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ROYAL AUSTRALIAN AIR FORCE

The Air Power Manual

3rd Edition

Sponsor: Director Air Power Studies Centre

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FOREWORD

by

THE CHIEF OF AIR FORCE

The Air Force Mission is to prepare for, conduct and sustain effective air operations to promote Australia's security and interests. Effective air operations depend on a host of inter-related factors but rely on sound doctrine at the strategic, operational and tactical levels of war. The Air Power Manual is the RAAF's strategic level doctrine, the expression of its fundamental beliefs and principles.

The notion of *fundamental principles* might imply that doctrine does not change. That is only partly true. Some aspects of doctrine are derived from enduring principles. For example, the aircraft is an inherently offensive weapon, a principle which influences how aircraft should be employed in battle. Other aspects of doctrine recognise that technology has certain limitations. For example, the aircraft is a highly sophisticated piece of equipment which cannot remain airborne indefinitely, and which requires regular maintenance and support for its efficient operation. Therefore, doctrine must recognise the fundamental importance of the air base, its enabling functions and its defence. Yet other aspects of doctrine recognise the constraints of physical geography; that is, the nature and limitations of the air, land and sea environments. All of these realities, and others, impose a changeless quality on doctrine.

But at the same time, pressures arising from social organisation and technology drive the variable aspects of doctrine. History shows that military doctrine, organisation, strategy, tactics and logistics may remain relatively unchanged for hundreds of years but then undergo rapid and far reaching change. Today, the nature of conflict is changing in ways that are likely to be profound. This is why I directed that we review air power doctrine laid out in the 1994 edition of The Air Power Manual.

Furthermore, the environment in which the Air Force conducts air operations and in which it develops its doctrine is changing; and that change is both rapid and substantial. Issues include:

- Global and regional change, especially since the end of the Cold War.

- Strenuous and ongoing initiatives to make the Defence Organisation more effective and efficient in its functions, organisation, processes and outputs (noting that Air Force's output is *air power*).

- Emergent forms of force employment: because the threat or use of armed force is no longer confined to conflict between states, air operations must address all of the applications of military force.

- Emergent methods of conflict: Air Force's conduct of air operations must reflect the Revolution in Military Affairs and the advent of information warfare.

- Radical shifts in the way in which organisations conduct their business, away from traditional hierarchical command and control arrangements towards networks which share information across all levels.

The third edition of The Air Power Manual reflects not only these changes, but also the significant advances in the RAAF's professional mastery of air power gained through sustained efforts over the past decade. These efforts include education and training programs, fellowships, a substantial body of publications, and a series of major conferences. These efforts would not have succeeded without mutually supporting initiatives such as RAAF Quality and a clear focus on the individual and human factors.

With air forces in our region now able to access the same level of capability as the RAAF, we can no longer depend on technology alone to maintain a qualitative edge. We must look to our people for that qualitative edge by giving them the best education and the most realistic training to ensure that we are smarter in the application of air power. The key to being smarter is our doctrine. Our doctrine must reflect the lessons learnt from sacrifice, help in the selection of winning strategies, guide our planning to meet any future contingencies, and show our team how each member contributes.

While some aspects of doctrine are enduring, others reflect contemporary strategic thinking and desired or demonstrated technological advances. Therefore, it should not be surprising to find that there are significant differences between this and the earlier editions of the manual. These differences are most apparent in the establishment of Air Force *core air power capabilities.* These core competencies rely on much more than just aircrew in cockpits and clearly reflect Air Force's Goal 1 - 'One Air Power Team'. No longer should we discuss *air power capabilities* separately from *vital enabling functions.* Often previously described as 'support' activities, vital enabling functions are an *integral part* of the RAAF's war-fighting structure and are *essential* to the success of air operations.

While every member of the RAAF is to take The Air Power Manual as authoritative guidance, many other Australians in the Defence Organisation and the broader community have an interest in the exercise of air power in the context of joint ADF operations. 1 commend to all an understanding and critical review of the basic doctrine set out in this manual.

(Original Signed)

L.B. FISHER
Air Marshal
Canberra, 1998

CHAPTER 1

INTRODUCTION TO
DOCTRINE AND PROFESSIONAL MASTERY

*What air power doctrine is and
why it affects every RAAF member*

AN OVERVIEW OF THE AIR POWER MANUAL

1.1.   The broad structure of The Air Power Manual is illustrated in Figure 1-1.

CH1: INTRODUCTION TO DOCTRINE AND PROFESSIONAL MASTERY
What air power doctrine is and why it affects every RAAF member

CH2: NATIONAL SECURITY & MILITARY POWER
Why Australia needs military power

CH3: CHARACTERISTICS OF AIR POWER
What is distinctive about air power

CH4: CORE AIR POWER CAPABILITIES
What air power can do

CH5: AIR POWER ROLES
How air power is applied

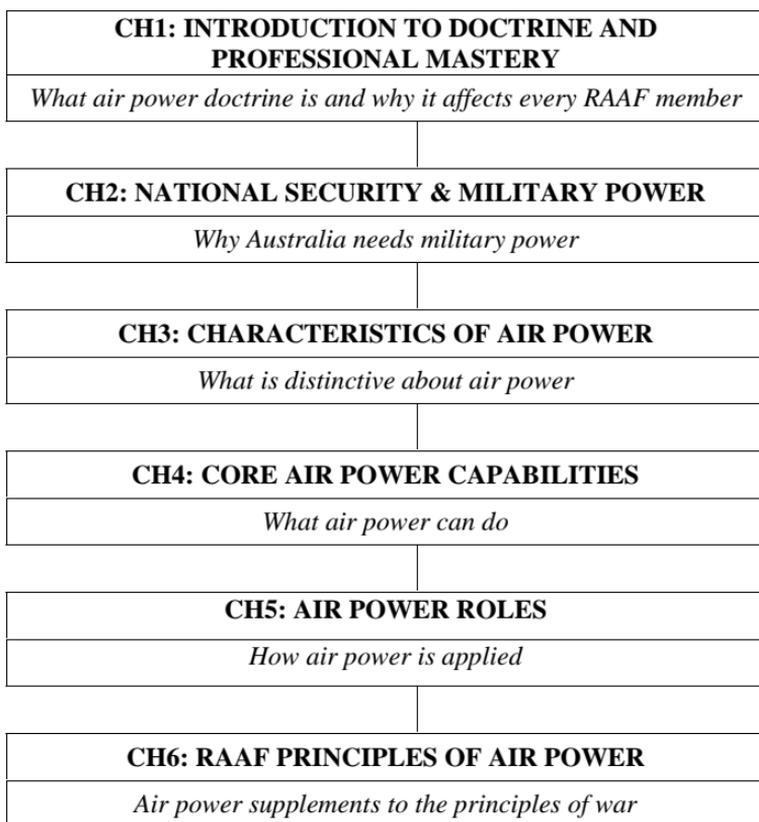| CH6: RAAF PRINCIPLES OF AIR POWER |
| :---: |
| *Air power supplements to the principles of war* |

Figure 1-1: Structure of The Air Power Manual

DOCTRINE

1.2.   The Australian Defence Force (ADF) defines military doctrine as fundamental principles by which military forces guide their actions in support of national objectives. It is authoritative but requires judgment in its application.

1.3.   As shown in Figure 1-2, military doctrine is derived from three sources:

a.   the lessons of the history of war;

b.   theory, which is the outcome of strategic thought; and

c.   demonstrated or desired technological developments.
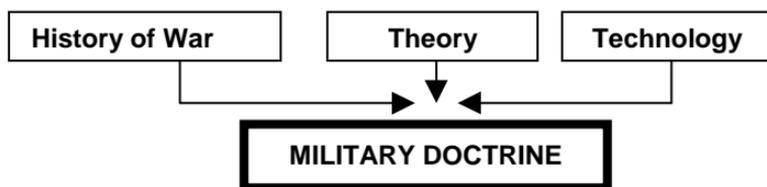
Figure 1-2: Sources of Military Doctrine

1.4.   ADF doctrine is published in two forms - *doctrine* and *procedures - and is drawn extensively from single Service doctrine and procedures.* Military doctrine relates to combat power, and is drawn in part from the air, land and sea power doctrine developed by Air Force, Army and Navy respectively. Procedures describe how doctrine is applied.

1.5.   An understanding of the relationship of basic doctrine to defence strategy and the force structuring process is crucial. The key distinction is that, while doctrine should be a factor in the development of the national defence strategy and, therefore, the force structure, it need not necessarily be an overriding determinant. Especially in peacetime, *basic doctrine's prime purpose is to educate - to provide the foundation of professional mastery.*

1.6.   The distinction can be illustrated by comparing notional strategies. Take the case of a nation with a strategy based on defending its air and sea approaches. When translated into a force structure, that strategy should see priority given to weapons systems capable of conducting control of the air, precision strike and information exploitation operations. If, however, that same nation decided to adopt a strategy based on guerrilla warfare, then it would be unlikely to need control of the air and precision strike capabilities.

1.7.   This leads to the critical point regarding doctrine. Defence strategies can and do change, and different countries have different strategies. Only by possessing a deep knowledge of the *full range* of capabilities their particular form of combat power can generate can military professionals properly advise senior commanders and government. Basic doctrine is the key to that knowledge.

THE NATURE OF AIR POWER DOCTRINE

Combat Power

1.8.   Combat power is defined by the ADF as the total means of destructive and/or disruptive force which a military unit/formation can apply against an opponent at a given time. While the components ascribed to combat power vary widely, those commonly cited include firepower, manoeuvre, command and control, logistics, and human factors such as leadership and morale.

1.9.   Combat power has three environmentally-orientated forms: air power, land power and sea power.

Air Power

1.10.   Air power is a subset of combat power and is defined as the ability to project military force in the third dimension - which includes the environment of space - by or from a platform above the surface of the earth.

1.11.   It should be noted that, as a concept, air power:

a.   implies the use of the air as a medium not merely for transit, as in the case of a projectile, but also for manoeuvre, concealment and surprise; and

b.   relies fundamentally on national arrangements for logistics support; engineering and maintenance; and research, development, test and evaluation.

Air Power Doctrine

1.12.   The Hierarchy of Air Power Doctrine. Air power doctrine is developed and applied as a hierarchy structured broadly in accordance with the levels of war. Importantly, the levels of air power doctrine are neither rigid nor mutually exclusive. The hierarchy comprises:

a.   strategic air power doctrine, normally referred to as *basic air power doctrine;*

b.   operational air power doctrine; and

c.   tactical air power doctrine.

The Air Power Manual presents basic air power doctrine.

1.13.   Basic Air Power Doctrine. Basic air power doctrine establishes the fundamental philosophy for the employment of air power. It presents:

a.   what the RAAF believes to be true and in the best interests of Australia's security;

b.   the essence of Australia's current aerospace school of strategic thought;

c.   a set of endorsed principles for the guidance of ADF commanders contemplating the use of air power or directing the employment of air assets in operations;

d.   the central body of knowledge which - through *professional mastery* as discussed later in this chapter - influences the way *all* members of Air Force think and act in meeting their individual and collective responsibilities for the promotion of Australia's security through air power;

e.   an authoritative source from which joint doctrine and procedures may be drawn; and

f.   an authoritative source from which operational and tactical level air power doctrine is developed.

1.14.   Basic air power doctrine is the responsibility of the Chief of Air Force in accordance with his Chief of the Defence Force Directive which, among other things, calls on him to 'formulate single Service and joint doctrine for the combat employment and support of [Air Force] as required for the potential range of Australian Defence Force operations'.

1.15.   Operational Air Power Doctrine. Operational air power doctrine provides the basis for the planning and conduct of air campaigns waged in the context of joint operations. This level of doctrine comprises procedures issued mainly in the form of instructions to the commanders of RAAF Force Element Groups. It should influence operational activities such as campaign planning and the development of Rules of Engagement. Operational air power doctrine is the responsibility of Air Commander Australia in accordance with his Chief of Air Force Directive.

1.16.   Tactical Air Power Doctrine. Tactical air power doctrine provides the procedural basis for the detailed planning and execution of roles and tasks. This level of doctrine comprises procedures mainly in the form of instructions issued to the commanders of Air Force squadrons and other units, and checklists and other materials issued to guide the safe, effective and efficient operation of specific weapons systems. Tactical air power doctrine is the responsibility of Force Element Group commanders in accordance with their Air Commander Australia Directives.

PROFESSIONAL MASTERY

1.17.   Professional mastery is the discipline of striving continually to achieve the most appropriate, effective and efficient air power for Australia's security. It requires a comprehensive understanding of a profession's body of knowledge and the recognised ability to apply that knowledge in the pursuit of a mission.

1.18.   In the same way that artists do not dominate their craft, professional mastery does not mean gaining dominance over people or objects. In the same way that aircraft, spare parts, flying, administration, intelligence and weapons are not ends but means, professional mastery is not the RAAF's ultimate objective but a process for getting there.

1.19.   The discipline of professional mastery starts with understanding that air power is the responsibility of every member of the Air Force; and that every member must aspire to maximise their contribution to the ADF's ability to *fight and win.* Further, every member of the RAAF must be committed to the objective of Defence being *highly respected for its professionalism, effectiveness and efficiency.* The professional mastery of air power binds together members of the Air Force around *a common identity and sense of destiny.*

1.20.   On a historical note, during the Vietnam War allied air power did not fail, but professional mastery did. More than enough capability was available, and the individual competence and courage of air and ground crews and units was beyond question. But until the Linebacker II campaign in December 1972, the available air power was employed incorrectly in exhausting battles of attrition rather than as an instrument of decisive warfare. If political considerations militated against the decisive application of air power over North Vietnam, then perhaps it should not have been used.

1.21.   Conversely, the success of the air campaign in the Gulf War is testament to professional mastery and a benchmark for the development and application of air power doctrine based on insightful interpretations of past failures and successes, on analysis of rigorous theory, and on advanced technology.

1.22.   Professional mastery means striving to achieve a *special level of proficiency* through a shared vision. It means being committed to a career of continual learning. This explains why Air Force continually develops, publishes, applies and promotes a knowledge of air power doctrine as the central focus of professional mastery.

1.23.   As part of the pursuit of professional mastery, every member of the RAAF has a responsibility to understand air power doctrine. That understanding must be set within a joint Service context.

1.24. Because of the complexity of modem warfare, there is a significant degree of interdependence between the Services. Combat operations in any one environment (namely, aerospace, land and sea) may facilitate or provide direct support to operations in the other environments. While major operations will invariably be joint or combined, the contribution of the single Services is the foundation on which the success of those operations will depend. The roles each Service performs, and the environment in which they operate, require fundamentally different sets of skills.

1.25. The development of specialist single Service war-fighting skills remains a prerequisite to the conduct of joint operations in the ADF

1.26. The Air Force's war-fighting skills are not confined to those which contribute directly to aircraft operations. Many different skills are needed if the RAAF is to support the desired Defence outcome of providing both combat capability and advice to government. Each and every member of the RAAF must:

a.   contribute to Air Force's Mission - *Prepare for, conduct and sustain effective air operations to promote Australia's security and interests;*

b.   by achieving Air Force's Vision - *To be combat-focused force, structured for war and trained to win;*

c.   through established Air Force Goals - *One Air Power Team; Effective; Productive; Community Partnership;* and

d.   in accordance with Air Force's Values - *Esprit de Corps; Professionalism Flexibility; Dedication; Courage; Excellence; Ethical Conduct.*

1.27. Individual skills are the basis of the ADF's war-fighting skills. This is what makes the Services so very different from those careers where a single skill is the profession. In the Air Force, for example, engineering, personnel management, intelligence, flying, education and many other skills are essential, but are secondary to skill at delivering air power. Membership of the Profession of Arms is unique and brings with it the challenge of extreme dedication.

1.28. This challenge is met through *individual skills,* which are the lock that controls the quantity and quality of the air power available from the Air Force's physical capabilities; and *professional mastery,* which is the key.

THE APPLICABILITY OF AIR POWER DOCTRINE

1.29.   Applicability to Navy and Army.   The force structure of the ADF provides Navy and Army with integral air assets with which to generate air power to enhance sea and land operations respectively. Air power doctrine published by the Chief of Air Force is authoritative in the RAAF only. The other Services may, however, wish to be guided by the principles of The Air Power Manual and relevant lower level Air Force doctrinal publications.

1.30.   Applicability to Air Force. Every Air Force member - whether permanent, part-time, civilian or contractor - must subscribe to the Defence Mission - *to promote the security of Australia, and to protect its people and its interests;* and share the Defence Vision - *the Defence Force will be able to fight and win; and the Defence Organisation will be highly respected for its professionalism, effectiveness and efficiency.* Although the RAAF is an independent Service, it exists only to promote the Defence Mission through its own Mission - *Prepare for, conduct and sustain effective air operations to promote Australia's security and interests.* The contribution of each Air Force member to that mission must be made through the *professional mastery* of air power doctrine in accordance with the RAAF's *Vision, Goals* and *Values.*

DOCTRINE AND THE INDIVIDUAL

1.31.   Everyone involved with ADF air power has a responsibility for doctrine. Designated ADF commanders are responsible for issuing specific levels of air power doctrine. The Air Power Studies Centre is responsible for continually developing basic air power doctrine in The Air Power Manual; ensuring that ADF joint doctrine adequately reflects the unique characteristics of air power; coordinating the air power education process for all RAAF members, the Navy, the Army, the Defence Organisation and the wider community; and, finally, promoting an understanding of the contribution air power makes to national, and hence regional, security.

1.32.   Every RAAF commander and supervisor is responsible for encouraging and recognising air power education at unit level. Briefings, air experience, attendance on exercises, and a constant willingness to discuss any issue related to air power are examples of what can and should be done.

1.33.   In the spirit of professional mastery, every individual is encouraged to learn more about air power - through reading and discussion and, if possible, writing. The practice of professional mastery, complemented by one's own set of key skills, will enable unique insights to be drawn as to how air power could be delivered better. And not only by Air Force, but by the ADF through improved joint doctrine. In this sense, all individuals have an equal responsibility - regardless of rank, category, mustering, appointment or location - to do their very best.

NATIONAL SECURITY AND MILITARY POWER

Why Australia needs military power

NATIONAL SECURITY

National Interests

2.1. The first responsibility of government is to promote and protect national interests. Those interests are generally taken to include: national sovereignty and the physical security of the country, its people and territories; the preservation of national institutions and values; and the enhancement of the economic and social well-being of its people. The fundamental aspects of national interests are largely enduring, although they may be modified in response to changing internal and external forces.

National Objectives

2.2. The government pursues a set of national objectives through which to promote and protect Australia's national interests. While again not codified, policy objectives relate to, for instance, political, diplomatic, social, economic and defence outcomes. National objectives tend to be largely enduring.

National Power

2.3. National power may be described as Australia's total capability to achieve its national objectives. National power comprises an array of interrelated capabilities, usually referred to as the *elements of national power.* Among others, political, diplomatic, economic, social and military elements may be identified. Over time, the elements of national power may change generically and comparatively in relation to the national power of other nations.

2.4. The ADF provides the combat power element of Australia's national power.

NATIONAL SECURITY POLICY

Defence Policy

2.5. The application of national power requires the coordinated use of its elements to achieve national objectives. This requires the development of a national security policy. Certain elements of this policy are codified. Australia's defence policy is a case in point.

2.6. The Defence Organisation. Defence policy relates directly to the Defence Organisation and the desired outcome of providing both combat capabilities and advice to government. The Defence Organisation effectively comprises Service and non-Service Programs. Just as the elements of national power are coordinated through national security policy, so the structures, processes and outputs of the Department and the ADF are integrated through defence policy.

2.7. Defence Policy Considerations. Defence policy evolves in response to factors such as:

a.   national interests and objectives;

b.   strategic geography;

c.   a focus on the capabilities of possible adversaries;

d.   the likely form and nature of any conflict;

e.   treaties and agreements;

f.   foreign policy;

g.   current and prospective technologies; and

h.   financial guidance.

2.8. Defence Policy Outputs. Outputs of the defence policy process include:

a.   key planning assumptions (for example, defence self-reliance; that the ADF is to be structured for war and adapted for peace; that ADF operations will be predominantly joint);

b.   military strategy (for example, depth-in-defence; forward defence; people's war);

c.   defence roles and tasks (for example, command, control and communications; air defence; precision strike);

d.   military capabilities (for example, the Jindalee Operational Radar Network; Collins class submarines; F/A-18 aircraft); and

e.   preparedness policy.

2.9. Figure 2-1 illustrates the relationship between national security and defence policy.
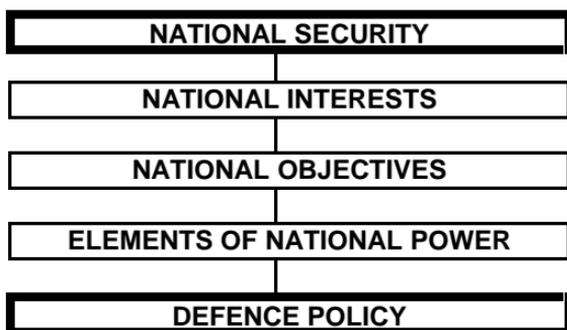
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Figure 2-1: National Security -Defence Policy Relationship

MILITARY STRATEGY

2.10. The ADF defines military strategy as that component of national or multinational strategy which describes the manner in which military power should be developed and applied to achieve national objectives or those of a group of nations.

2.11. The development of military strategy is a continuous process involving the alignment of military objectives, methods and means with national security objectives. Military strategy is the responsibility of those ministers, Defence and other departmental officials and ADF commanders and their staffs operating at the strategic level of war.

2.12. The development of military strategy results in, for instance:

a. advice to government,

b. contingency plans,

c. defining ADF preparedness,

d. strategic concepts,

e. directives to Joint Commanders,

f. amendments to Rules of Engagement,

g. assignment of single Service capabilities to Joint Commanders, and

h. capability development considerations.

CAPABILITY DEVELOPMENT

2.13.   Capability development is the process which provides the ADF with the military capabilities necessary to conduct the principal defence roles and tasks within the framework of the government's defence policy. The capability development process results in a force structure, which is defined as the size, organisation, and technical and operational characteristics of the force-in-being.

2.14.   Capability development is a complex process which addresses the totality of personnel, platforms, assets, sensors, weapons and facilities. It typically involves examination of each defence role, capability analysis, development of capability options, development of acquisition options and, ultimately, approval by the government of materiel solutions which determine the force-in-being.

PREPAREDNESS

2.15.   The effectiveness of the force-in-being is dependent on its level of preparedness. Preparedness is the ability of the force-in-being to undertake operations in a timely manner (that is, readiness) and sustain the activity involved in those operations (that is, sustainability).

2.16.   The readiness and sustainability of the force-in-being is regulated by CDF, on the basis of strategic warning, strategic concepts and other factors, essentially in terms of the lead time stipulated for designated elements of the ADF to be ready for operations; and in terms of how long those operations are to be sustained.

ADF CAPABILITIES

2.17.   Military capability is the combination of force structure and preparedness through which the nation exercises combat power.

2.18.   An ADF capability comprises a designated force structure component and its state of preparedness in specified roles and tasks. The preparedness of Air Force capabilities - until assigned to a Joint Commander - is the responsibility of the Chief of Air Force. RAAF force structure components are organised as Force Elements at the tactical level of war.

2.19.   ADF capabilities, by their very existence and preparedness, represent force that can be applied against an opponent at any given time. Thus, ADF capabilities: represent national military power; exercise combat power; and may be used to threaten the use of force.

2.20.   Actual force is applied as combat power in roles and tasks through the conduct of ADF operations.

ADF OPERATIONS

2.21. ADF operations are usually conducted using ADF capabilities assigned to a Joint Commander, in accordance with the military strategy designed to meet national security (that is, political) objectives, endorsed by government.

COMBAT POWER

2.22. Combat power is comprised of air, land and sea power. It is applied:

a. in peacetime - as a deterrent through the preparedness of ADF capabilities; and

b. in periods of tension and conflict - through deterrence and the conduct of operations.

AIR POWER

2.23. In addition to the power generated by the RAAF, some Navy and Army Force Elements and civilian organisations generate Australian air power. Figure 2-2 illustrates the relationship between national security and ADF air power.

IMPLICATIONS FOR AIR POWER DOCTRINE

Basic Doctrine and Defence Policy

2.24. Defence policy is developed at the strategic level of war. Accordingly, basic air power doctrine - in the form of The Air Power Manual - is a consideration in the development of defence policy. Basic air power doctrine influences the development of military strategy at the strategic level of war, and the capability development process.

Military Strategy - Basic Air Power Doctrine Relationship

2.25. Military strategy does not drive basic doctrine. If properly developed, basic doctrine will provide a set of principles which should provide sound guidance for those involved in decisions about, for instance, the selection of military objectives and the assignment of forces to a Joint Commander.

Capability Development - Basic Air Power Doctrine Relationship

2.26. Finally, basic air power doctrine is not developed with a particular military strategy in mind. Hence, while the capability development process should take basic air power doctrine into account, many other factors will have an overriding influence on the solutions approved by government. Such factors include endorsed defence strategy, the relative importance placed on redressing particular ADF capability gaps, alternative capabilities, evolving technologies, cost of acquisition and operation, and a range of policy constraints.

2.27.   Hence the ADF force-in-being may not even include capabilities addressed in basic doctrine. For example, the lack of an Airborne Early Warning and Control (AEW&Q) capability should not prevent it being examined in air power doctrine. *Basic air power doctrine addresses what air power can do.*
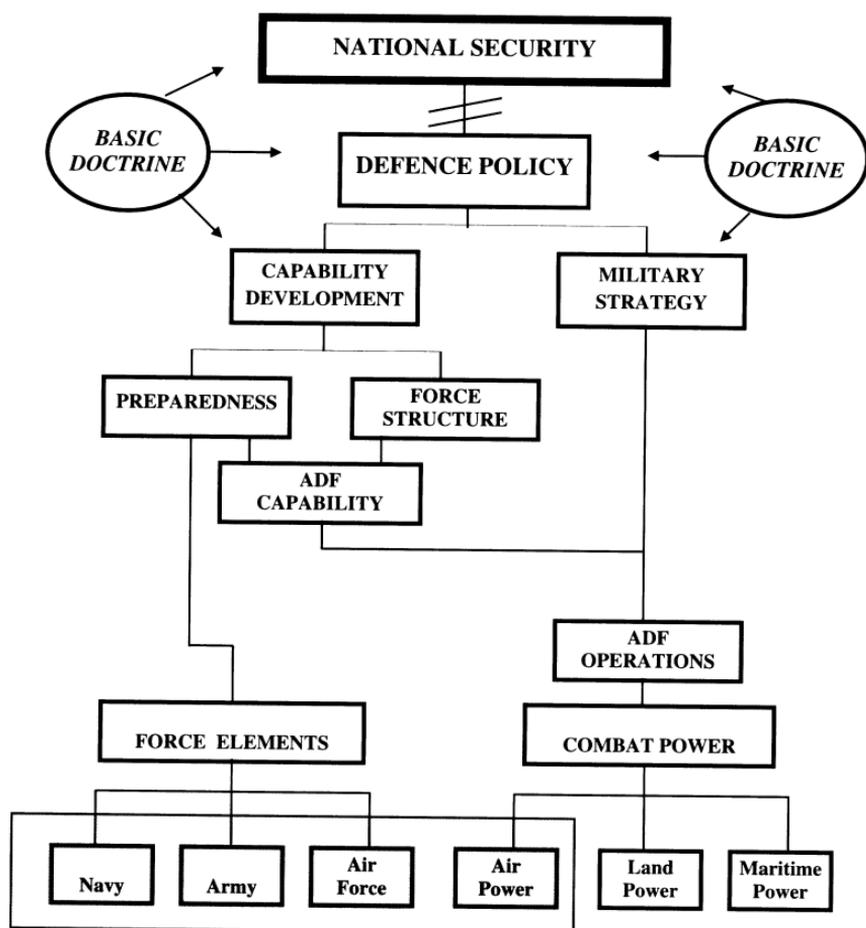

Figure 2-2: National Security-ADF Air Power Relationship

APPLYING MILITARY POWER

2.28.   While defence against armed attack is the government's fundamental responsibility, national security has many other facets. ADF capabilities are inherently flexible, especially those which exercise air power. Consequently, the ADF has considerable potential to contribute to the promotion of Australia's wider national interests, in conjunction with the other elements of national power.

2.29.   Clearly then, air power doctrine must accommodate ADF operational and non-operational roles associated with the foreseeable applications of military power across a wide spectrum of conflict, as indicated in Figure 2-3.
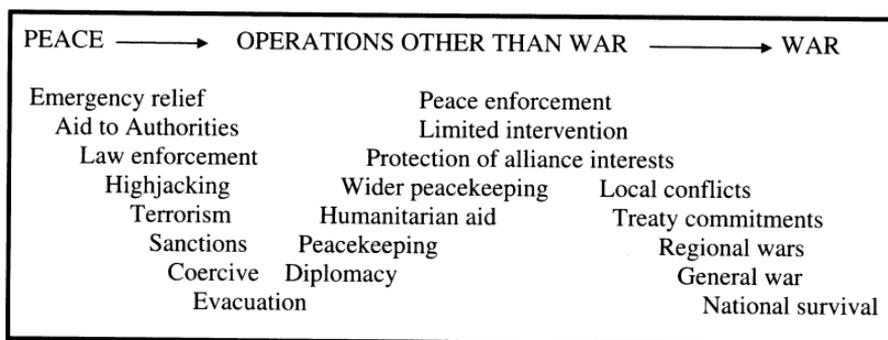
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PEACE ──────►      OPERATIONS OTHER THAN WAR  ──────────► WAR

    Emergency relief              Peace enforcement
     Aid to Authorities            Limited intervention
      Law enforcement          Protection of alliance interests
       Highjacking              Wider peacekeeping    Local conflicts
        Terrorism                Humanitarian aid      Treaty commitments
         Sanctions          Peacekeeping                Regional wars
          Coercive  Diplomacy                           General war
            Evacuation                                  National survival
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Figure 2-3: Spectrum of Conflict

2.30.   ADF operational and non-operational roles are examined below under the headings of deterrence, strategic engagement, combat operations, information operations, peace operations and civil support operations. These headings are neither rigid nor mutually exclusive, but cover the broad range of activities military power may be required to undertake.

DETERRENCE

2.31.   Australia's clear and unequivocal intention is to defend itself. However, Australia's defence posture is essentially defensive. Australia will not use armed force except in response to the use or threat of force by others. By force structuring and preparing ADF capabilities in peacetime, Australia is not only defending itself, it is helping to make armed conflict less likely. That is, the combination of firm intention combined with an appropriate range of credible capabilities helps to deter aggression against Australia.

2.32.   Australia does not develop capabilities to act primarily as a conventional deterrent force. Rather, deterrence is the secondary effect of being manifestly intent and capable of exercising combat power. Nevertheless, deterrence is an important application of military power.

2.33. Deterrence represents an application of military power provided *indirectly* by the levels of ADF capabilities structured and prepared to perform ADF operational roles. The deterrent effect is indirect because it is the *existence* of the capabilities, not their employment, that deters.

STRATEGIC ENGAGEMENT

2.34. Like our economic prosperity, Australia's future security is inextricably linked to the security and prosperity of Asia and the Pacific. Australia's strategic engagement with the region is an integral element of our national effort to make our place in the region. Our defence relationships underpin the development of closer links in other fields. Our ability to defend ourselves and contribute to regional security does much to ensure that we are respected and helps us engage in the region by creating confidence that we can manage uncertainty and assure our security.

2.35. Effective strategic engagement requires the coordinated application of several elements of national power, including diplomacy, trade and the military power provided by ADF capabilities.

2.36. Like deterrence, strategic engagement serves to make the use of armed force against Australia and its wider interests less likely. Examples of the application of military power for strategic engagement include:

a. development and maintenance of high-level military contacts between the ADF and foreign defence forces;

b. active membership of multilateral agreements such as the Five Power Defence Arrangements (incorporating the Integrated Air Defence System);

c. bilateral agreements, such as that between Australia and Indonesia;

d. hosting permanent deployments and major exercises in Australia;

e. interoperability with major US capabilities;

f. encouragement of wide regional attendance at major defence-related conferences and workshops;

g. personnel exchanges;

h. staff college exchanges; and

i. opening a wide range of ADF training courses to regional attendees.

COMBAT OPERATIONS

2.37. Armed force could be used against Australian interests in one or more of the following forms:

a. general war,

b. major regional conflict,

c. low-level military operations,

d. attacks on or other interference with shipping engaged in trade, and

e. attacks on or other interference with international or national airline operations.

2.38. In the event that Australia's total national power fails to deter the threat or use of armed force, military power will be applied to achieve military objectives linked directly to the national strategic objectives and desired end-state to the conflict as endorsed by the government. In meeting such threats, the ADF may operate independently or as a member of a coalition.

2.39. This does not mean that other attempts to resolve the conflict will be suspended. To the extent practicable, other elements of national power will continue to be brought to bear to achieve the desired outcome through a coordinated national strategy, of which military strategy and military power are only parts. Typical components of an integrated national strategy include:

a. maintenance of open channels of communications and a willingness to resolve the conflict by means other than armed force;

b. enlistment of moral and material support from allies;

c. pursuit of diplomatic initiatives through the UN and other appropriate forums;

d. imposition of economic pressure, such as sanctions, preferably on a multilateral scale;

e. bringing selected command and control, combat and combat support capabilities to their operational level through ADF preparedness mechanisms; and

f. undertaking/accelerating ADF equipment upgrades and modifications.

2.40.   Concurrently, military power could be applied through a range of measures including:

a.   increasing the readiness for combat operations by increasing the complexity and tempo of single Service and joint training activities, the acceleration/deferment of deeper maintenance, and calling out Reserve forces;

b.   deterring escalation of the conflict by rapid force projection and/or through deployments to, and exercising in, the likely Area of Operations; and

c.   applying military power forcefully and decisively, to resolve the conflict rapidly on Australia's terms, in accordance with government-endorsed Rules of Engagement and within the Law of Armed Conflict.

INFORMATION OPERATIONS

2.41.   Information about the enemy and own forces has been a feature of warfare throughout history. Information is the life blood of command and control; it is vital to the development of military strategy and the execution of tactics; and it is the basis of deception and active countermeasures. The dependency of ADF operations on information is certain to increase in the era of *information age warfare.*

2.42.   Information warfare consists of the acquisition and exploitation of *data, knowledge and wisdom.* It may be defined as the denial, exploitation, corruption or destruction of an adversary's information; the protection of own information; and the exploitation of own information.

2.43.   Information warfare treats information as:

a.   operating in its own environment - a domain distinct but not exclusive of the air, land and sea environments;

b.   possessing its own power as a weapon; and

c.   a target of the highest value.

2.44.   Information is not technology. Increasingly, however, to achieve its full potential, information depends on technology for its acquisition, transmission, storage and manipulation.

2.45.   Information warfare reflects the *information revolution.* In turn, that revolution reflects the rapid advance of computerised information and communications technologies and related innovations in organisation and management theory. In both its technological and non-technological aspects, the information revolution has crucial consequences for military doctrine, military strategy and tactics, and military capabilities and their organisation.

2.46. Information operations could involve:

a. every element of national power, including: military capabilities, banks, stock markets, electronic funds transfer, telecommunications, manufacturing industry, and education systems - no organisation can function without information;

b. any attack against any civil or military information function, regardless of the method employed, noting that a telephone exchange, for example, may be disabled by a precision-guided bomb or a potent software virus;

c. the protection of own civil and military information functions, noting that the protection of a telephone exchange may require both active and passive measures, such as hardening and anti-virus software; and

d. a set of defensive measures, the lack of which might by itself lead to defeat.

2.47. The Defence Organisation has information warfare capabilities which specialise in, for instance, electronic information gathering and wide area surveillance, and which enhance the operations of numerous elements of national power. Those capabilities are inherent to various degrees in many elements of the ADF

2.48. Importantly, information warfare can be conducted by national instruments other than military power, and when undertaken using military power does not necessarily involve the use of force.

PEACE OPERATIONS

2.49. The application of military power may include the following peace operations:

a. United Nations (UN) peacekeeping operations, and

b. UN peace enforcement operations.

2.50. Those international responsibilities might also be met under the auspices of a specially formed coalition force.

UN Peacekeeping Operations

2.51. The purpose of UN peacekeeping operations is to bring hostile parties to an agreement. The ADF defines peacekeeping operations as those that involve military personnel to help restore and maintain peace in an area of conflict with the consent of all parties.

2.52. ADF doctrine states that peacekeeping operations may include:

a. observer missions,

b. inter-positional force,

c.   preventive deployment,

d.   internal conflict resolution,

e.   security assistance to the civil authority,

f.   protection of humanitarian relief, and

g.   guarantee of right of passage.

2.53.   In terms of national security, peacekeeping operations are related directly to ADF capabilities, their force structure and preparedness to perform operational roles, and their potential to deliver non-combat related outputs in the wider national interest.

UN Peace Enforcement Operations

2.54.   UN peacekeeping operations rely wholly on the subject parties agreeing to intervention and member states being willing to implement resolutions. The UN Charter clearly states that when all other measures have failed, the use of military force to enforce the Security Council's decisions remains an option. UN-sponsored military activities, although based on the concept of peacekeeping, have varied from the deployment of a number of individuals in the role of observers, to intervention operations involving large formations of air, land and sea forces for protracted periods, fighting a conventional war.

2.55.   Peace enforcement operations could include military and/or non-military measures. The UN may impose sanctions against the belligerent(s) in an attempt to deny external support. Typical examples include economic sanctions and arms embargoes. The imposition of sanctions, while non-military, may involve the threat or use of force.

CIVIL SUPPORT OPERATIONS

2.56.   The application of military power may also include civil support operations. The following are examples of such operations, only some of which may require the use of force:

a.   Defence Force Aid to the Civil Power,

b.   Services Assisted Evacuation and Services Protected Evacuation,

c.   Search and Rescue / Combat Search and Rescue, and

d.   Defence Assistance to the Civil Community.

Defence Force Aid to the Civil Power

2.57. Military power may be applied as Defence Force Aid to the Civil Power (DFACP). Examples of situations in which the ADF may be involved in DFACP are:

a. counter-terrorist operations,

b. controlling public movement,

c. picketing and guarding,

d. operations against organised crime, and

e. operations against piracy.

2.58. In terms of national security, DFACP is related directly to ADF capabilities *with the appropriate skills, training and equipment.*

Services Assisted and Services Protected Evacuation.

2.59. The ADF describes Services Assisted Evacuation (SAE) and Services Protected Evacuation (SPE) as operations concerned with the safe recovery of Australians, or other approved non-combatants, from situations of real or potential peril.

2.60. SAE and SPE may be needed in a wide range of circumstances including:

a. evacuation necessitated by civil disorder or military conflict outside Australian territory;

b. evacuation from an Australian flagged ship or airliner under threat from hostile forces;

c. evacuation of Australian diplomatic staff from an embassy or foreign post under threat;

d. support to UN or allied forces engaged in the evacuation of threatened non-combatants from an area of present or potential conflict; and

e. evacuation necessitated by a natural disaster.

2.61. In terms of national security, SAE and SPE are related directly to ADF capabilities, their force structure and preparedness to perform operational roles, and their potential to conduct non-combat activities in the wider national interest.

Search And Rescue / Combat Search And Rescue

2.62. The ADF defines search and rescue (SAR) operations as those in which ADF assistance is provided to civilian agencies and the community, and also involves operations directed towards saving lives of ADF personnel in peace and war.

2.63. Other SAR authorities in Australia include the Department of Transport and Communications, Air Services Australia, and State/Territory police forces.

2.64. As is the case with SAE and SPE, the ADF's capacity to conduct SAR is derived from its operational capabilities.

2.65. The possibility that SAR might have to be conducted under the threat of attack reduces the option of using civilian resources and highlights the need for a Combat Search and Rescue (CSAR) capability. The absence of a CSAR capability could be a limiting factor on air operations by inhibiting the recovery of downed aircrew.

Defence Assistance to the Civil Community

2.66. Military power may be applied as Defence Assistance to the Civil Community (DACC) which the ADF defines as the provision of Defence resources for the performance of tasks which are primarily the responsibility of the civil community and should be regarded as the exception rather than the rule.

2.67. DACC includes:

a. assistance to State/Territory Governments during civil emergencies/disasters;

b. assistance to State/Territory Governments for significant events (for example, anniversaries, international sporting events);

c. counter-disaster training;

d. aeromedical evacuation;

e. law enforcement tasks where there is no likelihood of ADF personnel being required to use force; and

f. training assistance to Federal/State/Territory police forces (for example, counter-terrorism training).

IMPLICATIONS FOR AIR POWER DOCTRINE

2.68. The applications of military power are numerous, involve operations other than those for which ADF capabilities are force structured and prepared, and may or may not require actual force to be exercised as combat power. Because military doctrine is based on the history of war, theory and technology, an analysis of these factors in relation to the applications discussed above should reveal some implications for air power doctrine.

2.69. The history of war shows that military capabilities often are not employed in war as planned in peacetime. The building blocks of operational roles are usually the same. What differs is their employment in terms of national and military strategy. The implication is that basic air power doctrine needs to take a broad approach, notwithstanding the persuasiveness of enduring geopolitical factors and the likely form and nature of conflict. On the other hand, sound tactical doctrine will enable the flexible employment of capabilities in operations designed to fulfil a specific range of military and political objectives.

2.70. Turning to theory, wars usually begin when two nations disagree on their relative strength, and they usually cease when the fighting nations agree on their relative strength. Agreement or disagreement emerges from the shuffling of the same set of factors. Thus each factor is capable of promoting war or peace. This highlights the importance of strategic engagement and its primary foundation, namely, professional, effective and efficient military capabilities. In this sense, air power doctrine at all levels must guide the conduct of operational roles, usually in joint operations, to maximise ADF combat power.

2.71. And finally, a closely related but perhaps even greater challenge is provided by the technological aspects of the *information revolution.* Information operations are likely to have an even greater impact on national security than the advent of air power did a century ago. Basic air power doctrine is the domain which, in the first instance, must address this challenge.

CHARACTERISTICS OF AIR POWER

What is distinctive about air power

THE NATURE OF AIR POWER

3.1.　　Success in combat is a function of the relative strengths and weaknesses of the opposing forces and how they are exploited. Those strengths and weaknesses relate both to physical and psychological factors. This chapter deals primarily with the physical characteristics of air power. Some of the implications drawn, however, relate to how air power can be used to influence an adversary's thinking and undermine his will.

3.2.　　The characteristics of air power are derived from the sciences of, for example, aerodynamics, engineering, physics, telecommunications, computing, economics, meteorology and logistics. This could easily be misinterpreted as implying that air power does not have a human dimension. Nothing could be further from the truth for, ultimately, both the exercise of and response to the effects of air power depend entirely on people.

3.3.　　The characteristics cited in this chapter:

a.　　are strengths or limitations in a relative sense; that is, they can be either a strength or a limitation depending on circumstance and perspective;

b.　　are not necessarily better or worse than the individual characteristics of land power or sea power;

c.　　are not addressed in any order of precedence;

d.　　are not discrete entities as they often overlap or are closely related; and

e.　　are not ends in themselves but are simply important factors which need careful consideration in the development of basic doctrine.

3.4.　　The key to the nature of air power is found in the synergistic effect of its characteristics, rather than in the individual effects. And the combination of air power's characteristics is what differentiates it from the other forms of combat power and provides the foundation for basic air power doctrine.

STRENGTHS OF AIR POWER

Versatility

3.5. Air power is versatile, in that:

a. Air assets can be diverted in -flight from one task to another or from one target to another.

b. Multi-role weapons systems can be quickly reconfigured for alternative roles.

c. Multi-mission weapons systems can perform more than one specialist task during a single sortie.

d. Identical assets can produce a wide range of effects.

e. The same assets can be operated over a wide range of tempos - aircraft can be loaded and immediately ready for operations, but held on alert; or the same assets can be operated around the clock for considerable periods of time; or located elsewhere on task and relocated quickly.

3.6. While this inherent versatility gives governments and operational commanders many options, it comes at a cost in terms of acquisition, operation, training and logistic support.

3.7. Training is a case in point. The potential to exploit the versatility of task switching of airborne multi-role and multi-mission aircraft, and of the air power available through high operational tempo, comes only with highly trained aircrews and responsive maintenance, engineering and intelligence personnel. Air power simply does not come from a standing start, and high levels of competence across all approved roles is the price to be paid for versatility.

Reach

3.8. About 70 per cent of the earth's surface is covered by water and 30 per cent by land. Air, and space above it, covers 100 per cent of the earth's surface. Aerospace power has great reach since it is able to operate unconstrained by physical barriers anywhere over the surface of the earth.

3.9. Forward deployment is one option for exploiting air power's potential reach. Whether that is available or not, the use of air -to -air refuelling as a *force multiplier* can extend radius -of -action many times over and/or greatly extend time on task.

Perspective

3.10. Perspective is the way a force looks at the battlespace. Land forces look over the terrain, maybe to the next ridgeline. Sea forces look to the horizon. Air forces, by

contrast, can often see over an entire battlefield, and over vast areas of the entire battlespace. By their nature, air forces occupy the high ground.

3.11. Unlike surface -based platforms, aerospace -based surveillance and reconnaissance platforms often can operate effectively outside the threat envelope of hostile defensive systems. Consequently, air power's perspective greatly complicates the enemy's defensive strategy and tactics.

Speed

3.12. Speed defines the ability to cover distance quickly and to apply force with little delay. Implicit in this characteristic is the notion of going anywhere and covering long distances. Speed is therefore associated with penetration and pervasiveness.

Penetration

3.13. Given its reach, perspective and speed, aerospace power is able to penetrate enemy territory, exhibiting high levels of manoeuvre at the strategic, operational and tactical levels of war.

3.14. Surface manoeuvre warfare is based on containing the enemy's strengths, probing for and then penetrating his points of weakness, and then hitting decisively. The presence of physical barriers and limited speeds of advance led to the concept of the *air -land battle,* in which air power is indispensable to penetrating and hitting decisively. When used appropriately, air power greatly enhances land and sea power.

3.15. Conversely, air power can be used, without the need to contain, to penetrate directly deep into enemy territory to strike a wide range of strategic and other targets. Moreover, it can be applied with shock effect, departing rapidly without an audit trail. And finally, the threat of air power's potential reach and penetration can be conveyed to an aggressor to *coerce* without actually resorting to offensive action.

Pervasiveness

3.16. Pervasiveness, or ubiquity, is a strength of aerospace power derived from its characteristics of reach, perspective, speed and penetration. Pervasiveness allows air power to be employed in almost every facet of warfare, either to enhance land power and/or sea power, or in its own right.

Responsiveness

3.17. With its versatility, reach, speed and pervasiveness, air power is highly responsive. It can be deployed rapidly from its home base or from a forward operating base, and undertake operations almost immediately.

3.18. Because of its inherent responsiveness, air power is liable to be misused. The employment of air power needs careful consideration at all levels of war. It can

be used tactically when it should be used strategically; and vice versa. It can be used jointly when it should be used independently; and vice versa. It can be used too early or too late. However, there is no doubt that the availability of aerospace power confers on decision makers at all levels many alternative methods and means and the capacity to pursue a wide range of outcomes.

Concentration of Force

3.19. Air power can be concentrated rapidly and effectively in time and space, when and where needed, using its characteristics of versatility, reach, speed and responsiveness.

3.20. The forces involved can be:

a. dissimilar in type of weapons systems or primary role;

b. operated or deployed from widely dispersed locations;

c. concentrated in hours, or a few days at most; and

d. employed together without the need for lengthy in -area familiarisation or work -up periods.

Tempo

3.21. In combination, the strengths listed above allow air power to achieve a unique and potentially decisive operational tempo. Air power can be employed jointly with land power and sea power, or independently, against a number of targets to achieve outcomes at each of the three levels of war.

Concurrent Operations

3.22. Because of its responsiveness, reach and tempo, air power is able to pose a threat across a wide geographical area by performing multiple roles and missions. Consequently, it can be employed in concurrent (or 'parallel') operations in which a number of military objectives are engaged simultaneously. In contrast, surface operations tend to be sequential, with only one objective being engaged at a time.

3.23. Concurrent operations can greatly enhance a commander's ability to control the tempo of the battle, and are far more likely to disorientate an adversary's situational awareness. Furthermore, the characteristics which enable air power to conduct concurrent operations make it possible for the same forces to participate in two or more concurrent campaigns.

Asymmetric Response

3.24. A further effect of air power's versatility, reach and responsiveness is its ability to respond to an attack or other provocation in ways totally unrelated to the

initial event. This is known as an asymmetric response, and enables a commander to target an enemy weakness rather than a strength.

3.25. For example, a threat to shipping can be countered by a demonstration attack on a designated target unrelated to the initial threat; or the shadowing of own shipping could be answered by the illumination of the adversary's warships with an offensive weapons system.

Lethality

3.26. Increasingly, any target which can be located can be struck with a precision - guided munition. The destructive power applied through air -dropped or air - launched stand -off munitions is effective against all but specially hardened targets constructed deep underground. And even these may be susceptible to astutely planned strikes against their support systems, such as communications, power, access and ventilation; or by using specifically designed penetrator weapons. Today, there is little on the earth's surface which is not vulnerable in almost any conditions of visibility to air power's lethality.

3.27. Air power is also lethal in many other respects. Examples are:

a. the engagement of air targets beyond visual range;

b. the pin -point location of targets through surveillance/reconnaissance; and

c. the destruction of sub -surface targets, such as submarines.

Casualty Minimisation

3.28. The judicious use of air power minimises casualties by:

a. conducting precision attacks and thereby causing minimum collateral damage, including enemy civilians and, indeed, armed forces; and

b. placing a minimal number of own combatants at risk by utilising aircraft, uninhabited combat air vehicles (UCAV) or uninhabited reconnaissance air vehicles (URAV).

3.29. With its responsiveness, speed, reach and versatility, air power provides options which can be used by governments to minimise casualties and to avoid becoming enmeshed in a contingency. Such considerations are of increasing concern to democratic governments.

LIMITATIONS OF AIR POWER

Base Dependence

3.30. The biggest limitation of air power is its dependence on air bases, be they fixed, or mobile as in the case of aircraft carriers. Most fixed -wing aircraft depend fundamentally on air bases which are large in area; well -developed in terms of pavements, power, water, and airfield approach aids; well supported by command and control systems; and well -stocked and continually re -supplied. Because of these features, air bases are extremely difficult to secure. Further, their high value makes them a focus of enemy intelligence and a focal point for attack. Personnel and equipment are probably more at risk at a permanently sited air base than in a dispersed brigade area.

3.31. Air bases are vital points. This limitation needs to be countered by:

a. redundancy through a network of alternative operating bases;

b. redundancy through the construction of air bases with well -spaced and/or multi-purpose operating surfaces;

c. forward operating bases, for either basing or transient operations;

d. ground and air defensive measures, both active and passive;

e. base security;

f. air -to -air refuelling, which allows aircraft to operate from airfields in more protected rear areas;

g. preparation of personnel; and

h. rapid repair of battle damage to generate missions.

Fragility

3.32. Air power is fragile. All other things being equal, aircraft and their crews are soft targets. Similarly, air bases are vulnerable to air and ground attack.

3.33. Although fragile, air power is not necessarily vulnerable, because of the range of protective measures which can be applied. These measures include:

a. offsetting characteristics - speed, altitude and manoeuvrability;

b. low observable technologies (stealth) - to reduce aircraft radar cross section, infra -red signature and engine noise;

c. aircraft self -defence systems - electronic counter measures, chaff and flares;

d.   tactics - route planning, deception and surprise;

e.   redundant aircraft systems - flight controls, hydraulics, electrics, etc; and

f.   air base defence.

Limited Payload

3.34.   Aircraft carry limited payloads by comparison with ships and many land vehicles. This weakness is offset to various degrees by air power's strengths of responsiveness, speed, reach, tempo and lethality.

3.35.   For example, attrition warfare has long been superseded by more dynamic military strategies. Increasingly, concentration of firepower against a decisive point is stressed. Less and less emphasis is placed on the sheer volume of firepower delivered. More effective and efficient weapons systems now permit precision attack. Because of its other attributes, air power places the enemy's *centre of gravity* and *vital points* increasingly under threat of destruction or neutralisation, despite the limited amount of payload carried.

3.36.   Taking airlift as another example, the equation is one of ten tonnes today or a thousand tonnes in ten days time. Ten tonnes today may often be the better solution, and sometimes the only solution.

Information Dependence

3.37.   Air power is critically dependent on information. This dependence is apparent in the need for:

a.   effective command and control - air power is a potent weapon, but it relies on purposeful direction and detailed planning and coordination; and

b.   intelligence - the accurate delivery of precision -guided munitions and other payloads depends on accurate target information.

3.38.   On the other hand, air power's use of the third dimension enables it to exploit information to provide the knowledge required for the conduct of successful operations by air, land and sea forces.

Cost

3.39.   Air power is expensive to acquire, operate and maintain. This characteristic applies equally to weapons systems, simulators, aircrew, specialist enabling personnel, ground support equipment, spares and air bases.

3.40.   As with other characteristics, the costs of air power are not absolute but need to be assessed in terms of *relative* benefit -cost.

Impermanence

3.41.   Air power by itself is unable to hold ground, while the costs for a small or medium sized air force of maintaining a semi-permanent presence can be prohibitive.

3.42.   However, air power increasingly can establish presence through surveillance, reconnaissance, air patrols and rapid response to detected/reported incidents on the surface and in the air. This presence, which can be permanent in its *effect, is* called *air occupation* and has been practised successfully in particular circumstances for six decades.

3.43.   The growing use of satellites, uninhabited aerial vehicles, advanced strike aircraft armed with stand -off precision weapons, and Airborne Early Warning and Control systems will continue to enhance the importance and value of air occupation.

3.44.   Physical permanence attracts its own penalties such as political and military inflexibility, vulnerability, and the need to establish and maintain lines of communication. The 'remote' permanence which air power can provide in certain circumstances through air occupation may be preferable to surface occupation.

DOCTRINAL IMPLICATIONS

3.45.   Air power without *adequate doctrine is* like having all the ingredients but no recipe. For example, the rapid concentration of different air assets may be possible, but they will not be effective in combat unless they are instantly interoperable.

3.46.   The efficacy of air power depends critically on *command and control.* Air power is a very complex business and all commanders should be certain that they have adequate levels of professional advice to guide its employment. Command as such is not the issue. Effective control is the key to the unity of effort needed to maximise the benefits of air power. This control is essential to focus the overall effort of the limited available air assets against the adversary's Observation - Orientation -Decision -Action (OODA) system.

3.47.   Each decision maker must have an acute understanding of air power's strengths and limitations. This applies at all levels of war and to all commanders- joint, air, land and sea. Thorough planning based on *professional mastery is* the key. For instance:

a.   Strategically - use air power's superior reach, responsiveness and lethality to exploit the uncertainty of asymmetric response, and to strike directly at vital points, achieve strategic surprise and shock, and confound the enemy's situational awareness.

b.   Operationally - attain military objectives using air power's versatility, reach, tempo, penetration and lethality, rather than undertaking an attrition campaign. Air power may also permit the conduct of concurrent operations and campaigns.

c.   Tactically - exploit the element of surprise by dynamic leadership, high quality crews, innovative tactics, deception and speed of manoeuvre.

3.48.   The effectiveness of air power (and for that matter land and sea power) is directly proportional to *situational awareness* - that is, the commander's knowledge of all possible threats in terms of their location, identification, track, firing envelope, projected location and the optimal methods of making or avoiding an engagement. Situational awareness is Observation-Orientation by another name and has strategic, operational and tactical dimensions:

a.   Strategically - situational awareness is strategic warning; that is, effective situational awareness will provide timely warning of potential threats to national security.

b.   Operationally - situational awareness gives a commander knowledge dominance in an Area of Operations.

c.   Tactically - situational awareness enables a person to dictate activities in the battlespace.

3.49.   The *balance* of a nation's air power must be consistent with defence policy and strategy. Issues affecting balance include:

a.   The offensive/defensive mix - because of its characteristics, air power is an inherently offensive weapon.

b.   The capability mix-which must exploit air power's strengths and complement the national defence strategy.

c.   Aircraft to personnel ratios - the achievement of high tempo from a given number of platforms is dependent upon both adequate numbers and the associated skill of air and ground crews.

d.   Aircraft to weapons ratios - advanced weapons platforms are only as good as the available weapons.

e.   Aircraft/air training costs-highly complex weapons systems employed in complex operations must be supported by effective training. To ignore this relationship is a recipe for mission failure at best, defeat at worst.

f.   Infrastructure costs - the potency of weapons systems is only as good as the security of their air bases.

3.50.   This chapter has examined the characteristics of air power and their implications for doctrine. The conclusions drawn lead to the identification of the *core air power capabilities* presented in Chapter 4.

CHAPTER 4

CORE AIR POWER CAPABILITIES

What air power can do

DEFINING CORE AIR POWER CAPABILITIES

4.1.   The term *capability is* used in this manual as meaning the quality of being capable; of having a particular capacity or ability. The word *core* is used as meaning the central, innermost, or most essential part of anything. Accordingly, the term 'core air power capabilities' defines the fundamental effects generated by the use of military   force in the third dimension, including space.

4.2.   The RAAF recognises five core air power capabilities, as follows:

a.   control of the air,

b.   precision strike,

c.   precision engagement,

d.   rapid force projection, and

e.   information exploitation.

4.3.   Before examining the core capabilities, three critical points must be made. First, all five core capabilities need not be present in an air force. Those that are present are likely to be determined by national policy, the resources provided by government, and defence strategy. For example, a country which adopts guerrilla warfare as its defence strategy is unlikely to need 'control of the air' and 'precision strike' capabilities; while many air forces are deficient in capabilities simply because of financial constraints.

4.4.   However, it is axiomatic that professional airmen will have a deep understanding of air power's full potential, regardless of their own service's capabilities.

4.5.   Second, air power which is not based on a high quality, wide range of *vital enabling functions will* eventually fail through its inability to sustain successful operations or, in extreme cases, to regenerate itself. The time taken to fail will be directly related to the lack of depth and quality of the vital enabling functions.

4.6.   *The enabling function cannot achieve a military outcome in its own right, but it is integral to every core air power capability.* For example, the most advanced strike aircraft which has not been refuelled, or has not been armed with weapons, or is grounded for the lack of an inexpensive spare part, or whose aircrew are sick, or badly trained, etc, etc, will be useless.

4.7.   Vital enabling functions comprise at least the following:

a.   recruitment,

b.   training and education,

c.   personnel services,

d.   administration,

e.   logistics,

f.   facilities,

g.   air base operability,

h.   ground defence,

i.   research, development, test and evaluation, and

j.   industry support.

4.8.   And third, core capabilities are applied through *campaigns*. Campaigns are the means of achieving the operational level commander's assigned military objectives, and are defined as 'a controlled series of simultaneous or sequential operations designed to achieve an operational commander's objective, normally within a given time or space'.

CONTROL OF THE AIR

4.9.   The primary air power capability is control of the air. Control of the air is the ability to use the third dimension and the surface below it without being threatened or attacked effectively by the enemy's air power.

4.10.   Control of the air is an end and a means. A nation will surrender some of its strategic relevance unless it can exercise a degree of control of the air. Without control of the air a nation jeopardises its sovereignty and places its people, infrastructure and international lines of communication at the mercy of enemy air attack. In this sense, control of the air is an end in itself.

4.11.   Control of the air is almost invariably a prerequisite for successful defensive and offensive military operations on and beneath the sea, on the ground, and in the air. Without control of the air a nation can conduct campaigns only at the risk of high attrition of its platforms and combatants and greatly diminished chances of success. In this sense, control of the air is a means.

4.12. Control of the air is a relative condition in both time and space, as follows:

a. **Local air superiority** - is the result of the exercise of air power specifically to ensure that, for a limited period of time and over a given area, enemy air power does not pose a serious threat to one's own population, national infrastructure or international lines of communication, or to the success of one's own air, land or sea operations.

b. **Air superiority** - applies for a lengthy period of time over an area where enemy air power does not present any threat to one's own population, national infrastructure or international lines of communication, or to one's own air, land or sea operations.

c. **Air supremacy** - applies when enemy air power in no way presents a threat to national sovereignty, or to one's own air, land or sea operations.

4.13. Air power may be used to achieve control of the air through a combination of offensive and defensive measures.

a. **Offensive** measures involve seeking out and reducing the enemy's air power capabilities and their threat to one's own control of the air. Targets in this case include enemy air defence systems, aircraft in the air and on the ground, air and ground crews, command and control systems, air bases and supply nodes.

b. **Defensive** measures deny the enemy control of the air by attacking his intrusive air power in the air, and nullifying enemy air attacks.

4.14. While there is a need to take both offensive and defensive action from time to time, offensive measures are generally preferable because they:

a. take the initiative and exploit air power strengths such as concentration of force, reach, speed, pervasiveness, penetration and lethality, thereby generating the potential to achieve air supremacy, or at least air superiority, rather than having to fight reactively for air superiority, or at least local air superiority;

b. minimise air power limitations such as base dependence and impermanence; and

c. minimise the threat to national sovereignty and one's own land and sea operations.

Implications for Campaigns

4.15.   With regard to the threat posed by enemy air power, it is worth recalling that:

a.   Australia and its territories have enjoyed air supremacy since 1943, and

b.   Australia's Navy and Army have enjoyed the benefits of a high degree of air superiority wherever they have operated since about 1944.

4.16.   This most favourable situation underlines three important points. First, control of the air is a core air power capability. Second, control of the air has to be fought for. Third, land and sea power can contribute to control of the air through their organic capabilities, including anti-air radars, weapons and electronic warfare.

4.17.   Systems like AEW&C and air-to-air refuelling have changed the scope for control of the air operations by greatly enhancing reach, and greatly increasing the prospects of deterring and intercepting platforms *in the air.*

PRECISION STRIKE

4.18.   Precision strike is the ability to use air power to destroy or neutralise targets and to undermine the enemy's will to fight through the application of firepower with a high degree of lethality, discrimination and accuracy.

4.19.   Precision strike has long been an elusive objective of air power. Technology has now made theory a reality. Today, the precision air strike capability can be employed with great versatility, reach, speed, penetration, pervasiveness and lethality to destroy or neutralise any surface target. The Gulf War clearly showed that any target that can be located can be destroyed or neutralised by day or night, in almost any weather, with an accuracy measured in a few metres or less.

4.20.   'Precision' does not necessarily imply only the use of precision- guided munitions. The term incorporates the employment of precise intelligence, knowledge, navigation, air and ground skills, and so on. In the right circumstances, precision strike can be effected using so-called 'dumb' bombs, possibly in very large numbers.

4.21.   The application of precision strike may be termed strategic or operational or tactical *depending solely on the outcome sought.* Whether precision strike is strategic, operational or tactical has nothing whatsoever to do with the distance to the target, the type of platform employed. the number of platforms employed, the type of weapons delivered, or even the physical target struck.

4.22.   Take the following example. A precision strike is selected as the *means* of destroying a single building with a hardened basement located on the outskirts of an enemy city. The *method* selected is to deliver a penetrating weapon through the roof into the basement and destroy the building with blast and shock. The strike is

termed strategic if its *objective is* to destroy the building because it houses key senior functions of the enemy government. The strike is termed operational if its *objective is* to destroy the building because it is an enemy maritime headquarters. And it is tactical if its *objective* is to destroy the building because it is a strong point holding up the advance of one's own troops.

4.23. That said, too much is probably made of whether a particular precision strike is strategic, operational or tactical. What really matters is that a precision strike air power capability confers on the government and on military commanders and planners the option of destroying or neutralising targets to achieve a range of military and, in turn, political, objectives.

Implications for Campaigns

4.24. Targeting based on knowledge of the enemy's war-fighting and value systems is critical. Air power can be wasted on inappropriate targets. Hit vital points.

4.25. A well-executed precision strike can be decisive, as the Gulf War demonstrated. Consequently, striking first may well be the rational option, notwithstanding the difficulty such a decision would create for a democratic nation.

4.26. The threat of precision strike can force an aggressor into making a disproportionate defensive effort, thus undermining his offensive potential.

4.27. Air-to-air refuelling greatly increases reach, manoeuvre and deception; and the number of potential targets.

PRECISION ENGAGEMENT

4.28. Precision engagement describes air power's ability to engage an aggressor directly *without applying firepower.* Because of air power's reach, speed and pervasiveness, precision engagement can, if necessary, be conducted at very long range for extended periods.

4.29. The precision engagement capability might include activities such as tracking a submarine, shadowing a surface fleet or land force, air and surface surveillance and reconnaissance, airborne insertion and extraction, a fighter sweep which penetrates an aggressor's air space or radar screen, and intelligence operations generally. Intimidation will often be a characteristic of precision engagement.

4.30. The example of anti-submarine warfare can be used to illustrate the distinction between precision engagement and precision strike. An aircraft tracking a submarine would be involved in precision engagement. However, if a decision was made to prosecute the target - to make an attack - and a weapon was released, the capability would change to precision strike.

Implications for Campaigns

4.31.   In some circumstances, precision engagement could be sufficient by itself to achieve a commander's objectives. Through the overt act of tracking forces, or deliberately penetrating air space, and so on, a 'message' can be sent which may convince an aggressor to modify his behaviour - to stop whatever he is doing which is causing us concern.

RAPID FORCE PROJECTION

4.32.   Rapid force projection is the deployment of military power to locations in or near an area where the government wishes to increase significantly its strategic influence on the basis of force. It is an end and a means.

4.33.   Even in the context of a defensive national posture, the government must have the option of responding positively, through rapid force projection, to a warning that a possible adversary's actions are ambiguous or unacceptable. Having a rapid force projection capability provides options across the spectrum of power: influence, coercion and force. The possession of the capability enhances a nation's strategic relevance.

4.34.   The kind of force which air power can project can come from anywhere across the spectrum of capabilities. Depending on the circumstances, the ability to apply firepower may or may not be considered necessary. For example, the deployment of AEW&C platforms with complementary fighter escorts to a specific location can send an unmistakable message to a potential aggressor, and simply through that deployment perhaps convince him to modify his behaviour to acceptable standards. To take the example further, it is feasible that, depending on circumstances, the deployment of an Operational Support Group could send a similar message and achieve a similar result.

4.35.   A rapid projection capability relies fundamentally on:

a.   flexibility - force projection should not close off subsequent political or military options;

b.   mobility - in turn a function of responsiveness, speed and reach; and

c.   concentration of force - appropriate to the government's objectives and selected military strategy.

4.36.   Flexibility, mobility and concentration of force are key attributes of air power. Rapid force projection is synonymous with control of the air, precision strike, precision engagement, and information exploitation capabilities exercised usually, but not necessarily, in combination.

4.37. Typical national objectives supported by a rapid force projection capability include:

a. to deter,

b. to support diplomacy,

c. to provide tangible support to friends and allies,

d. to support particular UN resolutions,

e. to meet other international commitments, and

f. to effect strategic manoeuvre.

Implications for Campaigns

4.38. The point of rapid force projection is to quickly put a military footprint on the ground. In certain circumstances, that footprint may achieve a strategic outcome in its own right.

4.39. If rapid force projection is to be fully exploited, commanders must ensure that they have control of the air and secure forward bases.

INFORMATION EXPLOITATION

4.40. Information exploitation involves the use of aerospace power to provide the knowledge required for the conduct of successful operations by air, land and sea forces. In this sense, information exploitation is a means. In the context of *information operations,* information exploitation is also an end.

4.41. Successful operations are no longer primarily a function of which nation puts the most personnel, equipment and technology into the battlespace, but, rather, which has the best knowledge about that battlespace. Gathering and exploiting information about friendly and enemy forces is the essence of the Observation-Orientation-Decision-Action cycle of successful operations demonstrated so compellingly by the Coalition forces in the 1991 Gulf War. Acting decisively on superior knowledge is the key to getting inside the enemy's decision cycle, thus being able to repeatedly and unexpectedly apply a strength against a weakness, and to gain and keep the initiative.

4.42. An information exploitation capability involves:

a. using aerospace power to gather *data* from airborne surveillance and reconnaissance systems;

b. translating that data into *information;*

c. fusing that information with the information available from all single-Service, joint and national sources;

d. collating, analysing, storing and communicating the total information in forms which provide useable and meaningful *knowledge* to combatants, staffs and commanders involved in the planning and execution of military strategy, operations and tactics; and

e. using that knowledge in real or near-real time to optimise the effectiveness of all core capabilities.

4.43. Air power's characteristics of reach, perspective, versatility and pervasiveness are the basis of information exploitation. Using manned and uninhabited platforms, air power can gather data:

a. overtly and covertly in peace and war;

b. from the aerospace, surface and sub-surface environments;

c. from overhead land and sea battles; and

d. at great distances from own national borders or land and sea forces.

Implications for Campaigns

4.44. Information exploitation is an indispensable input to the other core air power capabilities. More generally, a commander's ability to harness air power's potential, to generate a high tempo of operations, and to concentrate force against enemy weaknesses, depends centrally on the exploitation of information.

CORE AIR POWER CAPABILITIES AND THE CONDUCT OF CAMPAIGNS

4.45. Campaigns may be conducted using one or a combination of air, land and sea forces. From the time of the emergence of air power in World War I, campaigns almost invariably have been joint, with surface operations being enhanced by air operations. Air power is the common denominator in most joint operations.

4.46. Notwithstanding the general predominance of joint campaigns, circumstances can and do arise where a single form of combat power may be best used in a discrete campaign. One of the most successful examples was the *air campaign* which preceded the liberation of Kuwait during the 1991 Gulf War.

4.47. Thus the notion of the *leading environment* is an important factor in campaign planning. Assuming that the combat power of two or more environments is needed to gain the military objective, rarely will two, let alone three, forms have an equal role. If that is the case, then the leading environment should be identified, so that the other two can stand in support. Particular campaigns take on the name of the leading environment - hence *the air campaign.*

4.48.   When planning a campaign or joint operations, the joint force commander should consider whether his military objective will be best achieved by one or more forms of combat power and, if more than one Service is needed, which is the *leading environment.*

4.49.   These two questions face commanders at two different levels of war. It is the strategic level that usually decides which forces to allocate to the operational level commander to achieve his assigned objective. It is the operational level that decides how to employ assigned forces to achieve the objective, and whether or not there is a leading environment in the series of simultaneous or sequential operations planned.

4.50.   In both cases, the commander should be aware of the following:

a.   Some degree of control of the air is the precondition for most operations.

b.   Notwithstanding the air supremacy enjoyed by Australian forces for the past fifty years, the spread of advanced technology fighter/attack aircraft across the globe indicates the necessity to plan on having to fight for control of the air in future.

c.   Successful precision air strike operations against an enemy's political centre of gravity can make the defeat of his armed forces in the field unnecessary. These operations should be conducted as an *air campaign.*

d.   The same core air power capability can perform the same operation *simultaneously* in different campaigns. Take, for example, a contingency in which an enemy has made a land incursion which is being reinforced by sea under conditions of contested control of the air. Two campaigns are underway: a land campaign to contain and defeat the incursion; and a maritime campaign to regain sea control and thus isolate the incursion. The control of the air core air power capability can provide defensive counter air operations *simultaneously* in both campaigns.

e.   The same core air power capability can perform different operations *simultaneously* in the same campaign. Take the contingency used in the example above. In the land campaign, some of the precision strike core air power capability can attack enemy land forces while the remainder simultaneously performs battlefield interdiction by attacking enemy supply dumps in the littoral and sea lines of communication.

Theatre Control

4.51.   An air campaign can achieve high levels of control on the surface through astute application of the five core air power capabilities in combination. Depending on the extent of that dominance, air power can achieve *theatre control* or *air occupation. By controlling the air and dominating the surface, air power can dominate the battlespace.*

CHAPTER 5

AIR POWER ROLES

How air power is applied

5.1. The business of the RAAF is to fly and fight and its mission is to prepare for, conduct and sustain effective air operations to promote Australia's security and interests. To do this, the ADF must be capable of conducting a wide range of air power roles.

5.2. By conducting specific roles a defence force demonstrates its competence (or lack thereof) in the five core air power capabilities. While some roles relate almost exclusively to a particular capability - for example, the air defence role is invariably conducted in relation to the control of the air core capability - in general, air power's inherent flexibility enables many roles to be conducted in support of the full range of capabilities. Examples are airlift, air-to-air refuelling and information warfare, all of which could be related to all five capabilities.

5.3. **Counter Air** operations are conducted to attain and maintain a desired degree of control of the air. The ADF must be capable in both Offensive Counter Air (OCA) and Defensive Counter Air (DCA) roles.

5.4. OCA operations are designed to reduce or destroy an enemy's potential to conduct his own control of the air campaign. OCA can be categorised as:

a. OCA Attack: attacks intended to destroy an enemy's air defence infrastructure and assets on the ground;

b. Offensive Sweep: the use of fighter aircraft to probe airspace and, if necessary, attack enemy air and ground assets; and

c. Suppression of Enemy Air Defences (SEAD): the neutralisation, destruction or temporary degradation of enemy air defence systems so that aircraft have the freedom of action to perform their missions without interference from enemy air defence systems.

5.5. **DCA or Air Defence** operations involve a combination of active and measures to nullify or reduce the effectiveness of an enemy air attack.

a. Active air defence systems include strike and fighter aircraft, air-to-air and surface-to-air weapons, a robust command and control system, over-the-horizon radar, AEW&C, tactical radars, and electronic warfare. Active air defence reduces the effectiveness of and inflicts attrition on enemy air power.

b. Passive air defence reduces the effectiveness of enemy offensive air power by using such measures as camouflage and other methods of deception, dispersion, and protective construction.

5.6. **Precision strike operations** take the war to the enemy and are offensive in nature. They provide the capability to project power beyond national boundaries if necessary. Precision strike may take the form of:

a. Land strike: the application of air power against land targets not directly involved with enemy forces in contact. Typical targets are enemy leadership, command and control systems, and war-fighting infrastructure.

b. Maritime strike: the application of air power against naval targets not in contact, but posing an indirect or longer term threat.

c. Interdiction: the application of air power against enemy lines of communication, both land and sea, to cut and disrupt the flow of resupply. (Interdiction is aimed at influencing future battles.)

d. Offensive Air Support (OAS): the use of air power to directly support surface forces. There are two main roles for each of the land and sea environments:

       i. Battlefield Air Interdiction (BAI): air action directed against enemy forces and resources that are in a position to directly influence and affect land operations. (BAI is aimed at influencing tomorrow's battle.)

       ii. Close Air Support (CAS): air action against hostile targets in close proximity to friendly forces, and which requires detailed integration of each air mission with the fire and movement of those forces. (CAS is aimed at influencing the battle in progress.)

       iii. Anti-Submarine Warfare (ASW): tracking or attack by airborne assets against enemy submarines that directly threaten or are in contact with friendly surface forces.

       iv. Anti-Surface Warfare (ASuW): tracking or attack by airborne assets against enemy ships that directly threaten or are in contact with friendly forces. Note that ASuW has also been called Anti-Ship Warfare, Anti-Surface Shipping Warfare, and Maritime Strike.

5.7. **Airlift** provides commanders with the capability to deploy forces quickly and over long distances. It also assists deployed forces to apply their military effort effectively and to sustain that effort. Airlift can take many forms and includes military fixed and rotary wing aircraft, and civil air assets.

5.8. **Reconnaissance** is the collection of information via a specific mission, usually conducted over a limited period and directed against specific targets. Aerial reconnaissance involves the gathering of information by airborne means using photographic, radar, infra-red, electronic, acoustic and visual methods.

5.9. **Surveillance** is the systematic observation of areas, persons or objects by any available sensor. It is generally wide area, continuous, and non-specific.

5.10. **Combat Search and Rescue** (CSAR) is a specific task performed by rescue forces to effect the recovery of distressed personnel during wartime or contingency operations.

5.11. **Special Operations** are conducted by specially organised, trained and equipped forces to achieve military, political, economic or psychological objectives by unconventional means in hostile, denied or politically sensitive areas.

5.12. **Information Warfare** (IW) comprises activities undertaken to enable, enhance or protect the ability to collect, process and act upon information while endeavouring to exploit, deny, corrupt or destroy an adversary's information.

5.13. The objective of **Electronic Warfare** (EW) is to gain or exploit control of the electromagnetic spectrum and to deny its effective use to the enemy. EW is a subset of IW; that is, IW conducted within the electromagnetic spectrum.

5.14. The process of collection, collation and analysis of an enemy's Electronic Order of Battle (EOoB) is **Electronic Intelligence** (ELINT) and is performed using **Electronic Support Measures** (ESM) equipment.

5.15. Defensive and offensive EW operations involve the use of Support Jamming and Self-screening or Defensive Jamming. Jamming is performed by **Electronic Counter Measures** (ECM) equipment.

5.16. **Electronic Protective Measures** (EPM) or **Electronic Counter Counter Measures** (ECCM) facilities fitted to our operational systems (sensors, communications, navigation and so on) provide protection against hostile jamming. Ideally, all aircraft should be fitted with comprehensive EW self-defence systems.

5.17. **Air-to-Air Refuelling** (AAR) extends the range and flexibility of air operations and improves the response of air assets. AAR is a force multiplier; that is, it extends the capability of combat aircraft.

5.18. **Airborne Early Warning and Control** (AEW&C) provides airborne surveillance, detection and tracking of air and surface targets; and control of friendly forces prosecuting those targets or undertaking operations.

5.19. **Command and Control** (C^2) is the exercise of authority and direction by a purposely designated commander over assigned forces in the accomplishment of the mission. C^2 should not be confused with **Command, Control, Communications, Computers and Intelligence** (C^4I), which describes the equipment, facilities and procedures used in the exercise of C^2.

5.20.   Intelligence is the product of collection, evaluation, analysis, integration and interpretation of all available information on foreign countries and non-state organisations, such as terrorists and criminals, their resources, capabilities and intentions.

5.21.   Logistics encompasses supply, engineering, maintenance, base support, stockholding, information systems and transport. A vital enabling function, quality logistics must emphasise simple, flexible, efficient and effective systems. Logistics must be comprehensive, make effective use of available resources, and avoid unnecessary duplication.

5.22.   Air power depends on air bases which must be protected. *All RAAF personnel have operational ground defence and security responsibilities.* **Ground Defence** encompasses:

a.   Active defence measures, which deny the enemy the ability to attack an airfield, its associated installations and aircraft from the ground. Active defence also involves the employment of aggressive offensive action to deny a contested area to the enemy.

b.   Passive defence measures, which sustain air operations during and after an attack. These measures include decoys, camouflage, bunker and revetment construction, and training of personnel. Damage control and explosive ordnance disposal would be required following an attack.

c.   Physical security measures include policing activities, prevention of unauthorised access, and safeguarding personnel, equipment and facilities.

5.23.   Research, Development, Test and Evaluation (RDT&E) is the specialist capability for innovative development, adaptation and maintenance of aircraft, weapons and technical equipment.

5.24.   Training. As stated in previous chapters, high quality training is fundamental to the development and application of air power.

CHAPTER 6

RAAF PRINCIPLES OF AIR POWER

Air power supplements to the principles of war

ADF PRINCIPLES OF WAR

6.1. ADF doctrine states that the principles of war are maxims about waging war and apply to all levels of war. In some cases they overlap and, on first examination, may appear contradictory. They are not absolute nor is there a standardised list of principles between nations. Indeed, nations change their principles from time to time. Unlike the laws of natural science where observance of certain conditions produces a predictable result; or the rules of a game, the breach of which entails a definite fixed penalty, the principles of war simply represent a series of factors that in the past successful commanders have found necessary to consider. Their practical value as a guide to action will depend very much on the individual's skill and understanding of war. The weight given to each particular principle depends on the circumstances; however, to disregard a principle involves risk and may bring failure.

6.2. The ADF principles of war are:

a. selection and maintenance of the aim,

b. concentration of force,

c. cooperation,

d. economy of effort,

e. security,

f. offensive action,

g. surprise,

h. flexibility,

i. administration, and

j. morale.

6.3. These principles are elaborated in ADF doctrine and need no further explanation here.

THE NEED FOR RAAF PRINCIPLES OF AIR POWER

6.4. The earlier chapters of this manual derived a number of implications, or beliefs or principles relating to the development and application of air power. These principles in no way run counter to the ADF principles of war. Air Force takes the ADF principles of war as overarching guidance in the planning and conduct of every operation in which it participates.

6.5. However, the basic wisdom distilled from air power theory, the lessons of war, and aerospace technology indicate the need for additional air power doctrinal guidance.

6.6. RAAF principles of air power are therefore provided to supplement ADF principles of war with regard to aerospace operations. Furthermore:

a. In some cases, RAAF principles of air power overlap and, on first examination, may appear contradictory to ADF principles of war.

b. RAAF principles of air power are not absolute; nor is there a standardised list of principles between air forces. Indeed, air forces change their principles from time to time, which is precisely the case in this, the third edition of The Air Power Manual.

c. Unlike the laws of natural science where observance of certain conditions produces a predictable result, these air power principles are *authoritative but require judgment in application.*

d. With due regard to the circumstances, successful air operations depend on a correct application of the principles considered in combination.

e. The conflicting claims of various principles can often be balanced by being tested against the ADF principle of war, 'economy of effort'.

f. The practical value of RAAF principles of air power as a guide to action will depend very much on the individual's skill and understanding of air power; that is, on professional mastery.

RAAF PRINCIPLES OF AIR POWER

6.7. There are eight RAAF principles of air power:

a. professional mastery,

b. unity in application,

c. situational awareness,

d.   centre of gravity,

e.   concurrent operations,

f.   high tempo,

g.   attrition management, and

h.   qualitative edge.

Professional Mastery

6.8.   Professional mastery is the discipline of striving continually to achieve the most appropriate, effective and efficient air power for Australia's security.

6.9.   Selection and maintenance of the aim is the ADF's master principle of war. Professional mastery is the RAAF master principle of air power. The Air Force Mission and the Defence Mission embody the aim selected for air power. Professional mastery is the culture through which Air Force strives continually to achieve a special level of proficiency in preparing for, and conducting and sustaining, air operations to promote Australia's security and interests.

6.10.   Culture comprises attitudes, values and beliefs. Professional mastery depends upon an attitude of commitment to the Air Force Mission through mutually shared values and beliefs. Air Force has a set of clear values, integrated with its vision and goals. The RAAF sets out its central beliefs in this manual.

6.11.   Professional mastery is fundamentally an individual responsibility. That responsibility is met in two closely-related areas of personal endeavour. First, every member of the RAAF is responsible for maximising the personal contribution made to Air Force values using a team approach. Second, each individual must be committed to understanding, discussing, questioning and striving to improve the formal expression of what Air Force believes - air power doctrine.

6.12.   Professional mastery is the means of Air Force becoming an organisation which seeks not just to survive, but to create its future through continually improving its individual and team skills, its delivery of air power, and its development of air power concepts.

6.13.   Professional mastery is the master air power principle because it is the means through which the other principles are understood and applied in accordance with particular circumstances.

6.14.   Professional mastery relies on more than individual endeavour. Certainly, individual commitment must be encouraged and rewarded, but in its formal and informal forms, air power education remains a priority concern; and training of all types and at all levels enables air power's technology and concepts to prevail in combat in the context of joint operations.

Unity in Application

6.15. Unity in application describes the system of centralised control and decentralised execution which experience has shown to be the most effective way of employing air power. The means of achieving unity in application is an appropriate command structure.

6.16. The achievement of unity in application involves three closely interrelated methods: appointment of a single air commander; planning by a central air operations staff; and devolved conduct of operations.

6.17. The appointment of a *single air commander is* the indispensable condition to achieving unity in application. If maritime or land is the leading environment, then all air power should be controlled by a single Air Component Commander under command of the Joint Commander. If air is the leading environment, then an airman should be appointed as the campaign's Joint Commander. Either way, centralised direction will be retained at the highest practical level; one airman will be clearly responsible for achieving his assigned objectives; and the Joint Commander will retain maximum flexibility in applying and redirecting his air assets as he considers best in all circumstances.

6.18. All air operations should be planned by a *central air staff,* augmented as necessary by members of the other Services. This staff should be responsible for completing the broad planning needed to coordinate target selection, air defence sectors, air refuelling, the enhancement of land and sea operations, and so on. To the maximum extent possible, detailed mission planning should be left to commanders at the tactical level of war.

6.19. Detailed planning and conduct of missions at the tactical level of war should be *devolved* to the tactical commander, operating under the broadest directive control arrangements.

Situational Awareness

6.20. Situational awareness is the ability to observe and orientate both enemy and own forces. The objective of situational awareness is to predetermine to the maximum extent possible the outcome of any operation in which the ADF is employed by observing and orientating more quickly, more comprehensively and more cohesively than the adversary, thereby being able to decide and act inside his decision loop and thus defeat him.

6.21. Situational awareness has strategic, operational and tactical applications. At the strategic level of war, observation and orientation are fundamental to:

a. the strategic warning process;

b. the development of advice to government regarding alternative military strategies which promote political objectives;

c.   the assignment of military objectives and forces to Joint Commanders; and

d.   strategic manoeuvre - the rapid shifting, if appropriate, of the military focus, or main objectives and forces, against the adversary's weaknesses; or to tie up or exhaust his strength, to gain or maintain the initiative.

6.22.   At the operational level of war, observation and orientation are fundamental to the operational art and, for example, for:

a.   determining what types of military campaigns will achieve the strategic objectives;

b.   developing a campaign plan which apportions capabilities, sequences major operations, allocates effort to operations, and assigns tasks to tactical units; and

c.   providing advice to the strategic level concerning the appropriateness of assigned objectives and forces.

6.23.   At the tactical level of war, observation and orientation are fundamental to:

a.   deciding if, when, where and how to close with the enemy;

b.   manoeuvring to bring firepower to bear or to avoid being threatened; and

c.   deciding if and when to abort or to leave the fight.

6.24.   At all levels of war, situational awareness depends upon timely, accurate and integrated information, presented in ways which promote effective decision making and plan execution.

6.25.   Situational awareness comes from knowledge which is derived from, among other things:

a.   accurate and readily accessible military geographic information;

b.   current data and information about one's own forces (for example, location, logistic status, progress towards objectives);

c.   comprehensive intelligence about enemy forces (location, movements, strengths, weaknesses, intentions);

d.   filtering, fusing, analysing, storing and manipulating data as information;

e.   comparing current information with historical data bases;

f.   analysing changes; and

g.   devolving information and intelligence in real time to warflighters.

Centre Of Gravity

6.26. Centre of gravity is that point where an attack or other action has the best chance of being *decisive.* The objective of centre of gravity has two components: to decide which enemy target is most valuable to the enemy; and to decide which point on one's own side is most valuable. The principle of centre of gravity has strategic, operational and tactical applications in the selection of enemy targets and the defence of our own.

6.27. Centre of gravity is the essence of economy of effort. The destruction or neutralisation of the enemy's most critical target makes the maximum *strategic* contribution to success using the forces available.

6.28. The application of the principle of centre of gravity may be described as three inter-related methods. First, an appreciation is needed of targets and target systems, and, most importantly, the value they represent to national leadership *in the context of the particular conflict.* At the strategic level, for example, prospective targets may be conceptualised as nodes; and these generally are taken to comprise: political leadership; strategic command and control; essential production; national transport network; deployed military forces; and essential military logistics services.

6.29. Second, vulnerability has to be assessed in terms of the forces available. If the highest value target system can be successfully attacked using the forces available, then that course of action is truly strategic and represents the ultimate economy of force. If the force available only allows lower order targets to be destroyed or neutralised, then the need for a series of campaigns is indicated.

6.30. Third, the means and methods of destroying those targets have to be considered and target systems matched to campaigns and, in turn, operations and actions.

6.31. Centre of gravity is an air power principle because, of the three forms of combat power, air power offers the best potential for striking directly at, and destroying or neutralising, those enemy target systems which are of most national significance. Centre of gravity rests on air power's:

a. characteristic responsiveness, reach, penetration and lethality;

b. precision strike capability;

c. ability to achieve concentration of force in both time and space, rapidly and flexibly;

d. ability to participate in concurrent operations;

e. ability to make an asymmetric response; and

f. ability to minimise own and, if appropriate, enemy casualties.

Concurrent Operations

6.32.   Concurrent operations describes the ability to participate simultaneously in two or more operations. It is based on the same inherent air power characteristics which make 'centre of gravity' a RAAF principle. The objective of concurrent operations is to achieve political and/or military objectives as quickly as possible.

6.33.   The same core air power capability can perform *simultaneously:*

a.   the same operation in different campaigns, and

b.   different operations in the same campaign.

High Tempo

6.34.   High tempo is the ability to generate and sustain high sortie rates using finite resources. The objective of high tempo is for air power to generate and sustain for a decisive period an overwhelming and irresistible concentration of force.

6.35.   Air power is inherently capable of high tempo. The extent to which high tempo is realised is a factor of resources and professional mastery.

6.36.   The main considerations concerning high tempo at the respective levels of war are as follows.

a.   Strategic - the tempo which can be potentially reached and sustained depends upon the numbers of air and ground crews trained and available for a particular campaign; the stocks of weapons and spares acquired; the engineering and maintenance arrangements to accommodate battle damage and combat servicing; and the air base and enabling infrastructure deployed to sustain air operations. With few exceptions, these outcomes are only achieved from long term planning.

b.   Operational - air power is a highly flexible and capable instrument when unleashed. But it must be husbanded by operational commanders and employed when and where it is most effective. This is because air power has broad utility across the spectrum of air, land and sea operations; and there will always be more requests than the available air power can satisfy. Generally, air power is employed to greatest effect when it is focused in an unrelenting manner on an objective until the aim is achieved. Its concentrated application against the enemy's centre of gravity is a case in point. Attrition management is a key consideration shared with the tactical level.

c.   Tactical - at the tactical level, high tempo is largely a matter of leadership, careful mission and logistics planning, dedication, flexibility and technical innovation. Attrition management is a key consideration shared with the operational level.

Attrition Management

6.37. Attrition management involves balancing progress towards achievement of the operational objective against any attendant loss of platforms and crews. Therefore, the objective of attrition management is economy of effort through which the commander maximises his ability to achieve concentration of force.

6.38. Attrition management is typically related to three situations:

a. in training to support readiness;

b. in combat missions, when not engaged by the enemy; and

c. in combat missions, when directly engaged by the enemy.

6.39. The level of flexibility, survivability and effectiveness achieved in combat by a given weapons system and its crews is proportional to the amount of realistic training provided. Attrition management is a matter of achieving a proper balance between realism and its attendant risks.

6.40. When not engaged by the enemy, attrition is a matter of training and mission planning. Attrition management in mission planning involves achieving the correct balance between the risk of successful engagement by the enemy and, typically, collision with the ground or another aircraft.

6.41. Attrition in combat is a central concern at the operational level of war. For a small force like the ADF high attrition would be extremely serious. Just how serious in terms of overall national policy would depend on the extent to which key military objectives had been achieved. The destruction of the enemy's centre of gravity is one thing; the achievement of marginal benefits that fritter away the ability to concentrate effectively is a clear misuse of air power.

Qualitative Edge

6.42. Qualitative edge is superiority relative to potential or actual adversaries. Accordingly, the objective of qualitative edge is to maximise the air power available from a given level of resources.

6.43. Qualitative edge is also a function of technology, RDT&E, numbers of weapons systems, personnel and doctrine, synthesised through professional mastery. When assessing technology's contribution to this equation, it is important to remember that superior weapons favour victory but they do not assure it.

6.44. Air power depends on *technology* for its very existence. The technological advances associated with the information age are, almost without exception, applicable to air power. However, the full range of that technology is simply not affordable in a relatively small air force like the RAAF. Two imperatives are indicated. First, advanced technologies must be acquired and operated selectively. Second, wherever practicable, interoperability must be retained. Nowhere is this

more important than with information systems. For example, the RAAF may have the technical capability to destroy, neutralise or engage almost any target; but locating a particular target may be possible only through the use of an unaffordable space-based or other sensor.

6.45. Technological quality needs to be balanced against the need to provide air power across a number of selected capabilities, operations and campaigns. In other words, quantity - the *number of weapons systems* - can be important. The extent of a technological edge may be traded against additional platforms. Quality versus quantity is an enduring issue which can only be addressed sensibly through deep analysis and on a case-by-case basis.

6.46. Regardless of the mix of technology and numbers of weapons systems, it is ultimately the quality of the *personnel* commanding, operating, maintaining and supporting air operations which will determine the qualitative edge actually achieved. Factors here include leadership, education, training and professional mastery.

6.47. Ultimately, the extent to which sound *doctrine* is developed and applied in combat will determine how much any potential technological and personnel advantage is realised. Quality doctrine which is the result of continued development and evaluation is essential to the qualitative edge.