability outcomes.

4.18 The training of TEG workforce will need to continue to be complemented by sponsored graduate and postgraduate education intended to equip selected personnel with the professional skills that

such education delivers. This education program will always augment tertiary education acquired by personnel on an individual basis.

Reformation of the Armament Technician Mustering

The reformation of the Armament Technician (ARMTECH) mustering is a key structural change resulting from the AFMMGR. On 17 April 2007, CAF agreed to the creation of the Armament mustering within the TEG. The Armament mustering was identified as a key capability for Air Force's current and future air combat capability, and was estimated to increase in strength with the introduction of future capabilities such as the Joint Strike Fighter (JSF). The majority of the ARMTECH workforce is employed within ACG; however, a significant proportion of higher ranks (CPL–WOFF) are employed in CSG and in the VCDF Group in diverse and varied roles when compared to the ACG Armament Technician roles.

4.19 The structures, training, education and other professional development arrangements are only part of the equation. Recruiting and retention policies and routine personnel management are an essential component of the Personnel FIC—monitoring health of the employment group and assuring that it remains focused on the requirements of Air Force capability in an environment of dynamic change will continue to require close interaction between the DGPERS-AF staff and the TEG Sponsor.

4.20 Finally, the TEG Sponsor and Air Force senior leadership have a responsibility to ensure that the structural health and effectiveness of the employment group workforce are adequately considered in reviews that deliver organisational efficiency.

CHAPTER 5

CONCLUSION

5.1 *The Air Force Approach to Logistics* is the endorsed doctrinal basis for development of capability management planning and individual arrangements underpinning current and future Air Force capabilities. In particular, it provides a sound basis for logistics training and workforce development in support of Air Force activities.

5.2 *The Air Force Approach to Logistics* is to be used as the foundation to develop Air Force logistics policy and systems development, and to influence joint logistics doctrine and policy. It should also be used to inform the development of LSCs for the acquisition of new weapons systems.

5.3 Air Force logistics is generally referred to as having three main functions: Engineering, Maintenance and Supply Support. Rigorous regulation of these three functions is essential to the mounting and sustainment of Air Force operations. The ready availability of Air Force logistics assets, through sound management and accountability by personnel engaged in logistics activities, is an essential component of Air Force preparedness, and exists to enable the Air Force to raise, train, sustain and conduct operations.

5.4 Logistics support for Air Force expeditionary capabilities must be deployable and capable of operating as part of a joint and/or multinational logistics system. Logistics support must also be structured to be able to support and sustain concurrent operations. To ensure interoperability, there is a need to have the skills, knowledge, procedures and ICT systems to operate alongside the United States and other allies. Greater integration of industry in support of Air Force operations will require strategic arrangements to ensure industry

understands Air Force's logistics needs and is in a position to provide the required level of support for those expeditionary capabilities.



Personnel prepare for the long flight on board the C-17 Globemaster at RAAF Base Amberley shortly before leaving for Pakistan.

5.5 The Air Force capability view of logistics reflects that air power is fundamentally dependent on the availability and capability of aircraft and major systems supporting operations, air bases and their support elements. The delivery of logistics support for Air Force capabilities is through logistics elements that are managed within a logistics governance framework. This framework describes the overall system by which the capability is planned, organised, directed, controlled and held to account. The Air Force Maintenance Governance Model brings together the three main components of Performance, Compliance and Governance.

5.6 Air power is realised using all of the FIC supporting Air Force operations. Comparatively large numbers of personnel and other resources are dedicated to keeping a relatively small number of air power capabilities and other major systems operational.

5.7 CAF, as the Air Force Capability Manager, is responsible to CDF for raising, training and sustaining the Air Force to ensure it is ready for potential operations. CAF as the DAA and the ADF Airworthiness Authority is responsible for airworthiness standards and the management of the airworthiness system. Logistics is a fundamental component of Air Force capability, and CAF has a direct interest in the performance of the logistics systems that support Air Force.

5.8 *The Air Force Approach to Logistics* is planned to be revised on a five-yearly cycle linked to the Defence White Paper cycle.

GLOSSARY

The source for approved ADF terms, definitions, abbreviations and acronyms is the Australian Defence Glossary (ADG), available on the Defence Restricted Network at <http://adg.eas.defence.mil.au/adgms/>. All definitions have been taken from the ADG where the ADF definitions apply. Where an alternative definition has been used, the applicable source document has been identified.

Accredited Maintenance Organisation (AMO)

An AMO is an organisation that has been assessed as compliant with the Army Technical Regulatory Framework and has been certified as an AMO by the Accreditation Authority. (TRAMM-L)

Airworthiness

A concept, the application of which defines the condition of an aircraft and supplies the basis for judgement of the suitability for flight of that aircraft, in that it has been designed, constructed, maintained and is expected to be operated to approved standards and limitations, by competent and authorised individuals, who are acting as members of an approved organisation and whose work is both certified as correct and accepted on behalf of Defence. (DI(G) OPS 02–2)

Australian Military Type Certificate

A document issued by the Defence Aviation Authority (DAA), on advice from the Airworthiness Board (AwB), signifying compliance with the ADF airworthiness requirements for Type Certification as a state registered aircraft.

Authorised Maintenance Organisation (AMO)

An AMO is an organisation, including a contractor, that has been certified by the ADF Technical Airworthiness Regulator (ADF TAR), to conduct maintenance on ADF aircraft and aircraft equipment.

Capability

The power to achieve a desired operational effect in a nominated environment within a specified time and to sustain that effect for a designated period. Note: it is delivered by systems that incorporate people, organisation, doctrine, collective training, platforms, materiel, facilities, in-service support, and command and management.

Capability Manager

Raises, trains and sustains in-service capabilities through the coordination of fundamental inputs to capability.

Concurrency

Competing demands for resources and/or competing demands on force elements to meet simultaneous requirements.

Contingency Maintenance (CMAINT)

The maintenance carried out on technical equipment during a contingency, when the availability of that equipment is crucial to force capability and normal operating maintenance procedures are inappropriate. CMAINT includes both scheduled and unscheduled maintenance during the contingency.

Directed Level Of Capability (DLOC)

The funded average level of capability maintained during a specified budget period, normally a financial year. DLOC agreements establish the levels of capability, which are to be maintained to meet preparedness, ongoing operations, Defence international engagement

program tasks and known national task requirements within financial guidance. The agreement is the level of capability at which the organisation is funded and resourced. (ADDP 00.2)

Fundamental Inputs to Capability (FIC)

The standard list for consideration of what is required to generate 'capability', comprising organisation, personnel, collective training, major systems, supplies, facilities, support, command and management. It is to be used by Defence agencies at all levels and is designed to ensure that all agencies manage and report capability, using a common set of management areas.

Governance

The principles, values, practices and processes by which an organisation is led, managed and held to account. It includes organisational culture and values, key principles of accountability and stewardship, and review functions which provide confidence about performance and conformance. In the Defence context, good governance means that the Government and the general public can rely on Defence to do its work well with full probity and accountability. (DI(G) LOG 4-1-015)

Information and Communications Technology (ICT)

The applied science and engineering aspects related to the creation, manipulation, presentation, dissemination etc of data for the communication of information between users.

Integrated Logistics Support Plan (ILSP)

The primary logistics support management document that identifies all logistics support requirements and activities during the acquisition, in-service and disposal phases of the equipment or weapon system life cycle.

Logistics Support Concept (LSC)

A broad outline the philosophies, concepts, requirements and constraints associated with the support aspects of the Materiel System.

Maintenance

All action taken to retain material in or restore it to a specified condition, or restore it to serviceability. It includes inspection, condition monitoring, testing, servicing, repair, overhaul, calibration, rebuilding and reclamation, modification, recovery, classification and the salvage of technical equipment.

Mission System

The element of the capability that directly performs the operational function, which includes platforms, distributed systems and discrete systems that integrate into other mission systems.

Off-Equipment Maintenance

All units of work accomplished on components removed from a parent equipment, except for components that are repaired in situ or removed for convenience for bench check and/or repair. (DI(AF) LOG 3–102)

Operational Concept Document (OCD)

The primary reference for determining fitness for purpose of the desired capability to be developed, and is a complementary document to the Function and Performance Specification (FPS) and the Test Concept Document (TCD) which form the Capability Definition Documents (CDD) to define the Capability System baseline.

Operational Viability Period (OVP)

The period immediately following deployment on operations during which deployed forces must be self-sufficient until the logistic resupply system is in place, and is considered part of the sustainment period.

Operations Support

The support needed to deploy and redeploy a tailored force, and sustain it for the duration of an operation, and requires the establishment of a tailored logistic network that draws resources from the national and international support base, and positions those resources at the appropriate time and place using support bases and nodes to meet the supported forces needs.

Original Equipment Manufacturer (OEM)

The manufacturer listed as the approved source of manufacture of the qualified part described on approved drawings. The OEM is normally the source of the associated Illustrated Parts Breakdown (IPB), maintenance manuals and warranty cover of the part.

Reception, Staging, Onward Movement and Integration (RSO&I)

A phase of joint force projection that comprises a number of processes typically used to transition forces arriving in theatre into forces capable of meeting the commander's operational requirements. (ADFP 3.0.3)

Repairable Item (RI)

An item which can be reconditioned or economically repaired for reuse when it becomes unserviceable.

Service Release

A declaration by the ADF AA on advice from the Airworthiness Board (AwB), that operational, engineering, maintenance and logistics systems are adequate to ensure the continued airworthiness of a state registered aircraft.

Support System

The organisation of hardware, software, materiel, facilities, personnel, processes and data required to enable the mission system to be effectively operated and supported so that the mission system can meet its operational requirements.

Sustainability

The ability of a force to maintain the necessary level of combat power for the duration required to achieve its objectives.

Technical Airworthiness

A concept which defines the condition of an aircraft, and supplies the basis for the judgement of its sustainability for flight in that it has been designed, constructed and maintained to approved standards by competent and authorised individuals, who are acting as members of an approved or authorised organisation and whose work is certified as correct and accepted on behalf of the ADF. (AAP 7001.053(AM1))

Technical Integrity

An item's fitness for service, safety and compliance with regulations for environmental protection.

Through Life Support (TLS)

Through life support refers to all the activities and costs associated with keeping a piece of equipment in service and operational. This includes maintenance, repairs and servicing, and can incorporate modification and adaptation to meet altered requirements or strategic environments.

ACRONYMS AND ABBREVIATIONS

AAR	Air to Air Refuelling
ABXO	Air Base Executive Officer
ACG	Air Combat Group
ADDP	Australian Defence Doctrine Publication
ADF	Australian Defence Force
ADO	Australian Defence Organisation
AEW&C	Airborne Early Warning and Control
AFCMS	Air Force Capability Management System
AFHQ	Air Force Headquarters
AFMES	Air Force Materiel Entitlements System
AFMMGR	Air Force Maintenance Management and Governance Review
AFTG	Air Force Training Group
AIC	Australian Industry Capability
ALE	Air Logistics Estimate
ALG	Air Lift Group
AMO	Accredited/Authorised Maintenance Organisation
AMTC	Australian Military Type Certification
AO	Area of Operations
AOSG	Aerospace Operational Support Group
APOD	Air Point of Disembarkation
APS	Australian Public Service
ASD	Aerospace Systems Division
BAM	Base Accountability Model
BSA	Base Support Agreement
C2	Command and Control
CA	Chief of Army
CAF	Chief of Air Force
CDG	Capability Development Group

CIOG	Chief Information Officer Group
CJLOG	Commander Joint Logistics
CM	Capability Manager
CONOPS	Concept(s) of Operations
CSA	Customer Supplier Agreement
CSE	Combat Support Element
CSG	Combat Support Group
CSR	Combat Support Request
CSMP	Capability System Management Plan
CSSB	Combat Service Support Battalion
DCP	Defence Capability Plan
DGPERS-AF	Director General Personnel - Air Force
DGTA	Director General Technical Airworthiness
DLOC	Directed Level of Capability
DMO	Defence Materiel Organisation
DSC-AF	Director of Supply Capability - Air Force
DSG	Defence Support Group
DSTO	Defence Science and Technology Organisation
DTC-AF	Director of Technical Capability - Air Force
DTR-A	Director Technical Regulation - Army
ECSS	Expeditionary Combat Support Squadron
EOD	Explosive Ordnance Division
ESCM	Electronic Supply Chain Manual
ESD	Electronic Systems Division
FAK	Fly-Away Kit
FEG	Force Element Group
FIC	Fundamental Inputs to Capability
FMECA	Failure Modes, Effects, Criticality Analysis
FMB	Forward Mounting Base
FMS	Foreign Military Sales
FOB	Forward Operating Base

FSB	Force Support Battalion
GSE	Ground Support Equipment
HQAC	Headquarters Air Command
HQJOC	Headquarters Joint Operations Command
ICT	Information and Communications Technology
IET	Initial Employment Training
ILS	Integrated Logistics Support
ILSP	Integrated Logistics Support Plan
JHC	Joint Health Command
JLC	Joint Logistics Command
JMAP	Joint Military Appreciation Process
JOC	Joint Operations Command
LCC	Life Cycle Cost
LCM	Lead Capability Manager
LEG	Logistics Employment Group
LOAC	Law of Armed Conflict
LPOE	Logistics Preparation of the Operating Environment
LSA	Logistics Support Analysis
LSAR	Logistics Support Analysis Record
LSC	Logistics Support Concept
LSD	Land Systems Division
LSE	Logistics Support Element
MAA	Materiel Acquisition Agreement
MILIS	Military Integrated Logistics Information System
MPG	Major Projects Group
MSA	Materiel Sustainment Agreement
MSD	Maritime Systems Division
NACC	New Air Combat Capability
OCD	Operational Concept Document

OEM	Original Equipment Manufacturer
OSC	Operations Support Cycle
OVF	Operational Viability Period
PGM	Precision Guided Munitions
POD	Point of Disembarkation
POE	Point of Embarkation/Entry
RAF	Royal Air Force
RI	Repairable Item
RSO&I	Reception, Staging, Onward Movement and Integration
RSCS	RAAF Supply Chain Supplement
SI	Standing Instruction
SOP	Standard Operating Procedure
SPG	Service Provider Group
SPO	Systems Program Office
SRG	Surveillance and Response Group
SRP	Strategic Reform Program
STR	Supply Trades Restructure
TE	Task Element
TEG	Technical Employment Group
TLS	Through Life Support
TMP	Technical Maintenance Plan
TRAMM-L	Technical Regulation of ADF Materiel Manual - Land
TTP	Tactics, Techniques and Procedures
USAF	United States Air Force

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