FOREWORD

BY

THE CHIEF OF THE AIR STAFF

Air power represents a fundamental cornerstone in Australia's security and defence posture. While the Australian Government expects the Australian Defence Force (ADF) to undertake operational tasks in peacetime and in credible contingencies, it also charges the ADF with providing a basis for timely expansion should the necessity arise.

In meeting its tasks, the ADF relies on air power to play a major role in surveillance and intelligence gathering in the sea and air approaches to Australia and in controlling these approaches. Furthermore, should the nation become engaged in a substantial conflict, air power would provide a comprehensive part of the cutting edge of the joint force tasked with resolving that conflict.

The Royal Australian Air Force (RAAF) is tasked with the responsibility of conducting effective air operations in pursuit of Australia's defence and national interests. A coherent, philosophical foundation for the employment of air power is an essential step in the evolution of an effective RAAF. That philosophical foundation is provided through the doctrine articulated in this manual. Doctrine, in turn, establishes the basic knowledge and sense of purpose within the RAAF and provides a guide to the wider Defence and Australian communities in understanding the nature of air power in the defence of Australia.

I.B. GRATTON, AO, AFC
Air Marshal
Canberra, 1993
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AAA  Anti-Aircraft Artillery
AAP  Australian Air Publication
AAR  Air-to-Air Refuelling
AAW  Anti-Air Warfare
ACAUST  Air Commander Australia
ACMAT-AF  Assistant Chief of the Air Staff – Materiel
ACO  Air Contact Officer
ACOPS  Assistant Chief of the Defence Force – Operations
ACPRM-AF  Assistant Chief of the Air Staff – Personnel and Resource Management
ADF  Australian Defence Force
ADFWC  Australian Defence Force Warfare Centre
ADG  Airfield Defence Guard
ADGE  Air Defence Ground Environment
ADFP  Australian Defence Force Publication
ADIZ  Air Defence Identification Zone
ADOA  Air Defence Operations Area
ADOC  Air Defence Operations Centre
AEW&C  Airborne Early Warning and Control
AFC  Australian Flying Corps
AFO  Air Force Office
AI  Air Intercept
ALG  Air Lift Group
ANZUS  Australia, New Zealand, United States
AO  Area of Operations
AOCLC  Air Officer Commanding Logistics Command
AOCS  Air Operations Communications System
AOCTC  Air Officer Commanding Training Command
APSC  Air Power Studies Centre
ARM  Anti-Radiation Missile
ASOC  Air Support Operations Centre
ASW  Anti-Submarine Warfare
ASuW  Anti-Surface Warfare
ATC  Air Traffic Control
ATOC  Air Transport Operations Centre
AWACS  Airborne Warning and Control System

BAI  Battlefield Air Interdiction
BCP  Base Combatant Personnel
BDA  Bomb Damage Assessment
BDR  Battle Damage Repair
BVR  Beyond Visual Range

CAA  Civil Aviation Authority
CAIRS  Close Air Support
CAP  Combat Air Patrol
<table>
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<th>Abbreviation</th>
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<td>Chief of the Air Staff</td>
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<td>Chief of the Air Staff Advisory Committee</td>
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<td>CBU</td>
<td>Cluster Bomb Unit</td>
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<td>CJFA</td>
<td>Commander Joint Forces Australia</td>
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<td>COMINT</td>
<td>Communications Intelligence</td>
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<td>COMSEC</td>
<td>Communications Security</td>
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<td>C²</td>
<td>Command and Control</td>
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<td>C³</td>
<td>Command, Control and Communications</td>
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<td>C³I</td>
<td>Command, Control, Communications and Intelligence</td>
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<td>DCA</td>
<td>Defensive Counter Air</td>
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<td>DCAS</td>
<td>Deputy Chief of the Air Staff</td>
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<td>DCNS</td>
<td>Deputy Chief of Naval Staff</td>
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<td>DGFD(AIR)</td>
<td>Director General Force Development (Air)</td>
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<td>Director General Military Strategy and Concepts</td>
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<td>Defence Integrated Secure Communications Network</td>
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<td>Deeper Maintenance</td>
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<td>Electronic Combat</td>
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<td>Electronic Protection Measures</td>
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<td>Fly-Away Kit</td>
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<td>Facsimile</td>
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<td>FLIP</td>
<td>Flight Information Publication</td>
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<td>GCA</td>
<td>Ground Control Approach</td>
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<td>GDOC</td>
<td>Ground Defence Operations Centre</td>
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<td>GPS</td>
<td>Global Positioning Satellite Navigation System</td>
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<td>HARM</td>
<td>High-speed Anti-Radiation Missile</td>
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<td>HF</td>
<td>High Frequency</td>
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<td>HQTASF</td>
<td>Headquarters Tactical Air Support Force</td>
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<td>Human Intelligence</td>
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<td>IAF</td>
<td>Israeli Air Force</td>
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<td>ILS</td>
<td>Instrument Landing Systems</td>
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<td>JFAO</td>
<td>Joint Force Area of Operations</td>
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<td>Acronym</td>
<td>Definition</td>
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<td>JFC</td>
<td>Joint Force Commander</td>
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<td>JIC</td>
<td>Joint Intelligence Centre</td>
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<td>JORN</td>
<td>Jindalee Over-the-horizon Radar Network</td>
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<td>LLAD</td>
<td>Low Level Air Defence</td>
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<td>LOAC</td>
<td>Law of Armed Conflict</td>
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<td>LOC</td>
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<td>LOX</td>
<td>Liquid Oxygen</td>
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<td>Maritime Exclusion Zone</td>
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<td>Missile Engagement Zone</td>
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<td>MPA</td>
<td>Maritime Patrol Aircraft</td>
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<td>Maritime Patrol Group</td>
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<td>MLS</td>
<td>Microwave Landing Systems</td>
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<td>MSA</td>
<td>Main Support Area</td>
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<td>NADACS</td>
<td>National Air Defence and Airspace Control System</td>
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<td>NADC</td>
<td>National Air Defence Commander</td>
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<tr>
<td>NADOC</td>
<td>National Air Defence Operations Centre</td>
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<tr>
<td>NBC</td>
<td>Nuclear, Biological, Chemical</td>
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<td>NGS</td>
<td>Naval Gunfire Support</td>
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<td>NVG</td>
<td>Night Vision Goggles</td>
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<td>OAS</td>
<td>Offensive Air Support</td>
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<td>OCA</td>
<td>Offensive Counter Air</td>
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<td>OM</td>
<td>Operational Maintenance</td>
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<tr>
<td>OSG</td>
<td>Operational Support Group</td>
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<tr>
<td>PGM</td>
<td>Precision Guided Munition</td>
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<td>PNG</td>
<td>Papua New Guinea</td>
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<td>POE</td>
<td>Point of Entry</td>
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<tr>
<td>POL</td>
<td>Petrol, Oils, Lubricants</td>
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<tr>
<td>QRF</td>
<td>Quick Reaction Force</td>
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<tr>
<td>RAAF</td>
<td>Royal Australian Air Force</td>
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<td>RAAFSC</td>
<td>Royal Australian Air Force Staff College</td>
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<td>RAF</td>
<td>Royal Air Force</td>
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<tr>
<td>RAN</td>
<td>Royal Australian Navy</td>
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<tr>
<td>RDT&amp;E</td>
<td>Research, Development, Test and Evaluation</td>
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<tr>
<td>ROE</td>
<td>Rules of Engagement</td>
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<tr>
<td>RPV</td>
<td>Remotely Piloted Vehicle</td>
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<tr>
<td>SADC</td>
<td>Sector Air Defence Commander</td>
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<tr>
<td>SADOC</td>
<td>Sector Air Defence Operations Centre</td>
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<tr>
<td>SAM</td>
<td>Surface-to-Air Missile</td>
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<td>SAR</td>
<td>Search and Rescue</td>
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<td>SCC</td>
<td>Sensor Coordination Centre</td>
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<td>SEAD</td>
<td>Suppression of Enemy Air Defences</td>
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<tr>
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<tr>
<td>SIGINT</td>
<td>Signals Intelligence</td>
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<td>Surveillance and Reconnaissance Centre</td>
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<td>SRG</td>
<td>Strike Reconnaissance Group</td>
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<tr>
<td>TACC</td>
<td>Tactical Air Control Centre</td>
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<tr>
<td>TFG</td>
<td>Tactical Fighter Group</td>
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<tr>
<td>TQM</td>
<td>Total Quality Management</td>
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<tr>
<td>UAV</td>
<td>Unmanned Aerial Vehicle</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<tr>
<td>USAAF</td>
<td>United States Army Air Force</td>
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<td>USAF</td>
<td>United States Air Force</td>
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<tr>
<td>VAP</td>
<td>Vital Asset Protection</td>
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<tr>
<td>VOP</td>
<td>Visual Observation Post</td>
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<tr>
<td>VTOL</td>
<td>Vertical Take-Off and Landing</td>
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PART 1

GENERAL

This Part briefly discusses the theory and philosophy of human conflict, and the place of air power in that conflict. It reflects generally-accepted Australian viewpoints on war and air power, and comprises four chapters – war, doctrine, air power, and air power in Australia.

Some nations might see war as an inevitable result of continual struggle and, therefore, a normal occurrence between interludes of uncomfortable peace. Others, including Australia, take the opposite view. To them, war is an unusual and extreme occurrence disturbing the peace: it is a consequence of a failure of politics and diplomacy. The armed forces of those nations consequently are seen primarily as instruments for the maintenance of peace.

Australia is neither an aggressive nor an expansionist nation. Its defence policy is emphatically defensive, rather than offensive, in nature. Yet, within a defensive strategic posture, there remains the need to conduct operational and tactical offensives. Air power offers the flexibility to meet that need.

Due to the lack of an agreed lexicon for air power terms, specific definitions are provided in this Part. The characteristics, maxims and sources of air power need to be appreciated for a better understanding of how air power can be used. In applying air power, the Royal Australian Air Force observes several fundamental imperatives to ensure that it can achieve its mission of providing maximum military effectiveness in the air.
CHAPTER 1

WAR

An Outline

Any military professional should have a basic understanding of war. It is a complex phenomenon characterised by confusion and unpredictability (friction). Two interacting components of warfare - offence and defence - add to the complexity.

Whether one is defending or attacking, centres of gravity and the human factor will feature prominently. War can be categorised in different classes (global nuclear, general, limited), but irrespective of the class, will be conducted philosophically along similar lines. That is, the levels of war, the principles of war and the form of military capability all impinge on the conduct of war. Impacting also is the law of armed conflict which codifies internationally-accepted rules of behaviour in war.

Fundamental to a nation's ability to engage in warfare, is its war potential which comprises national will, armed forces, economic strength, research and development, population, geography, and alliances.
WAR

War - The Final Arbiter

.1 International conflict can take many forms ranging from political argument to global war. War usually results from divergent national interests between protagonists. This conflict of interests, with its resultant policies, shapes and defines military strategies and objectives.

.2 Even a nation with no aggressive intentions must protect interests vital to its security and uphold international covenants to which it is party. At times, a nation, in support of its national interests, may be forced to exert pressure upon one or more other nations. There is a number of means which it can employ, including diplomacy, propaganda, economic pressure in the form of restrictions on trade, and the threat of war. In certain circumstances, the use of armed force may be unavoidable. War therefore, can be viewed simply as another political tool, as an extension of political will. But it is an extreme form of political expression. War occupies a special place in the discipline of strategic thought because, unlike other political means, once set in train, war can produce a series of dire consequences which transforms the way of life of the entire nation and from which there may be no simple extrication. In a very real sense, it is the final arbiter.

.3 Notwithstanding the finality of warfare as a political option, war is still not an end in itself. It has a direct relationship to politics. This relationship between the political objectives of war and the military means to attain them must be clearly understood. A nation, through its leaders, should promulgate widely and unambiguously definite, clear and attainable political objectives against which national strategies, including defence policies, can be set. Within those strategies, the use of armed force must exhibit the same sense of proportionality and compatibility which is applied to any other commitment of force, such as diplomatic or economic pressure. Prudence in any use of force to achieve national objectives is politically expedient, morally requisite and legally binding under the laws of war. In warfare, therefore, the nexus that exists between political ends and military means should ensure that a purely political or military decision is not made in isolation.

.4 Determining a clear political aim is crucial to the conduct of war. It is also crucial to its successful
resolution. In any conflict, the ultimate aim of military forces is victory, but the overriding political aim must be to arrive at a favourable state of peace at the cessation of hostilities. Victory may no longer mean simply defeating the enemy's military forces, as it so often did in the past. Satisfactory conflict resolution may result from more limited aims, such as territorial concessions, a recovery of certain sovereign resources, or simply forcing a belligerent to the negotiating table. Striving for the total subjugation of an opposing force may be an unrealistic aim for both politician and commander, as to do so may jeopardise an ultimate peace. First, total subjugation is most difficult to attain; second, it encourages war to become a means in itself with no political accountability; and finally and most importantly, it may exact penalties from the vanquished state of an order that either threaten its basic survival or prevent peaceful co-existence once hostilities cease.

THE NATURE OF WAR

.5 The most fundamental and vital task for the military professional is to understand war. Success in the military field, whether in preliminary planning or in the actual conduct of operations, is largely a matter of judgment. Judgment, though partly intuitive, is based mainly on knowledge. All officers should therefore strive continually to increase their knowledge in the profession of arms so that their judgment is soundly based. Other members of the military should also strive to understand war; by doing so they will better appreciate their contribution to the overall military effort.

.6 Much light can be thrown on the planning and conduct of combat operations by a clear understanding of war and a study of its history. A knowledge of the nature of war and the reasons for success or failure in past campaigns, when correctly related to modern conditions, will assist a commander to make the right decisions. At the same time, a commander must be flexible in his application of knowledge from past experiences. Slavish adherence to the lessons of the past can be dangerous and can lead to preparing for the wrong war.

.7 War is a complex phenomenon. It is not ordered, nor does it follow a set of rules. Beyond the danger, exertion, fear, uncertainty and chance that permeate warfare, there are four significant components that characterise its nature.
First and foremost, war is unpredictable and chaotic, characteristics which often make its outcome a gamble. This confusion and uncertainty creates a condition that is detrimental to the conduct of war, and which is generally referred to as 'friction'. Second, war's actions are controlled by the seemingly opposed, but closely interrelated, concepts of offence and defence. Third, its outcome depends on the ability to focus on an opponent's central elements, or centres of gravity, while protecting one's own centres of gravity. Finally, irrespective of the type of conflict or the weapons used, wars ultimately are won or lost by people.
Friction

In theory, war might appear to be a simple enterprise. In practice, however, its conduct is difficult and complex because of the many factors which impinge on it. Those factors, often unpredictable and confused, have been described by one of the greatest war theorists, Carl von Clausewitz, as the 'friction of war'. Friction encompasses those countless factors and incidents, perhaps minor in themselves, which singularly and collectively tend to reduce the effectiveness and overall efficiency of military efforts.

Friction can be the breakdown in communications that prevents the orders getting through; the unforeseen design defect that makes weapons malfunction; or the unanticipated resistance from a resolute enemy. In sum, friction is all of the unexpected factors that can quickly change the conditions of war. Its sources lie in the paralysing effects of danger, the extraordinary demands for exertion, the uncertainties of information and actions, and the overall influence of chance on each of the protagonists. Friction, the cumulative effect of all these factors, distinguishes real war from theoretical war; yet, friction is one feature of war that is often overlooked or underestimated.

Thus, war can be viewed as a contest of opposing wills which is heavily influenced by friction. It follows that the task of the combat leader is to impose his will on the enemy while containing the singular and collective effects of friction within his own force. Actions taken to increase an adversary's friction are as vital to success as those taken to minimise one's own. Friction remains an important ingredient in the nature of war. It can never be totally eliminated by human or technical endeavour, and its insidious influence must never be underestimated by commanders.

Offence and Defence

Within warfare there are two interacting components - the offence and the defence. Philosophically, the objective of offence is to destroy while the aim of defence is to preserve. Neither can assume absolute primacy in combat, and they continually interact. Consequently, each must be accounted for in all aspects of military operations.

Historically, defence has proven the stronger posture, as it is intrinsically easier to defend than to attack. Paradoxically though, it is only through offensive action that victory is likely to be attained, because the most
that defence can usually hope to achieve is a condition of stalemate. While the defender may hold the stronger position in most military operations, the attacker has decided advantages. An aggressor can take the initiative by deciding the time, place, strength and method of attack, while the defender must prepare for all contingencies. If a defender seeks a favourable result beyond a stalemate, at some time he probably will have to take the initiative and go over to the offensive.

Centre of Gravity

.12 Clearly there is more to gaining victory than simply taking the offensive. Offensive action must be directed in such a way that it will have the greatest impact on an enemy's capacity and will to continue. There are vital elements within a nation or an alliance which, in comparison with others, are more important to effective operations and which, if destroyed, damaged or lost will wreak havoc of a disproportionate effect. Termed the centres of gravity, these elements provide strength and balance to a nation and its armed forces. Centres of gravity can be either physical or psychological, and must be the focus of offensive action, subject to political guidance.

.13 Pressure, or force, applied against an adversary's centres of gravity produces maximum disruption of his ability to fight. Identifying the correct centres of gravity therefore, is critical to the best use of one's capabilities. Yet, centres of gravity can be difficult to identify. They might be a critical engagement, a strong leader, national will, a command and control centre, perhaps cohesion within an alliance, or a key economic resource or locality. Every armed force has a centre of gravity, but like all others it may be difficult to identify and, moreover, it may change with time.

.14 While a successful attack on the centres of gravity will be the surest path to victory, it may not always be the easiest. Further, an adversary almost certainly will have assessed and identified the centres of gravity he should attack. The defence of those centres therefore, is also critical to success.

The Human Factor

.15 Above all else, war is a human enterprise. Wars are fought with machines but are won by people. Ultimately, it is
the human factor that is the decisive element in battle. Sound leadership and highly skilled and courageous people operating in cohesive, well-trained units are the essential components of that decisive factor. Proper training, sound doctrine, strong and imaginative leadership and high levels of readiness and discipline all generate high morale within a defence force. As success in battle depends more on the state of morale of the force than on physical qualities, the nature of war demands attention to the human element above any other single factor.
CLASSES OF WAR

.16 Armed force can be applied in varying degrees. The wide range of applications of violence can be broadly classified into global nuclear war, general war and limited war.

.17 Global Nuclear War. Global nuclear war is armed conflict on a world-wide scale involving nuclear forces.

.18 General War. General war is an armed conflict among major powers in which the total resources of the belligerents are used and the national survival of a major belligerent is in jeopardy. This scale of war is generally limited to conventional forces with or without tactical or theatre nuclear weapons. All nations would not necessarily be involved in the fighting, but the direct repercussions of such a war would be world-wide. World War II is an example of general war.

.19 Limited War. Limited war is any international armed conflict short of general war. Normally, such conflicts would be limited either geographically to a single theatre or operationally in the weapons employed, although they might involve the use of tactical nuclear weapons. Limited wars since World War II include Korea, Vietnam, Arab/Israel, the Falklands, Grenada, Iran/Iraq and Kuwait. Limited war can be divided into three broad levels of conflict - high, medium and low.

a. High Level Conflict. High level conflict sets out to achieve lasting political and territorial gains, usually by defeating the opposing military force. It includes operations to counter large scale enemy lodgments, invasion, and major air and naval attacks.

b. Medium Level Conflict. Medium level conflict involves the military forces of two or more nations engaged in operations to achieve or oppose specific political aims and territorial objectives which have limited geographic boundaries. It may or may not develop from the escalation of low level conflict. It includes operations to counter major raids and geographically limited air and naval operations.

c. Low Level Conflict. Hostile acts which are deliberately limited in scale or confined geographically may be classified as low level
conflict. Typically, low level conflict has a specific political objective, being motivated by economical and social issues. Hostile acts are normally of a probing nature and can range from non-violent infringements to small scale military actions. Low level conflict can arise with little or no warning, and may or may not require direct military involvement.

.20 Unless drawn into general war through sovereignty violations or alliance obligations, medium and small powers will rarely have a direct influence on the lead up to, or prosecution of, the more extreme forms of warfare. They may, however, be directly concerned with the application of the doctrinal principles and methods used in limited war, as historically that class of war has been the most common.

.21 Wars which have limited objectives and which can cover a range of situations generally require different strategies and methods for success. Matching the most suitable strategic means to the chosen political ends is important in all classes of warfare, but it has particular relevance to the lower classes of warfare, where both ends and means are tightly constrained. In limited war, therefore, the distinctions between levels of conflict must be clearly understood when military operations are considered. Moreover, both statesmen and military commanders should clearly establish from the outset the kind of war upon which they are embarking, and neither mistake it for, nor try to turn it into, something it is not. That is not to suggest that the level of conflict cannot change - on the contrary, escalation or de-escalation often occurs - but it is to suggest that, on such occasions, national leaders need to establish and articulate political and military objectives and adjust them if necessary.

.22 Military forces can also be used in operations short of war, such as peace-enforcement, peace-keeping, anti-terrorism and counter-narcotics. Peace-enforcement involves the use of armed forces to create a ceasefire between combatants. This usually means that at least one side does not want peace. Peace-keeping involves monitoring and enforcing an existing ceasefire, which has been agreed to by the opposing sides. Any transition from one to the other will generally call for a change in force composition. This arises because peace-enforcement may involve contending with hostility from all warring factions, and forces would need a more specialised and offensive capability than would peace-keeping forces.
While the distinction between peace-keeping and peace-enforcement may be relatively clear, and force contributions would revolve around individual contributor's national interests, there may also be grounds for humanitarian intervention which falls outside either definition. In such cases, national interests of participating nations and international security may not be as clearly-linked to intervention as would be the case in peace-enforcement or peace-keeping.

Finally, another term that has received specific international acceptance in the modern lexicon of warfare is Low Intensity Conflict (LIC), which is sometimes called revolutionary warfare or guerilla warfare. LIC is unique in that it directly targets the political-social structure of a country rather than primarily attacking its armed forces. It is more an ideological battle between competing political-social systems than warfare in the traditional sense.

THE CONDUCT OF WAR

The Levels of War

All classes of war are national undertakings which must be considered, coordinated and conducted in a way which ensures integration of effort from the highest levels of policy-making to the basic levels of execution. The planning and conduct of armed conflict take place at a range of levels. Modern military theory identifies four levels of war: grand strategic, military strategic, operational and tactical.

a. **Grand Strategic Level of War.** At the grand strategic level, the nation decides whether it will participate in a war, who its allies and enemies will be, and what its objectives are for the subsequent peace. It will involve political, economic, industrial, diplomatic and military considerations at the highest national level.

b. **Military Strategic Level of War.** At the military strategic level, the actual conduct of the war is considered. Decisions are made on the employment of the armed forces of the nation to secure the objectives of national policy by the application of force, or the threat of force.
c. **Operational Level of War.** The operational level of war is concerned with the direction of military resources to achieve military strategic aims. It is the level of war at which major campaigns and operations are planned. Operational art - that is, the control of military activities at the operational level of war - links military strategy to tactics. It does this by establishing operational objectives, initiating actions and applying resources within individual theatres of war.

d. **Tactical Level of War.** The tactical level of war is the level at which forces are deployed directly for battle with the enemy. The art of organising and manoeuvring forces to engage the enemy in combat is the art of tactics.

.26 Military doctrine is directly concerned with the military strategic, operational and tactical levels of war. While there are functional differences between those three levels of war, there is no clear-cut division between them. Planning and application considerations tend to interact and spill over between levels. At the strategic level of war, doctrine addresses the overall conduct of the war and the employment of a nation's total armed forces to fulfil the ends of policy. The aim of military commanders at that level is to ensure that military power works in concert with all other elements of national power. At the operational level of war, doctrine is concerned with conducting campaigns or gaining the advantage in the area of operations in support of the strategic ends of the war. It involves the employment of air, land and sea forces assigned to a theatre or campaign. At the tactical level of war, doctrine is concerned with employing forces in contact with an enemy. It is at that level of war that combat power brings about the destruction or neutralisation of enemy forces.

**The Principles of War**

.27 Study of war shows the extent of confusion, danger and chaos inherent within conflict and the significant influence that friction can have on the outcome. Further, wars are rarely alike. Thus, the temptation to try to establish order from chaos in war by quantitatively analysing combat, and reducing it to some mathematical equation or formula from which strategic predictions are made, should be
avoided. At worst, the practice is dangerous. It may prepare a nation for the wrong war or, if based on the wrong lessons of the past, may lead to defeat. Yet commanders have much to gain in military operations by establishing an intellectual framework, free of situational qualification, to guide their actions in combat.

.28 Principles of war are one means of establishing that framework. Principles are a distillation of centuries of military experience which present general and enduring truths to guide commanders through the friction of war.

.29 Principles put the experiences of war into a framework which allows commanders to test their logic processes and decision-making faculties during the planning and conduct of combat. They do not supplant initiative and improvisation, but they do provide an educative and guiding influence, which should be applied with judgment.

.30 The principles of war are not laws like those of natural science, where the compliance with specified conditions produces an inevitable result; nor are they rules like those of a game, a breach of which entails a prescribed penalty. Principles simply indicate guides which have proven successful in the past, and they serve as a warning that their disregard involves risk and has often brought failure.

.31 The most important consideration is how the principles of war are interpreted and applied. They are not separate and distinct entities listed on a 'menu' of actions from which a commander selectively chooses in the employment of his forces; nor are they a series of checklist items that necessarily lead to victory. Rather, they are interdependent and mutually supportive. Not all the principles of war are applicable to all situations at all times. Their relative importance varies from time to time and from situation to situation. Further, some principles have different interpretations or significance across the levels of war; for example, strategic surprise is not the same as tactical surprise. Put in perspective, it is not the knowledge of the principles of war that is so important, but rather the degree of intelligent use that is made of them in their application to all classes of war. In this respect, principles of war provide a better understanding of warfare; however, mastering the art of warfare requires a depth of knowledge far beyond mere principles.

.32 The Australian Defence Force has adopted 10 principles of war as a framework of reference for its
commanders. The principles which guide the planning and conduct of all ADF operations are:

a. Selection and Maintenance of the Aim,
b. Morale,
c. Offensive Action,
d. Security,
e. Surprise,
f. Concentration of Force,
g. Economy of Effort,
h. Flexibility,
i. Cooperation, and
j. Administration.

Selection and maintenance of the aim is the master principle of war. The remaining principles are not given in any order of precedence, since their relative importance will vary according to the nature of the operation.

Selection and Maintenance of the Aim. All operations in war must have a clear aim, defined before operations start, which is selected to achieve the most favourable conclusion. The ultimate aim is a victory which restores a favourable peace. All operations must be directed towards this supreme aim.

In time of conflict, Australia would have a main political aim which would depend in part on the level of conflict and the identity and nature of the enemy. After first determining the best way it could contribute to achieving the national aim, the ADF would select an appropriate military aim. The military aim must be simple, direct, within the capabilities of the force available, and defined to avoid ambiguity. Each separate operation would itself have an aim which, while more limited, must also meet those criteria, and in turn contribute directly to the overall military aim.

Once the military aim has been decided, all efforts must be directed towards its attainment. The aim must be
regularly reconsidered, as changing circumstances may demand a new appreciation and, possibly, a new aim. Every plan must be tested by its capacity to achieve the aim. Military commanders at all levels must know exactly what they are to achieve and inform their subordinates so that there is no expenditure of effort which does not contribute, directly or indirectly, to the attainment of the aim.

.37 Morale. Success in war depends on morale as well as material resources. Morale is a mental state but it is very sensitive to material conditions. It is based on a clear understanding of the aim, on training and discipline, and is immediately responsive to good leadership. It also depends to a marked degree on sound administration. Morale can be adversely affected by inferior or inefficient equipment. However, outstanding leadership will sustain a high level of morale when all other factors are against it. History has shown that success in battle is the best stimulant of morale.

.38 The morale of the ADF is important in all military operations. In preparing to prevent or, if necessary, to fight at higher levels of conflict, the morale of the Australian population also is of great importance. It constitutes the foundation of the national will to resist. The morale of the armed forces then becomes the embodiment of national resistance. Undue emphasis on the horrors of general war could possibly impair national morale to such a degree that the determination to avoid, rather than prevent, war at any cost might prevail. Without a national determination to use force as a last resort, the effectiveness of armed forces will be significantly constrained.

.39 Offensive Action. Unless offensive action is initiated, military victory is seldom possible. Many defensive actions may have to be fought, but ultimately success is likely to depend on the offensive use of the available forces.

.40 In a general war, offensive air action is essential to success. In limited war, the importance of the offensive may not always be evident, for the very limitations which distinguish such a conflict from general war may militate against an overtly offensive policy. Nevertheless, the aim must be to wrest the initiative from the enemy and to take offensive action at the earliest possible moment.

.41 Security. If a defence force's striking power were destroyed or gravely weakened at source, a successful offensive would become impossible or seriously prejudiced.
The first prerequisite for offensive action is, therefore, a degree of security which will permit freedom of action. This may take the form of adequate protection of forward bases and would include the air and ground defence of essential airfields, ports, communications, early warning systems and any other vital installations.

The art of war involves, in part, the ability to strike the right balance between offensive action and security, and to allot the proper proportions of resources to each. Security does not imply undue caution at the expense of bold action; on the contrary, it increases the latter's chance of success. Readiness for action and the ability to deny the enemy freedom of action are inherent in security.

Surprise. Surprise is a most powerful influence in war which can produce results disproportionate to the effort expended. It is also an inherent characteristic of aircraft, which can operate at high speeds from any direction at any time. Every endeavour must be made to surprise the enemy and to guard against being surprised. In some operations, particularly when other factors are unfavourable, surprise may be essential to success. Surprise can be achieved through manoeuvre, or by exploiting new doctrine and technology. Its elements are secrecy, concealment, deception, originality, audacity, timing and speed.

Concentration of Force. Success in war often depends on the ability to bring to bear forces superior to those of the enemy at the decisive time and place. Concentration does not necessarily imply massing forces in one place, but rather having them so disposed as to be able to deliver the decisive blow, or to counter an enemy threat, when and where required.

Concentration of sufficient force to achieve the decisive or most important task at the right time is perhaps the cardinal principle governing the employment of armed forces in war. Insufficient force loses the initiative, cannot be decisive and so may lead to protracted conflict which is more demanding of limited resources. On the other hand, the use of excessive force is wasteful. Aircraft are inherently capable of concentrating force rapidly in time and space. This characteristic has great military value and must be exploited to the full when planning air operations.

Economy of Effort. Economy of effort is closely associated with the principle of concentration of force. It means that no more effort than is absolutely necessary should
be devoted to any one task. In the narrower sense, it encompasses the correct use of weapons and weapon systems, a sound distribution of forces, and a careful balance in the allocation of tasks, with the object of achieving combat superiority at the decisive time and place.

.47 In the broader sense, economy of effort requires prudent husbandry of national and defence resources, the controlled expenditure of effort, the right balance between offence and defence, and the correct allocation of available resources and manpower to meet widely spread and differing requirements. Care must be taken to ensure that resources are not employed where they cannot effectively influence the aim.

.48 Flexibility. Flexibility is the ability to adapt to changed circumstances, to respond according to the situation as it presents itself rather than in a predictable or preordained way. A high degree of flexibility is desirable to meet changing situations and unexpected developments.

.49 Flexibility demands good training, organisation, discipline and communications. Above all, commanders and their subordinates should display both flexibility of mind and rapid decision-making. Flexibility also calls for physical mobility of a higher order so that forces can be redeployed to concentrate rapidly and economically at different times and places.

.50 Air power is inherently flexible and highly mobile. Within its radius of action, an aircraft can be switched from one target to another far away, or from one role to another with little warning. An air force's flexibility and mobility are indispensable elements of the principle of concentration.

.51 Cooperation. Cooperation embodies the coordination of all activities to achieve the maximum combined effort from the whole. Goodwill and the desire to cooperate are necessary at all levels within Services, between Services, between Services and Government, and between allies. Cooperation is as essential to planning and preparation in peacetime as it is in conflict. It is a means of attaining concentration of force with prudent expenditure of effort in pursuance of the aim.

.52 Administration. Appropriate administrative arrangements are essential to effect strategies, operations and tactics. Administration includes logistics and personnel aspects for the efficient support of the operational force. Disregard of administrative detail has led to failure in the
past and could just as likely do so in the future. No operational plan is likely to succeed unless great care is devoted to administration.

.53 Administrative arrangements must be designed to give the commander maximum freedom of action in executing the operational plan. At the same time, the commander must have a clear understanding of the administrative factors which may affect his activities and, within his sphere of authority, implement administrative procedures which will enhance his ability to conduct effective operations. The administrative organisation must be as simple as possible but structured in a way that, once threatened, allows for maximum resilience and improvisation.

Military Capability

.54 Nations maintain armed forces to allow governments to exercise independent political action through the use of force if necessary. Armed forces are also maintained to achieve political, economic, religious, social and ethnic objectives or aspirations where peaceful means fail. Armed forces meet national objectives through their capability to exercise combat power. The military capability of a nation is its ability to apply, or threaten to apply, violence through the combat power of its armed forces, to impose the national will on another state. More bluntly, military capability is the total destructive force a nation can bring to bear on an enemy at a given time.

.55 Military capability can be applied either through the threat of the use of force - that is, deterrence - or through the actual use of force in military campaigns. Deterrence means the active discouragement of hostile action by arousing fear of counter-action based on a credible military capability and a perceived willingness to use it. In the latter case, combat power is applied as campaigns of violence.

.56 Combat power relies ultimately on firepower, manoeuvre and morale for its effectiveness. Firepower is applied by one of three methods: through bombardment to attack the enemy's will and capacity to wage war; through blockade to deny him resources and support; and through invasion, where his armed forces are comprehensively engaged or his territory occupied.
Military capability has three forms, which are based on the physical environments in which force can be threatened or applied. Those forms are air power, land power and sea power, which traditionally have been applied in Australia by the Air Force, the Army and the Navy respectively. Military capabilities can be applied by those three Services either independently or jointly. Joint Warfare is the more usual means of employing modern combat power, although independent, single Service applications still have relevance to particular campaigns: for example, strategic air bombardment has usually been applied by air forces, and naval blockade by navies. In general, however, maximum military effectiveness is likely to be achieved when commanders appreciate that the three forms of military capability are interactive, interdependent and complementary in meeting national objectives.

Because military capability can be so destructive, its application depends on certain rules of behaviour that have been codified over time and now are regarded internationally as acceptable.

**LAW OF ARMED CONFLICT**

**International Law**

All members of the RAAF must understand the tenets of international law that set the legal parameters for combat action. If those laws are not observed, the national commitment to moral legitimacy in the conduct of conflict may be prejudiced. Further, the planning and execution of missions imposes legal accountability on commanders and combatants. To assist with compliance, commanders should have RAAF legal officers available to provide advice on this specialist area.

International law is essentially a voluntary code. It emanates from two principal sources: formal agreements (such as treaties) and customary international law. However, Australian domestic law contains enforcement provisions which recognise our international law obligations.

**Introduction to the Law of Armed Conflict**

Action in warfare involves the application of deadly force in furtherance of national interests. The individual combatant acts as an agent for the sovereign state which is
seeking to impose its authority and will. Inherent in recourse to armed conflict are, therefore, presumptions of: rationality; proper purpose; and the ability to control the forces unleashed in war. A hallmark of 'civilisation' - as it might be claimed by a state as a national characteristic - is a willingness to accept limits of action in armed conflict; to admit the proposition that the means of warfare are not unlimited; and to acknowledge that the concept of legitimacy can prevail in all aspects of conflict. The system which exists to regulate conduct in combat is known as the Law of Armed Conflict (LOAC). LOAC is the ADF preferred term for what is also known as the Law of War.

.62 Professions are distinguished by, among other things, a code of ethics. Whatever the profession - medicine, law, engineering - there is a governing body which maintains standards and ensures that all members conform to the particular professional code of ethics. LOAC is the code of ethics for the Profession of Arms. However, it is much more than that, as no other profession can be equated to the Serviceman's in terms of the burden of responsibility borne in combat. Thus, LOAC assumes the status of an inviolable moral compact. It signifies individual commitment to a nation's dedication to principled behaviour even amongst the confusion and anxieties of battle, and regardless of the actions of the enemy.

.63 A single, unifying concept can be regarded as providing the foundation for the LOAC. That concept is the direct relationship between humanitarian concerns and military objectives. Known as the doctrine of 'proportionality', the concept has been codified in Article 57(2) of Additional Protocol One to the Geneva Conventions 1977. This states that nations are to refrain from attacks which may be expected to cause collateral damage 'which would be excessive in relation to the concrete and direct military advantage anticipated'. In other words, for the combatant, military necessity is the benchmark against which to assess the likely humanitarian consequences of an attack. The concept is vital, for it applies to the entirety of the LOAC.

.64 The LOAC should not, however, be seen as unnecessarily hampering the combatant in the execution of operations. The over-riding unifying principle always applies - that the importance of the military mission (military necessity) determines, as a matter of balanced judgment (proportionality), the extent of permissible collateral or incidental injury to otherwise protected persons and objects. The belief that the destruction of vital targets has a long-
term humane effect if it significantly shortens the conflict is recognised by the law of armed conflict.

.65 Major elements of LOAC are formally expressed in Australian legislation in the Geneva Conventions Act, which incorporates the four Geneva Conventions (1949) and the 1977 Additional Protocols to these Conventions. These conventions relate primarily to the protection of various classes of people from the effects of hostilities, namely: prisoners of war; the wounded and sick in the field; the shipwrecked, wounded and sick at sea; and civilians.

.66 The Geneva Conventions Act incorporating Article 83 of Additional Protocol One specifies that signatory states must undertake to disseminate the provisions of the Conventions widely, and include their study in military training programs.

.67 A major change to the LOAC occurred when Australia passed into its domestic law the Additional Protocols to the Geneva Conventions in 1991. As stated by the Minister for Defence when he introduced the ratifying Act into Parliament: 'If limited armed conflicts cannot be avoided, it is hoped that they will at least be conducted with some regard for the rights of civilians and that belligerent nations will treat POWs and wounded in accordance with internationally agreed principles. I note ... in this regard the important protection provided by the Protocols ...'

.68 The 1949 Geneva Conventions and the Protocols deal with people likely to be affected by war and their claim to protection under defined circumstances, for example, medical and religious personnel. The Conventions' main relevance to the combatant is in respect of prisoner of war rights and conditions, and the status of protected persons. Additional Protocol One relates broadly to international conflicts, including wars of national liberation. In effect, Additional Protocol One extends and defines the protection afforded to the civilian population in international conflicts. Additional Protocol Two is a declaration of principles relating to the protection of victims of non-international armed conflict.

.69 Additional Protocol One's concern with the protection of civilians is evidenced by a number of prohibitions and restraints imposed on combatants. This Protocol also defines the limitations on the conduct of operations, infringements of which are classified as grave breaches and regarded as war crimes. Thus, it is imperative
for every combatant - primary or secondary - to understand the consequences of Additional Protocol One.

A special responsibility is placed on commanders who, under Article 87, must ensure that members under command are aware of the LOAC and must act to prevent breaches of the LOAC. Failure to prevent such breaches could mean a commander would be personally responsible for breaches committed by his subordinates.

**LOAC and Air Power Operations**

The LOAC applies to all RAAF personnel. This manual details the various ways in which air power would be used to protect Australia's interests. Strike operations, for example, would range far and wide. Surprise - attack where it is least expected - is deliberately sought to produce shock effect. Air strikes aim to produce the maximum possible hurt to the enemy. They set out to injure, and will be greatly resented by the enemy and the enemy's civilian population. To prevent loss of international and domestic support, it is essential that front-line crews and operational planning staff know precisely the legal regime which influences their wartime duties.

In periods of tension, there will be many situations in which aircraft commanders will have to exercise judgment and discretion in poorly defined circumstances and under extreme pressure. The action which first marks the transition from a state of tension to one of armed hostilities may well be that of an interceptor pilot acting on his own initiative. While the general provisions of LOAC will be embodied in the Rules of Engagement (ROE) prevailing at the time, there may be occasions where decisions have to be made from first principles, based on an understanding of LOAC. Therefore, especially in relation to air operations, the careful framing of ROE is critical in order to provide adequate guidance for decision-making under conditions of stress and severe time constraint.

RAAF aircrew will not deliberately be sent into action in such a way as to contravene the LOAC. Nevertheless, aircraft captains must be able to exercise judgment during combat. If, for example, during an attack, the character of a target was found to be different from that assumed in planning, then a decision would have to be made which would take into account, among other considerations, the provisions of LOAC. Similarly, strike crews diverted to secondary
targets or engaged in armed reconnaissance must be able to identify legal constraints which might apply to any target they decide to attack.

.74 It is not only aircrew to whom LOAC applies. All who wear the RAAF uniform can expect to be targets of enemy attack. Every member of the ADF is a combatant. Technical and other support personnel will have secondary combatant duties. As well, RAAF units in some areas may have to receive prisoners of war or detainees and care for them until they can be handed over. All such actions must be completed in accordance with, and demonstrate respect for, the provisions of the LOAC.

.75 Clearly, the nature of air warfare presents RAAF personnel with unique LOAC problems. Occasions demanding the ability to resolve LOAC issues will be encountered rarely, but when they are, the issues almost certainly will be of grave moment, and the time available for a decision, extremely limited. Both the Service's reputation and its claim to professionalism are directly dependent upon the level of understanding each RAAF member has of LOAC codes. Accordingly, at every level in every unit there is a need for personnel to know both the general character of LOAC and specific provisions related to air power operations in which they may be involved.

.76 LOAC and military capability may be of little relevance if a nation is unable to engage in war. There are several major indicators of a nation's potential to wage war which need to be understood to complement this overall discussion on war.

THE WAR POTENTIAL OF A NATION

.77 In any class of warfare the resources of a nation which together constitute its war potential can be classified under the following headings:

a. National Will,
b. Armed Forces,
c. Economic Strength,
d. Research and Development,
e. Population,
f. Geography, and  
g. Alliances.

.78 **National Will.** National will is the basis of a nation's war effort, since it is only by the will of the people that governments are able to draw fully on all their other resources. A nation can be defeated without a fight if its people or government lack the will or ability to face the consequences of war. National defeat may be brought about by a number of different factors, and may be effected without the prior defeat of the armed forces. It may result from the dislocation or destruction of the industrial and economic systems, from internal civil dissension, or from the absence of any reasonable hope of victory in the face of overwhelming odds. Once a nation's will to resist has been broken, its enemies are in a position to impose terms. A high morale is the most valuable asset a nation can possess. Morale provides the foundation of the power to deter aggression and, if necessary, to accept the consequences of war.

.79 Australia's national will could be expected to support the use of the ADF in our area of direct military interest, and especially within continental Australia. Moreover, Australians may be prepared to extend that support, particularly if a regional friend requested military assistance. Whether or not national will would support military action at the global level or for geographically remote conflicts would, however, be a question for political leadership to consider carefully before committing the ADF.

.80 **Armed Forces.** The armed forces are the instrument by which a nation brings direct physical pressure to bear on an enemy. They are usually structured to meet a range of likely contingencies which could arise to threaten the nation or its interests. This might mean not only repelling an initial assault but also withstanding subsequent attacks to allow time to activate reserve forces. Therefore, armed forces should contain elements which permit rapid expansion in the event of protracted combat or escalation to a higher level of conflict. Further, armed forces of nations who are signatories to collective security alliances must be prepared to engage in combined operations with their partners. This obligation may have direct consequences on the structure of the force-in-being.
The Australian Defence Force is small by world standards. However, it is modern, skilled and highly trained, with an historical tradition in combat and in peacetime which confirms its effectiveness. The ADF is characterised by responsiveness, reach, mobility and endurance, as well as having the combat power and flexibility to counter a variety of threats. Intelligence gathering and broad-area surveillance are fundamental requirements of the ADF in contributing to that flexibility.

An offensive strike and interdiction capability provides the essential tools to engage in the higher levels of conflict. In order to maintain its high technology capability, the RAAF for example has equipped its strike aircraft with stand-off precision weapon delivery systems and video recording facilities.

In maritime warfare, the ADF offers a joint force which is capable of detecting, tracking and destroying enemy targets above, on, or below the surface of the ocean. In land warfare, emphasis is placed on forces that are highly mobile and capable of rapid deployment. In air warfare, the ADF brings modern, effective and versatile equipment to bear through the offensive and defensive combat triad (strike, air defence and maritime aircraft) and through transport and other support aircraft.

Economic Strength. In most crises which end in armed conflict, national economic strength is crucial. A strong economy is critical to the development and maintenance of capable and ready armed forces in peacetime, and the sustained prosecution of operations in wartime.

The economic strength of a nation depends primarily upon its access to raw materials, its technological base, its existing infrastructure and, most importantly, the skills of its population.

a. Raw Materials. An assured supply of raw materials and foodstuffs is essential to national survival at any time. It is a basic necessity for war preparedness and war fighting.

b. Technological Base. No nation can be considered an independent and influential power without a scientific, industrial and technological capacity which is sufficient to meet the majority of its own requirements. It may receive financial and material assistance from a more highly industrialised and
technologically advanced ally, but rarely can a nation or group of nations retain regional or global influence unless they are largely self-sufficient in the means of production.

c. **Infrastructure.** Infrastructure facilitates the production and supply of essential services. It encompasses national transport and communications, logistics, services and facilities such as energy, education and health, as well as a trained workforce.

.86 **Research and Development.** A nation with the capacity to conduct and exploit research can direct the results of that research to further advantage by improving the quality of its defence equipment. There are two main components of research and development potential. The first is the economic capacity and political will to undertake pure research, without the guarantee of a return on possibly large investments, so that successful development can benefit the nation. The second is applying the results to military research and development. In both cases, research and development can give a nation's armed forces a qualitative edge. A lesser but related potential is the ability to conduct applied research to improve imported technology, which can also generate a qualitative advantage.

.87 **Population.** The single most important element of any nation unquestionably is its people. An adequate supply of highly trained and motivated personnel is essential both for the armed forces and to support the national economy. In addition to the national will and morale of the people, demographic characteristics are vital to war potential. Features such as total numbers, geographic distribution, age and well-being may determine whether a nation can successfully overcome a threat to its security. Education, training and technical skills are other important characteristics of the population which contribute to war potential. The demands on skilled manpower must be balanced during wartime so that all needs are achieved within the resources of the nation. Any imbalance could have dire long-term consequences for national security.

.88 Issues of importance for Australia and the ADF are the continuing changes in education and employment. Levels of schooling and numbers of tertiary-qualified people are increasing and the emphasis within training and the pace of training have undergone fundamental change, with a focus more on problem-solving and the abilities of individuals.
Employment patterns have changed, with permanent part-time work offering attraction and the tendency for people to seek second and even third careers. Additionally, the population is becoming more culturally diverse and technologically competent.

.89 **Geography.** A country's size, location, topography, avenues of approach and climate are all factors which directly affect its vulnerability, and thus its war potential. In general, large countries are difficult to defend in their entirety, as through careful planning and surprise an aggressor could expect to secure a foothold following an initial assault. On the other hand, the larger the country, the greater the capacity of the defender to absorb an attack and mount a counter-attack.

.90 Australia's geography poses a daunting prospect to any would-be invader for the reasons discussed above, as well as having to traverse the air-sea gap. Additionally, it allows identification of focal points at which defensive effort can be concentrated. However, at low levels of conflict, the large distances, impassable terrain and dispersion of resources become obstructions for the defender.

.91 **Alliances.** Nations use alliances to enhance their security and development. Alliances strengthen national security through mutually beneficial defence and economic relationships. They can redress such shortcomings as economic weakness and skill deficiencies in the work force. However, all alliances have limitations since they depend on the resolve and continuing self-interest of two or more parties. Thus, while the defensive posture of a nation may be strengthened by an alliance, reliance on a partner at the expense of maintaining adequate national armed forces would be contrary to the national interest.

.92 Australia maintains alliances with the United States and New Zealand (through ANZUS) and honours its regional commitments through formalised Defence Arrangements and informal defence relationships. Additionally, Australia is a member of the United Nations. The formal arrangements include the Five Power Defence Arrangements (involving Australia, United Kingdom, New Zealand, Singapore and Malaysia), the Joint Declaration of Principles (with Papua New Guinea), and the Radford-Collins Agreement which protects and controls shipping in the Pacific and Indian Oceans. Informally, Australia pursues bilateral defence relationships with all countries in the region.
Above all else, war is an instrument of politics. It is the act of last resort, employed only when other methods of resolving dispute have failed. Because war is neither ordered nor logical but is unpredictable and chaotic, strategists have identified principles and developed a body of doctrinal thought in an attempt to place the experience of war into a framework which is both comprehensible and practical. That process has identified the critical importance of: reducing the friction caused by the inevitable disorder of war; understanding the nature of the conditions of offence and defence; focusing on an enemy's centres of gravity; and effectively employing the full national war potential - particularly human resources - in times of crisis.

Understanding war is not simply a matter of drawing lessons from past experiences. Unless those lessons are related to current circumstances (which might be fundamentally different from those prevailing at the time the lessons emerged), it might be more harmful to try to apply such 'lessons' than simply to ignore the past.

The knowledge that underlies the profession of arms evolves, in the main, from appreciating war's intrinsic nature; knowing its guiding principles, doctrine and laws; and studying the war potential of various nations. Reasoned judgments and decisions about the application of military force are most likely to be made by individuals with a deep knowledge of their profession. Acquiring that knowledge is the duty of every member of the profession of arms.
CHAPTER 2

DOCTRINE

An Outline

Military doctrine provides the philosophical basis for the particular action taken by military forces in war and the reasons behind that action. Enduring principles, innovation in technical and conceptual terms, and experience constitute doctrine.

While doctrine is authoritative, it still requires judgment in its application. ADF doctrine provides philosophy, instruction and procedures for joint operations, joint exercises and joint training. It draws on single Service doctrine for expertise in specific areas.
DOCTRINE

.1 Military doctrine is the fundamental philosophy concerning the employment of a defence force. As the central body of beliefs which guides the application of combat power, doctrine details what military forces should do in war, and why. Derived from a combination of fundamental principles, innovative thinking and experience, doctrine is authoritative but requires judgment in its use. While fundamental principles are relatively stable, innovation embraces continual change, with the result that good doctrine will be the outcome of a dynamic process.

ADF Doctrine

.2 No form of military capability in a modern defence force is completely independent. Air, land and sea power are complementary, and for a joint force to achieve its greatest effect, the individual Services must interact and cooperate with each other. Military campaigns and operations conducted in the defence of Australia, its territories and national interests almost invariably will be joint, involving two or more of the single Services, operating together to achieve a common aim. Therefore, Australian military operations are based on joint doctrine.

.3 In joint operations, the Services will continue to operate, for the most part, exclusively in their own environments. If joint operations are to succeed, the Services must cooperate in all aspects of operational planning, command and control, and mission execution. Cooperation is the essence of successful joint operations. Success in joint operations will also demand sound joint doctrine.

.4 The ADF is one of the few national defence forces which has formalised its joint doctrine and recorded an extensive set of instructions and procedures for joint operations. Joint doctrine for ADF operations in peace and war is contained in ADF Publication 1 - Joint Force Operations Doctrine. Agreed instructions and procedures for the conduct of joint force operations are promulgated in the ADF Publications ADFP2 through 99. These agreed instructions and procedures reflect doctrine contained in ADFP1 and are the authority for joint Service training, joint exercises and joint operations for the ADF.
Single Service Doctrine

Joint operations are properly based on single Service expertise. Similarly, joint doctrine does not simply materialise: it is the product of an evolutionary process which has its foundations in single Service doctrine.

For a nation to gain maximum military effectiveness from its total combat power, each of the armed Services must first master its own environment and maximise its unique form of combat power. Consequently, a single Service doctrine for each form of combat power is essential. These independent doctrines of air, land and sea power are the central philosophies for forces seeking to make best use of their particular environment. They also form the basis upon which joint operations doctrine is built.

Over the years, the ADF has formulated single Service doctrine based on the defence policies, strategies and capabilities of the time. This manual, the AAP 1000, presents RAAF doctrine. Changing strategic circumstances can affect single Service doctrine, just as they can affect existing force structures and capabilities. Single Service doctrine therefore should be continually under review. The process for reviewing RAAF doctrine is detailed in Chapter 14 of this manual.

SUMMARY

Doctrine provides a military force with a philosophical framework for how that force will be employed. ADF doctrine draws on single Service doctrine for its essential foundation. In refining its doctrine, the RAAF recognises that the substance of that doctrine must be relevant to not only RAAF operations, but also to joint ADF operations.
CHAPTER 3

AIR POWER

An Outline

Air power is distinguished from sea and land power by its flexibility, speed, ubiquity, range and shock effect. These characteristics give air power a unique ability to concentrate force and manoeuvre rapidly over long distances. However, the successful use of this ability will depend on the availability of secure operating bases, substantial logistics support and effective command and control.

The RAAF recognises three distinct air campaigns: Control of the Air, Air Strike and Air Support. Control of the Air is the prime campaign and its objective is air superiority. Because Control of the Air generally will be established at a specific time and place, it may not be necessary to achieve continuous control. Air Strike is the offensive use of air power, aimed at areas of national strategic value that underpin military capability. Air Support includes the traditional application of firepower against enemy surface forces, but also extends to non-combat support of air, land and naval forces.

The air campaigns themselves are carried out through specific air roles, which in turn rely on particular support functions to ensure the readiness and sustainability of forces to perform those roles. The objective of air power is to gain maximum military effectiveness from the use of the air. That objective can be achieved most effectively through the observance of four maxims - concurrent air campaigns, unity, professional mastery, and balance. If the maxims are not observed, military effectiveness will be lessened.

Air power incorporates all of a nation's aviation capabilities - an air force, army and naval air arms, civil aviation assets and space-based systems.
AIR POWER

.1  Air power represents 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. As noted by the contemporary authors Armitage and Mason, air forces use the air not merely as a medium for transit, as does a bullet or other projectile, but also for manoeuvre, concealment and surprise.

.2  The first use of air power was confined to the direct support of land and sea forces; that is, air power was simply an extension of land and sea power. Aircraft provided new dimensions of speed, range and height which commanders of surface forces were able to exploit for reconnaissance and the direction of artillery. From that modest beginning, air power has developed into an integral yet discrete part of warfare. It can provide direct support to the surface battle but, overall, it will be involved in equally important air campaigns that do not necessarily involve surface forces. Indeed, the prime air campaign is gaining control of the air, which would be vital to success in the ensuing surface battle.

BASICS OF AIR POWER

.3  Because of its ability to operate in the third dimension, air power enjoys enormous advantages of perspective, speed and freedom of movement. At the same time, there are penalties involved.

.4  Perspective. The ability to improve visibility, and therefore knowledge, by gaining height has long been recognised. The use of vantage points, observation towers and periscopes are familiar examples. The military advantage derived from perspective was the genesis of the interest in air power, and it remains a fundamental reason for the use of the third dimension. The extension of the perceptive horizon has been a driving force in military aviation since the 19th Century, when observation balloons were used by Napoleon III in Europe and by both sides in the American Civil War. Similar practices continued during World War I, but with more effect, when aircraft were used extensively for reconnaissance and artillery observation. Since then, there has been a rapid proliferation of surveillance aircraft and, in recent years, the perceptive horizon has been extended even further with the advent of space-based systems. With these developments, the
importance of the perspective provided by air power has made it an essential element of modern warfare.

.5 Speed. The speed of air travel is often taken for granted, but it remains a very important factor in deciding whether or not, and how, air power should be used. In the military realm, speed allows force to be applied much more rapidly at great distances; it contributes significantly to the extension of the perceptive horizon by rapidly moving the point of observation; it provides the potential for a swifter response; and it facilitates the rapid concentration of dispersed forces.

.6 Freedom. The English novelist H.G. Wells observed that in the air there are no streets and no channels, and that all directions can lead everywhere. Geographical barriers and severe weather have little impact on modern aviation. Freedom of movement across land and sea contributes to the flexibility and utility of air power, enhancing its already significant advantages of speed and elevation.

.7 Penalties. There are penalties associated with air power's advantages of perspective, speed and freedom. Weight is one of them and expense is another. The useful payload of an air vehicle is often much smaller than that of comparable surface vehicles. Increased distance, elevation and speed leads inevitably to increased fuel requirements and, therefore, a diminished payload. This is especially the case with space vehicles where the payload is a very small proportion of the total weight, which includes primary rockets and boosters. Consequently, there is often a trade-off between weight, range and speed in space operations, as there is - although less critically - with conventional air operations. Payload limitations make all movement by air expensive, especially for large and/or bulky materials. Directly associated with the search for improved capabilities is the cost of research and development. As the technology barriers are extended, the costs increase significantly. On the whole, the perspective, speed and freedom of movement provided by air power are gained at relatively high cost.

AIR POWER DEVELOPMENT - A SHORT HISTORY

.8 Since the first successful heavier-than-air flight in 1903, air power has matured rapidly, mainly because it presented opportunities not available to land and naval forces. Throughout this century, it has remained at the
leading edge of technological development with airframes, engines, avionics and weapons increasing continually in their capabilities and effectiveness. The historical development of air power is concerned intimately with the drive to exploit technology for increased military capability.

**World War I**

9. Air power began in World War I as a subsidiary component of armies and navies. However, once the crews of reconnaissance and artillery observation aircraft started trying to shoot each other down, air-to-air combat, or the fight for control of the air, rapidly evolved. The successful use of aircraft to bomb, strafe and shock enemy troops widened the range of air combat roles. By the end of the war, almost all of the roles of modern air power had been established. Air power was no longer ancillary to surface forces, but seemed likely to become a pre-eminent form of military capability, especially through strategic bombing.

**Inter-war Period**

10. **The Classical Theorists.** The period between the wars saw the emerging air power doctrine of independent strategic bombing developed most forcefully. Much of that doctrine was based on theory and speculation rather than experience, and was strongly influenced by the personalities of the three 'classical' theorists, Douhet, Mitchell and Trenchard. The common thread in their work was the belief that strategic bombing would make all other forms of warfare obsolete. A general in the Italian Army, Giulio Douhet published *The Command of the Air* in 1921. While his book was unduly optimistic, it remains the classic treatise on air power. The American General William 'Billy' Mitchell was more a man of action whose writings, public appearances and personal controversy developed a broad awareness of air power potential. As the first CAS of the RAF, Hugh Trenchard exerted an enormous influence on both the theory and practice of air power. Trenchard championed the cause of strategic bombing and vigorously supported strong personalities who could further the cause of an independent air force.

11. **Independent Air Power.** The justification for strategic bombing rested essentially on the belief that air power would be capable of providing a swift and decisive victory by itself and therefore minimise human and material costs. The theory was based partly on the belief that bombing
would cause a collapse of public morale, and partly on a wish
to avoid a repetition of the horrors of the trench warfare of
World War I. During the inter-war years, statesmen were
haunted by the spectre of marauding fleets of strategic
bombers, against which it was believed defence would be
futile. There was widespread popular support for the opinion
expressed in 1931 by British Prime Minister Stanley Baldwin
that the bomber would always get through to its target.

World War II

.12 Control of the Air. World War II exposed the flaws
in the inter-war theories. Not only did the bombers not
always get through, but the most important doctrinal principle
of air power to emerge was in relation to air defence. The
concept of air superiority or control of the air quickly
emerged as the prime air campaign. The concept can be
considered as a logical extension of the principle of control
of the sea as advocated by the American naval strategist,
Alfred Thayer Mahan. It means establishing conditions which
allow friendly air forces to make use of the air for their own
purposes, and denying the enemy the use of the air to impede
friendly sea, land or air operations. The Battle of Britain
is the classic example of a fight to establish control of the
air. Employing a defensive strategy against intensive and
sustained Luftwaffe attacks, the RAF eventually established
local air superiority over the south of England, thus averting
the intended invasion of Great Britain. In a sense,
subsequent air operations in Europe throughout the rest of the
war can be seen as an ultimately successful attempt to expand
the local air superiority gained over Britain, leading
eventually to air supremacy (that is, total control of the
air) over Germany itself.

.13 Tactical Air Power. While predictions of the
supremacy of the strategic bomber may not have been completely
fulfilled in World War II, the tactical use of air power came
into its own. The importance of air power in support of
surface forces was emphatically reinforced, both over land and
sea. The success of the Desert Air Force in North Africa and
the Luftwaffe in the 'Blitzkrieg' battles of 1940 and 1941
confirmed the generally accepted belief that air power is most
effective when employed offensively. Each of the examples
illustrated the value of offensive air power in either
interdicting enemy supply lines or in support of troops in
combat. Those roles came to be known respectively as Air
Interdiction and Close Air Support.
Offensive Air Power. While the strategic bombing offensive remains one of the most contentious issues from World War II, there is no doubt that in the last 18 months of the war, when it was applied in a sustained and intensive campaign, it achieved impressive results. In September 1945, the United States Strategic Bombing Survey concluded that Allied air power had been decisive in the war in Europe, having brought the German economy to virtual collapse. In the Pacific Theatre, the Japanese initially benefited from the offensive use of air power, most notably through the attack on Pearl Harbor. Later they were its victims. Whether or not the use of the atomic bombs at Hiroshima and Nagasaki was necessary or justified remains a contentious and emotional issue. It is certain, however, that in 1945 no nation could have withstood the United States, with its monopoly of those apocalyptic air-delivered weapons.

Unity of Command. The experience of World War II demonstrated that air power is best employed as a unified force, and allocated to commanders - land, sea or air - as dictated by circumstances and priorities. Only through the principle of unity can the inherent characteristics of air power such as flexibility, mobility, rapid response and pervasiveness be fully exploited. The principle of unity of command of air power, which had its genesis towards the end of World War I with the formation of the RAF, reached maturity in the campaigns of World War II.

Post World War II

Flawed Doctrine. A new era of air power doctrine was introduced at the end of World War II with the arrival of the nuclear age. International relations were dominated by the nuclear threat and the Cold War between the superpowers. Thus, much Western doctrine was predicated on the likelihood that the next war would be a global nuclear confrontation, in which the critical forces would be strategic bombers and inter-continental ballistic missiles. In fact, when the next war came, in Korea, political considerations not only prevented the use of nuclear weapons, but also severely constrained the use of the West's conventionally armed strategic bombers. Those same constraints applied some 10 years later in Vietnam, once more illustrating the importance of being prepared to fight limited, conventional warfare.

Forgotten Lessons. Lessons which had been learned through hard experience during World War II were sometimes ignored in Korea and Vietnam. Both wars highlighted the folly
of conducting an air interdiction operation against widely dispersed supply lines, when the enemy ground forces hold the initiative and control the pace of the land battle. The fight for control of the air in Korea suffered from uncoordinated command and control, as United Nations (UN) forces reacted to the immediate demands of the land battle and divided their air effort. That organisational failing ignored the principle of unity of command (and effort), which had been applied so successfully by the Desert Air Force in North Africa. The piecemeal application of bombing against targets in North Vietnam provided another example of the misuse of air power. Also, significant political limitations were placed on the conduct of the wars in Korea and Vietnam, a constraint which sounded a warning for the use of offensive air power in particular.

Modern Era

.18 Political constraints did not inhibit the application of air power by Israel during the 1967 Six Day Arab-Israeli War. With national survival perceived to be at risk, the Israeli Air Force made a devastating, pre-emptive attack which effectively destroyed the Egyptian Air Force on the ground. With air superiority established, Israeli ground and air forces completed a stunning victory unimpeded by enemy air.

.19 Electronic Warfare. The Yom Kippur War of October 1973 highlighted the growing importance of electronic warfare. Israel's failure to act on Electronic Intelligence (ELINT) warnings allowed Arab forces to achieve strategic surprise. Subsequently, the Arabs' greatly improved ground-based air defence system compensated to some degree for their inferiority in air-to-air combat. In the 1982 Lebanon incursion, the pendulum reversed. The Israeli Air Force, in a coordinated, surprise air attack, wiped out the Syrian SAM network in the Beka'a Valley and then went on to destroy the Syrian Air Force. The Israeli air campaign was notable for the innovative and effective use of electronic warfare, Remotely Piloted Vehicles (RPVs) and Airborne Warning and Control System (AWACS) support, as well as superior aircraft and munitions, and better training and tactics.

.20 Technology. Technological development has been fundamental to the evolution of air power. Some of the more notable examples include: the synchronised, forward firing machine gun in World War I (which fired through the propeller rather than over it, thus greatly improving accuracy); the
Norden bombsight of World War II, which facilitated precision bombing by the Allies; the development of radar (which was critical to the RAF's success in the Battle of Britain); the jet engine; and Electronic Warfare. Perhaps the most important technological advance of recent years has been Precision Guided Munitions (PGMs), which were first used successfully on a large scale in Vietnam in 1972. Because PGMs have greatly increased accuracy and often afford a stand-off capability, they have a very high probability of success, so fewer weapons and sorties are needed. Further, and most significantly, the precision now possible with 'surgical strike' means that collateral (that is, unintended) damage can be largely avoided. Through a combination of accuracy, lethality, contribution to reducing attrition, and ability to avoid or minimise collateral damage, PGMs and their associated delivery systems have revolutionised air strike.

.21 Cost of Technology. Modern air power is based on expensive, high technology assets. However, while air forces are likely to operate fewer aircraft, weapon systems will be considerably more capable than those of the past. At the same time, ground-based defence systems have become more accurate, easier to operate, more accessible, and relatively cheap. Also, aircraft not equipped with suitable electronic protection systems are highly vulnerable to either ground- or air-based defence systems. Acquisition of the capabilities to counter these defence systems adds to the cost of modern aircraft, but is necessary.

.22 The 1991 Gulf War. The 1991 Gulf War saw the most effective campaign in the history of air warfare. Through the combination of innovative doctrine, high quality personnel (a direct function of good leadership and high quality training), and advanced technology, air power dominated a major war. While some of the conditions experienced in the Gulf could not be expected to pertain in all future conflicts (for example, geography and warning time), the three characteristics listed above have enduring and universal relevance.
Conclusions from History

.23 Antecedents. The different theories that developed in the early 1900s concerning the use of air power acknowledged either explicitly or implicitly the distilled experience of surface combat power. This experience was generally expressed as principles of war. In essence, the principles of war are the same for air power as they are for surface forces. However, the speed and range of air power present different considerations and offer special advantages, notably with respect to concentration of force and economy of effort, both of which may be achieved through the use of surprise and offensive action.

.24 Integral Nature. Air power has developed such that it is, and will continue to be, an integral part of warfare. During the early period of development, three quite separate air power campaigns evolved. First, control of the air, or air superiority, has become the essential criterion for the successful conduct of combat operations in any sphere—air, land or sea. Second, the strike capability of air power, which can be applied separately from the other functions, continues to become more powerful through advances in technology. Third, air power will continue to play an increasingly important firepower role in the surface battle, at all levels of war, and in providing the essential support required by all combat forces.

.25 Command. Acknowledgment of the central importance and pervasive influence of air power on all forms of operations has often led commanders at all levels to try to acquire organic air power as an essential component of their force structure. The result has been an argument over command and control which has been a persistent feature of air power’s history. Thus, the principle of unity of command continues to place command of national air power in conflict with the competing demand for organic command of air power at lower levels; the real importance of the third dimension—its flexibility and responsiveness—is not always easily or readily understood.

.26 Political Direction. Finally, the political appeal of air power has increased rather than decreased with time because of the air weapon’s flexibility, ready availability, and its ability to discriminate between targets, and hence minimise collateral damage.
From the brief historical review, it is evident that air power has some clearly defined characteristics. In some ways it is similar to other forms of combat power (through its ability to manoeuvre and deliver firepower), in others it is quite different. For example, the speed with which air power can be delivered far exceeds that of sea power, and its range far exceeds that of land power. The magnitude of such differences establishes the special qualities of air power.

The many analysts and theorists of air power have used different terms to describe its characteristics. While there is no single agreed set of terms, there is a general commonality in the concepts they encompass. This commonality of alternative terms can be conveniently grouped into positive attributes and limitations.

Positive Attributes

**Flexibility.** The most often quoted attribute of air power is flexibility. Air power is flexible in that assets can be diverted quickly and effectively from one task to another and from one target to another. A related characteristic is versatility, evident in the wide range of tasks aircraft can perform. Aircraft have long had the ability to carry out single, dedicated roles. Increasingly, however, they have been adapted to a wide range of roles, termed multi-role, whereby one aircraft (or more accurately, one weapon system) can be engaged in different modes of employment with minimum difficulty. Moreover, there are some aircraft that are individually capable of performing more than one specialist task during the one airborne sortie ('multi-mission').

**Swiftness of Application.** Also known as speed, rapidity, or responsiveness, the attribute of swiftness of application defines the ability to cover distance quickly and to apply force with little delay. Implicit in the characteristic is the notion of going anywhere and covering long distances. Swiftness of application is therefore associated with the attributes of ubiquity and range.

**Ubiquity.** The term 'ubiquity of air power' refers to the ability to operate almost anywhere within the air and over the surface. This attribute is also described as mobility and pervasiveness, and implies the same sense of movement, unconstrained by physical barriers.
Range. The general meaning of 'range' is that air power can deliver firepower over long distances. The characteristic of speed implies that these long distances will be covered quickly.

Shock. The sudden, disruptive effect of the presence of air power has always had a psychological as well as a physical effect. The combination gives rise to the shock effect of air power. This is a product of the noise of aircraft, the effect of apparently 'coming out of nowhere' and the concentrated firepower quickly delivered. The psychological effect is a fear of disproportionate vulnerability perceived by ground forces or civilians who have been subjected to aerial warfare. History suggests that, with continued exposure, people become accustomed to noise and, to some extent, bombardment. Shock therefore is most effective when combined with the element of surprise.

Secondary Strengths

Rapid Concentration. From these positive attributes, air power derives unique strengths. The main one is the great ability to concentrate rapidly in time and space, which derives from a combination of flexibility and swiftness of application.

Minimisation of Casualties. Air power brings with its offensive use the ability to reduce civilian casualties (and indeed enemy casualties) through its precise targeting and attack capability. It also reduces the number of friendly casualties since few personnel are placed at risk.

Complementary Capability. There are some tasks which are best achieved by the application of air power, while there are others which are best conducted by surface combat forces. In this sense, air power complements rather than competes with land and sea power and so should be used for those tasks for which it is best suited to gain significant military advantage. The advantage of air power is lost when it is misemployed on a task more suited to surface combat power. Air power can complement land and sea power, in that it may quickly reduce an enemy's ability to resist these surface forms of combat power. In other words, air power can 'soften up' the enemy for subsequent attack by surface forces.

Political Responsiveness. The characteristics of air power make it very responsive to, and capable of,
demonstrating a nation's political intent. As air power can be used quickly and 'at arm's length' from population centres, it has an impersonal and remote quality that is attractive to political use. Thus, air power can be used for an immediate response or display of force - 'gunboat diplomacy'. It also complements the traditional naval display of national power. This demonstration can be applied by an extensive range of air power assets depending on the political message to be conveyed. The mere presence of aircraft in a limited capacity, such as regular surveillance patrols, may be sufficient. Conversely, shock and concentration of firepower delivered by air power convey a very different message.

Limitations

.38 The hallmark of air power - its flexibility - tends to encourage the mistaken belief that it can do anything. Air power does have significant limitations, some absolute and some relative to the other forms of combat power.

.39 Base Dependence. Air power generally operates most effectively from permanent bases. Winston Churchill noted air power's ties to the ground when he remarked '... except in the air, (air power) is the least mobile of all the services. A squadron can reach its destination in a few hours, but its establishment, depots ... take many weeks, and even months, to develop'. Air bases exist to provide a platform for the training of the operational force and as a springboard for operations. The essence of the air base is that it is an operational entity consisting of supporting systems and personnel. Thus, the prepared base is likely to be the centre of gravity of all air power. Attacking this centre of gravity can be the immediate means of rendering air power ineffective, as the operational capacity of the air base is nullified.

.40 Without a secure base from which to operate, air power assets may be unable to influence a battle. The security of bases is a difficult, time-consuming and expensive undertaking. Furthermore, there is a need for a substantial supporting system which can include: infrastructure (runway or cleared area, fuel, fuel storage and handling, power and power distribution); logistics (the ability to deliver at the base); C^2 (equipment, discipline, techniques and procedures); and personnel (personnel trained in the delivery of logistics and where necessary the defence of the air base). Unlike the other Services which conduct operations only away from home bases, an Air Force operates largely from a home base. Of course, an Air Force can also deploy force elements to forward
bases or recover aircraft to alternative bases during operations. In every case, there is a dependence on the air base as an integral support system and springboard for the generation of air power. Recognition of the importance of air bases should lead to resilience which can be provided through redundant operating surfaces and airfield services, and passive defence measures.

.41 Cost. Air power can deliver enormous firepower and combat support, but it does so at a cost. It is expensive to acquire, operate and maintain. Successful surge capability and replacement of assets require considerable resources and skills as well as increases in absolute costs. Moreover, the precision inherently required in the use of air power demands an advanced level of technology. Modern technology is expensive, not only in terms of acquisition cost, but also in terms of costs associated with through-life logistics support and long training times. That said however, the effectiveness of air power as a military solution can counter-balance the associated costs.

.42 Vulnerability. Air power is relatively vulnerable in the air and on the ground. In the air, there are risks from enemy air and surface-based defensive systems. On the ground, the general concentration of aircraft and associated support facilities at focal points (fixed bases) marks air power as a high value target for an adversary's air and ground forces. Attrition of air assets, consisting of losses from battle and accidents, can be managed by balancing the positive attributes of air power and its limitations. Clearly, attrition in operations is inevitable but it should be minimised. The loss of just one very capable but costly asset, like a multi-role aircraft, could represent a disproportionate reduction of capability. The long lead time often associated with replacing high technology equipment can make any loss an even bigger factor in reduced effectiveness.

.43 Secondary Limitations. Air power cannot maintain a permanent presence which can affect the situations in which it is used. Endurance and, to a lesser degree, weather, can also affect the application of air power. Those three influences combine to limit the 'permanence' of air power. Additionally, the ease with which air power can be controlled politically can impair its employment. These two issues are discussed in more detail.

a. Impermanent Effect. In general, only sustained operations supported by a large logistics effort are likely to achieve a substantial degree of
permanence. The use of nuclear weapons or the prolonged use of PGMs may provide an exception. Air power in support of surface forces tends to be characteristic of each particular action, in that the effects may rapidly dissipate. The enemy may by-pass the damage altogether, adapt to the changed circumstances, or reconstruct, thus making the effects of any damage transitory. Impermanence can also be a consequence of the adverse influence of weather and the constraints of aircraft endurance. However, developments such as air-to-air refuelling and all-weather systems have minimised these limitations. While air power cannot hold ground in the conventional sense, it can establish the conditions whereby land and sea can be occupied by friendly surface forces. This can be achieved by exercising a presence or impeding and delaying enemy movement.

b. Political Restraint. The application of air power tends to attract a high level of political interest because it provides a readily available and responsive instrument of political will. The result has been the occasional direct control of this 'convenient' display of military power by political leaders. In such circumstances, the military effectiveness of an operation can be diminished by political considerations. It is the commander's job to advise accordingly, and then proceed as directed by government.
THE AIR CAMPAIGNS

Evolution of Campaigns

The purpose of air power must be to gain maximum military effectiveness from the use of the air. It is achieved through three closely related, but distinct, broad approaches or campaigns.

In the air power context, a campaign is a series of operations which shares a common objective aligned to the overall conduct of the war, and which by itself can have an influence on the war. A nation may conduct air operations against an opponent's air power, against national strategic nodes, against an enemy's land and sea power, or in supporting friendly air, land or sea power. These operations constitute three distinct air campaigns. They are Control of the Air, Air Strike, and Air Support, where the latter includes anti-surface force roles, and force enhancement roles such as airlift, reconnaissance and air-to-air refuelling. Air power should not be applied in disparate actions in which one campaign follows another in a formalised sequence. The three campaigns are interactive and should be pursued simultaneously if necessary, and in a balanced manner. Ideally, the air power campaigns should be applied concurrently.

Control of the Air

Control of the Air is the campaign in which operations are conducted for the purpose of gaining freedom of action in the air. Once that control has been established, other air, land and sea campaigns may be conducted when and where desired, without prejudice from enemy air power. Achieving control of the air means defeating or nullifying the effects of enemy air power, both in the air and on the ground. The campaign encompasses the notions of air supremacy and air superiority. Air supremacy is total domination in the air, seldom realised in practice; while air superiority implies a restriction to air supremacy in either time or space, or both.

Ideally, the aim of Control of the Air is the quick seizure of a required degree of control in the air over areas directly related to the overall objective of the conflict. Fighting for air superiority merely for the sake of contesting the air battle, rather than contributing to the overall aim, may waste valuable resources for no real military advantage. However, in all cases the appropriate degree of control of the
air is a necessary precursor to further success in conflict, either on the surface or in the air. For this reason, Control of the Air is designated as the prime air campaign.

**Prime Campaign.** Gaining control of the air does not of itself guarantee success, but its absence generally accompanies failure. A control of the air campaign can be conducted by either defensive or offensive operations, or through a combination of both. Yet, it is important to note that control of the air can be gained by surface forces; a technique used by the Israelis in the 1973 Yom Kippur War. Following unacceptable losses of Israeli Air Force (IAF) attack aircraft to ground-based missiles and anti-aircraft artillery in the early stages of the war, land forces were used to help destroy the opposing defensive systems, thus opening the way for the IAF to resume offensive operations.

**Air Strike**

Control of the air may not be sufficient to achieve maximum military effectiveness. Further, the overall aim may be compromised as other forces wait for a Control of the Air campaign to be decided. Therefore, a second, perhaps concurrent air campaign that pressures the enemy may be necessary. Such a campaign is Air Strike, in which an enemy's Command, Control, Communications and Intelligence nodes, key production facilities and transportation infrastructure are directly threatened.

Air Strike is the campaign in which air power may be used to attack an enemy's homeland, national interests, resources and war-making capacity. In contrast to the often inaccurate mass bomber raids characteristic of the European theatre during World War II, small numbers of aircraft using PGMs are now able to make punishing and discriminatory strikes against an enemy's centres of gravity, with minimum collateral damage. The aims of an Air Strike campaign can be diverse, ranging from sustained attacks to destroy the war potential of a nation, to a single attack as an expression of political will. In its diverse applications, Air Strike best exploits the advantages of air power while exposing few of its limitations.

**Pre-emptive Strike.** A major consideration in the use of Air Strike is the disproportionately advantageous effect of shock and surprise that it can achieve for a nation initially threatened or on the defensive. In seizing the initiative and striking an aggressor at his source, the
defender gains the upper hand. A pre-emptive strike which hits hard can create destruction and confusion, while minimising friendly casualties.

.52 **Doctrinal Guidance.** If Air Strike is to achieve maximum effectiveness, assets should not be used piecemeal, nor should there be frequent changes in strategic goals, as happened in Vietnam. Any commitment of limited resources to a sustained Air Strike campaign should be carefully considered, as the destruction of an enemy's war-making capacity is time-consuming, requires an intensive application of firepower, and exposes air power assets to an increasing risk of attrition. Experience has shown that the campaign should be considered only under the following circumstances: when the outcome will immediately affect the course of the war; when manoeuvre by friendly surface combat power, or an enemy's defensive posture has produced a favourable situation; when stalemate has occurred; or when a decisive effect is required and can be achieved only through the destruction of the enemy's industrial and economic capacity to continue the conflict.

**Air Support**

.53 The third campaign is Air Support, which is defined as those activities which complement the combat power of land, sea and air power assets. Air Support is not a subsidiary of other surface campaigns. By enhancing the capabilities of surface combat power through firepower, mobility, manoeuvre or sustainability, air support becomes an integral component of those campaigns. Note that the campaign can also be mounted in support of the other two air campaigns. It contains both lethal (firepower) and non-lethal aspects (such as airlift and reconnaissance).

**THE MAXIMS OF AIR POWER**

.54 From the latter days of World War I, air power strategists have appreciated that the air weapon is at its most flexible when commanded as a single entity, rather than being dispersed discretely into small packages. That fundamentally important conclusion is reflected in the guiding principles for the employment of air power, which have their genesis in the principles of war. These guiding principles are the maxims of air power, namely: concurrent campaigns, unity, professional mastery and balance.
Concurrent Campaigns

.55 'Concurrent campaigns' defines the ability to apply air power simultaneously in a combination of two or all three of the air campaigns. The concept is fundamental to achieving the objective of air power and is therefore the first maxim. Individual campaigns normally involve a mix of offensive and defensive actions, all of which should have the potential to be conducted concurrently. Concurrent campaigns allow parallel air attacks to be conducted, which in turn allows the breadth of an enemy's war potential to be attacked and its absorption and recovery ability to be negated.

.56 During the period June to December 1943, General George C. Kenney used the USAAF Fifth Air Force and the RAAF to conduct concurrent campaigns which set the standard for the remainder of the war in the Southwest Pacific. Fighter and light bomber aircraft were used to achieve air superiority over the area selected for the next attack by surface forces (Control of the Air). Simultaneously, longer-range bomber aircraft attacked more-distant Japanese bases (Air Strike). Allied air power then isolated the area to be attacked, preventing the Japanese from reinforcing their ground positions (Air Support). As General MacArthur's armies advanced, air attacks against Japanese ground targets in the area were intensified and continued throughout the battle (Air Support). The end result was a classic example of the maxim of conducting concurrent air campaigns. The maxim was reinforced during the Gulf War of 1991, when Iraq's sophisticated air defences, its essential production capabilities and infrastructure, and its surface forces were attacked concurrently.

Unity

.57 Air power is a composite of numerous roles, the full potential of which is only realised when it is treated as an entity. As is the case with land and sea power, air power demands an operational and organisational uniformity rather than dispersal into discrete packages, if economies of scale are to be achieved. This then allows a commander to exploit fully air power's inherent flexibility. Only unity permits the maximum possible effort when and where needed.

.58 Unity does not mean 'indivisibility'. Air power is inherently divisible. Some nations can, and do, successfully
divide their air power forces. That practice is not inconsistent with the maxim of unity, as long as each division is adequately supported so that, by itself, it is a complete entity capable of achieving the objective of air power. The measure of this adequacy of support is the concept of 'critical mass', which, in effect, is an application of economy of scale. Because air power has a large, complex and interdependent support base, there is a limiting minimum, realistic organisational size and structure required for its effective and efficient application. There is also a limiting maximum realistic size beyond which economies of scale start to fall off. Thus, 'critical mass' is a guide to the successful application of the maxim of unity.

Direction of all air power assets must be centralised so that one authority exercises command. That authority can then derive an inherent strength from organisational efficiency by exploiting the multi-role potential of air power assets across the whole spectrum of conflict. Command must be at the highest appropriate level, exercised by a single authority expert in the application of air power. Control should be delegated as necessary; failure to do so may cause delays and inefficiencies. Once the broad planning and direction is completed, the operating level should be allowed a certain freedom of action in carrying out the assigned task. This means that execution should be decentralised to the lowest possible levels.

In the Six Day War of 1967, Israeli air power was applied using concentration, economy of force, surprise and simplicity, while flexibility was maintained through unified control which switched assets to new targets as needed, including direct support for the ground forces once air supremacy had been achieved. The result was reminiscent of Blitzkrieg at its best and the perfected tactics of the Allied Desert Air Force of World War II. Similarly, in the 1991 Gulf War, the organisation of what was the most successful air campaign in history, was based on the maxim of unity. Unity in an overall sense was achieved through the appointment of a Joint Force Commander, and unity of air power was afforded through the appointment of a Joint Force Air Component Commander.

Professional Mastery

Specialised training in air power's unique environment is essential to develop the depth of expertise necessary for planning, directing and executing the
application of air power, and to exploit fully its potential. That training must encompass the whole range of operations and associated support activities, so that a government can rely on the professional judgment and advice of its air commanders. This assures the nation that its defence force can attain maximum effectiveness in the use of air power because its air force is organised and trained to do just that. Similarly, the specialist organisations of the navy and army assure the nation that its defence force can attain maximum effectiveness at sea and on land as well. When brought together as a joint force, this specialist expertise of the navy, army and air force is coordinated for best effect, and provides a consequent synergy.

.62 Professional mastery acknowledges that air power is applied in specific military operations for a unique purpose, by an organisation structured for that purpose and necessarily separate from other military organisations. That is, air warfare is conducted in its own environment, and is different from, but nevertheless complementary to, land and sea power.

.63 Australia was the second nation to form an independent air force as the means of achieving the optimum use of air power. The value to Australia has been the sustained, high levels of professional expertise and effectiveness that are so difficult to achieve in small military forces. Thus, the Australian interpretation has come to mean that maximum effectiveness in the use of the air is obtained when the prime source of air power is sufficiently large and developed to function as a separate force. Further, that force is not discrete from the other forms of combat power. It relies on augmentation and joint action, where necessary, either from specialist air arms or specialist surface capabilities such as airfield defence.

Balance

.64 A comparison of air forces/air arms shows no two models are quite the same in composition, organisation and assets. The differences can be explained by the balance in each force. Balance is the outcome of shaping a force structure to achieve particular capabilities, and the priority given to each of those capabilities. Several factors influence force structure. Foremost is the perception of likely threats. The others vary in degree: the geography of a nation and its contiguous areas, economic strength and geopolitical circumstances. Together, these factors produce a particular balance in different forces.
The relative emphasis on competing priorities such as readiness and training, sustainability and size, technology and doctrine determines a balance in the force. Thus, changes in any condition or factor ought to produce a corresponding shift in balance within the force. The new equilibrium will likely lag behind any change. However, profound changes such as a significant shift in the nature of the threat can produce dangerous long-term imbalances. Thus, as the Luftwaffe approached the Battle of Britain, the threat changed significantly. Instead of a series of short, sharp land-based battles, the Luftwaffe faced a protracted, long-range bombing campaign. It had been shaped for the former and could not adapt to the latter. In other words, the Luftwaffe lacked balance in its force structure. Conversely, the RAF approached the Battle of Britain with a force shaped by the threat of a bombing campaign and emphasised both defensive (fighter) and offensive (long-range bomber) measures in its force structure to counter the threat. The RAF observed the maxim of balance and won the Battle of Britain.

It would be a mistake to conclude that success can be predicated on having a bit of everything 'just in case'. Unnecessary assets can divert effort and resources from the real needs of a force. Undue emphasis on technology, to the detriment of doctrine, could lead to a force being equipped with assets that either place excessive demands on limited technical support or far exceed the operational capability of an adversary.

Balance should provide a qualitative edge over an adversary. Quality is achieved through leadership and organisational efficiency, the assets used, and the ability and training of personnel. Quantity of assets is also important because no nation should rely on just a few highly capable platforms to perform all the necessary tasks. While a particular asset may be capable and versatile, it plainly cannot perform two discrete tasks simultaneously, whereas two less-capable assets can. An optimum balance of the competing demands for quality and quantity must be determined.

A nation's air power capability may also contribute to an overall capability of an alliance. For example, in NATO, the balance of one member nation's air power force is not determined in isolation, and may be constructed around limited operations, such as counter-air and airlift. This could mean that in a strong alliance, no nation has to replicate the air power capabilities of its partners, thereby
ensuring a balance throughout the alliance as a whole and the most effective use of all available resources.

For Australia, the maxim of balance calls for a mix of appropriate assets, in suitable numbers and supported accordingly, in order to meet current and anticipated national circumstances while retaining some capability to deal with the unexpected.

Observations on the Maxims

The stated objective of air power is to gain maximum military effectiveness from the use of the third dimension. In combat, the objective of air power can generally be achieved best by conducting three air campaigns. The essence of air power is the potential to conduct these campaigns concurrently. Further, practical experience and assessments of what has worked best in the past indicate that the success of those concurrent campaigns is directly reliant on the use of a unified, balanced and independent force. These ideas on the best method of achieving the objective of air power are encapsulated in doctrine as maxims for air power application, with independence being a manifestation of the maxim of professional mastery.

When the maxims of air power are not observed, military effectiveness will decrease. There may, however, be reasons for not observing the maxims. These could include an inability to do so, a conscious decision to sacrifice effectiveness for expediency, or external influences such as political or alliance considerations which militate against the pursuit of maximum military effectiveness. However, the outcome is the same in all cases - air power will not be at its most effective.

Maxims and Doctrine

Maxims of air power are direct considerations in the formulation of air power doctrine. They are succinct statements that require interpretation for their use but their consequences always influence the development and application of air power. However, the key aspect of the maxims is their interpretation. Like any principles, the maxims are not sufficiently specific for direct guidance. Doctrine is derived from the maxims through an interpretation influenced by the many factors making up national attitudes, beliefs and objectives. Interpretation is therefore likely to vary from
one nation to another, as will subsequent specific guidance and priority in the use of air power. This specific guidance and priority forms a set of imperatives that reflects national perceptions of the best method for employing air power. Australian air power imperatives are discussed in Chapter Four.

ELEMENTS OF AIR POWER

.73 A range of terms exists to describe the different types and levels of air power activities. Terms such as strategic bombing, air superiority, roles, tasks and missions can, however, mean different things as there is no common, agreed air power vocabulary, nor is there a universally accepted way to categorise the elements of air power. The elements used in this manual are representative of the many different approaches to describing air power, and are consistent with Australian Defence Force Publications (ADFPs). A diagrammatic representation of the elements of air power is at Appendix 1.

.74 RAAF air power doctrine discusses these elements as: Air Campaigns, Air Roles, and Support Functions. The three closely related but distinct air campaigns are the starting point for defining the other elements.

Air Campaigns

.75 An air campaign is a controlled series of related air operations aimed at achieving a single, specific, strategic result or objective. An air campaign may involve a single battle but more often it is conducted over a protracted period or over considerable distance within a single, specific theatre or delimited area. The three air power campaigns are Control of the Air, Air Strike, and Air Support.

Air Roles

.76 Next are the Air Roles, which encompass the actual conduct of combat. The full range of air roles is covered by the four broad headings of Counter Air, Strike and Interdiction, Anti-Surface Forces, and Force Enhancement. The Air Roles are described in detail in Part 2 of this manual.
Support Functions

77 Support Functions are those activities, other than flying operations, which are essential to the conduct of the three air campaigns. They come under the four broad headings of Command, Control, Communications and Intelligence; Logistics; Infrastructure and Ground Defence; and Personnel and Training; and are described in detail in Part 3.

Sources of Air Power

78 Air power should be thought of as the sum total of a nation's aviation and related capabilities. The sources of air power therefore, are the national aviation assets usually described as air forces, air arms and civil aviation. The related capabilities of these organisations, such as infrastructure, logistics and personnel, must be included in the overall meaning of air power capability. Air power can be applied through any suitable combination of these sources. The extent to which civil aviation is included in a combined source of air power will be based on national perceptions and interests. Finally, air power is already dependent on space-based systems. The use of space systems, either independently or in support of traditional air power, will continue to expand, raising questions of organisational and command priorities. The different sources of air power are described in the following paragraphs.

Air Force

79 'Air force' is the traditional term for the independent military force which delivers air power. The range of capabilities of air forces reflects national perspectives, priorities and strategic needs, as exemplified by the large range of air force structures throughout the world. Even though the world's air forces have different profiles, they share similar characteristics of effectiveness, balance and organisation. For example, all air forces can, with relative economy of effort, achieve control of the air, concentrate firepower or provide support for air and surface forces.

80 The required characteristics of air forces and their assets have evolved from the experiences of all forms of warfare and the need to husband scarce resources. Moreover, history has shown that those air forces which were able to
make the transition from peacetime to wartime in the most effective manner, were those which concentrated on developing certain characteristics. Briefly these characteristics are:

a. **Survivability.** Survivability in the air is a function of manoeuvre, speed, countermeasures and design technology; while survivability on the ground depends on physical protective measures, concealment, defences and dispersal.

b. **Readiness.** Air forces must be prepared to react quickly to enemy actions or intentions because of the enormous destructive power of modern weapons and the speed with which they can be delivered.

c. **Mobility.** For aircraft to be mobile, essential support facilities must be available at deployment, diversion and staging points. The level of support required is very high and includes capabilities to protect, recover, turn-around, reload, re-task and relaunch aircraft as quickly as possible.

d. **Sustainability.** Sustainability of air operations will make heavy demands on all resources, which may test the will and capability to support a prolonged campaign.

e. **Regeneration.** The ability of an air force to relaunch aircraft following recovery is called regeneration. It depends on the complexity of support required and the ease of rectification and servicing of aircraft.

f. **Interoperability.** The capability to provide services to, and receive support from, other systems and sources of air power is called interoperability. It enables assets to operate effectively together.

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**Air Arm**

.81 The characteristics of air force assets are also required in those assets employed in an air arm. Generally, an air arm is an organic component of armies and navies which exercises air power. However, specialisation is usually the main characteristic of the air arm because, as an integral part of a surface force, it provides a capability that is not readily achieved by other elements of that surface force. The need for this capability is directly aligned to the immediate
objectives of the surface force. It is therefore, most effective in that context.

While size is not a criterion, air arms tend to be smaller than air forces because, by design, they are not capable of prosecuting all the air campaigns. Air arms may be even smaller in scope if they are confined to a specific specialist role. For example, an air arm used for light or tactical observation would be unlikely to provide additional mobility for ground troops because of the nature of the assets involved. Conversely, the other extreme is the use of air power, by the United States, as an organic component of naval and land forces. The description of these sources of air power as air arms is misleading, as they exhibit many of the characteristics and capabilities of an air force.

Civil Air Power

Civil aircraft also apply air power, while the civil aviation infrastructure can be integral to both civil and military applications of air power. The range of capabilities can be wide. At one extreme, civil assets may be built to, and conform with, military specifications even though used in a civil role; at the other extreme, purely civil assets used permanently in a civil role may still indirectly augment some military capabilities.

Civil aviation has always had an influence on military air power. Since World War II, civil organisations have become increasingly involved in improving the broader national aviation infrastructure. The major contribution of civil air power has been in the reserve capacity it provides should there be a need to surge in support of the combat forces. However, a civil airline system, because of its structure and capabilities, is unlikely to provide a complete, alternative cargo-carrying capability for a defence force.

Space

Satellites and spacecraft are an increasingly important source of air power. Currently, satellites provide navigation, communications, surveillance, reconnaissance, meteorological and early warning functions.

These space-based capabilities can also be used to augment other forms of combat power and as an additional form of combat power. As military and civil space systems are not
exclusive to air power, they will continue to raise questions of organisational priority, command and purpose. There are two conflicting views: one is that space is the fourth dimension and space assets represent the combat power of that dimension; and the other is that space systems are merely adjuncts to existing combat forces.

Space systems offer an alternative way of enhancing the effectiveness of air power. Improved navigation accuracy and real-time communications are already cost-effective contributions. Wide-area surveillance by satellite is an alternative to airborne systems complemented by ground-based radars. The particular strengths of space and air power assets can be utilised to ensure an optimal balance of each. Satellite reconnaissance, for example, is effective over large areas but there are considerable costs involved, as well as the penalty of limited response. Air power assets are more responsive (simply by being manned) and less expensive, but lack wide-area coverage. Future technological improvements may result in some aspects of space-based systems becoming cheaper, relative to air power assets. Therefore, a balance between cost and effectiveness will determine the extent to which space systems can be used as a source of air power.

SUMMARY

Throughout history, air power has been characterised by certain positive attributes and limitations. Air power is conducted through three distinct air campaigns—control of the air, air strike and air support. The use of air power has been most effective when certain maxims have pertained: that is, when the air campaigns have been conducted concurrently, in a unified and balanced manner by a separate air force.

Air power itself consists of subsidiary elements. At the highest level are the three campaigns, which are conducted through air roles set within a foundation of support functions. These air roles are generically grouped as Counter Air, Strike and Interdiction, Anti-Surface Forces, and Force Enhancement. The support functions, too, are grouped under four headings: namely, Command, Control, Communications and Intelligence; Logistics; Infrastructure and Ground Defence; and Personnel and Training. National air power is derived from an air force, air arms and civil air power, each of which is characterised by special qualities that complement one another.
An Outline

Australian defence strategy emphasises the importance of defending the air-sea gap and the need for flexible, mobile forces to operate over great distances. In this respect, air power is fundamental to Australia's defence strategy and responsibility for managing most air power resources is vested in the RAAF.

The RAAF has exercised air power in this capacity since its foundation in 1921 and this experience has provided the force with a clear understanding of the maxims of air power, allowing it to identify a set of specific imperatives. These imperatives - command, qualitative edge, attrition management, centre of gravity, timing, and preparedness - emphasise the essential nature and characteristics of a small, modern, conventional air force.
AIR POWER IN AUSTRALIA

.1 Air power is important to the defence of Australia, and has special significance to a nation with Australia's environmental characteristics and strategic circumstances. The size of Australia's area of interest, together with extant defence strategies and policies, requires the ADF to be able to conduct the full breadth of air power roles.

.2 Air power provides a substantial contribution to intelligence and surveillance and can defend and attack in the air-sea gap should the situation warrant combat action. It provides the basis of an essential offensive capability within Australia's defensive posture as it can interdict an enemy in transit to Australia, or at source if necessary.

.3 Air power can be applied offensively against enemy surface forces in an interdiction role and can be employed in the roles of close fire support to friendly surface forces. It also provides a strong airlift capability both into and within a defined area of operations.

ENDURING ENVIRONMENTAL FEATURES

.4 An understanding of the physical environment in which the ADF may be expected to operate is fundamental to the proficient use of national military power. In particular, geography, climate, distance and sea conditions are the principal elements which need to be addressed.

.5 Geography. Except for the eastern, south-eastern and south-western sea boards, the Australian coastline is generally rugged and inhospitable, particularly in the sparsely populated northern regions. Tidal variations in the north and west are extreme. The terrain of inland regions varies from swamp to arid hilly areas often bounded by desert. The geography differs markedly across the principal regions in the north, from the Pilbara to Cape York.

.6 Climate. Australia's climate is one of extremes. The southern areas are generally temperate and favourable for all-year operations; however, there are instances of extreme cold in certain areas. In northern Australia there are two distinct seasons: a dry season (May to October), and a wet season (November to April). Each poses particular challenges. Typically, the dry season is extremely hot, while the wet
season is accompanied by dense cloud cover, monsoonal rains and flooding. The stress of heat and dehydration can impose working limits and additional support requirements, especially a plentiful supply of potable water. Throughout the year, personnel (both in the air and on the ground) and equipment can be adversely affected by the extremes of one or both of heat and humidity. The rain and heavy thunderstorms, particularly in the coastal regions, can hamper and even disrupt air and ground operations. Support operations such as airfield security and road movement can be affected and sometimes stopped. Weather also affects electromagnetic radiation to the extent that communications and early warning capabilities can be degraded. These problems aside, for most of the year in the north and central regions, the climate is characterised by hot and dry days and cool nights, which are ideal for air operations.

.7 Distance. Australia is a vast continent, with great distances separating the industrial heartland in the south and the remote, less developed northern regions. Like the climate, distance is a feature which tests both people and machines.

.8 Sea Conditions. Sea conditions affect air operations in terms of surface surveillance, search and rescue, and other roles where visual or electronic acquisition may be necessary. Conditions range from high winds and spray in the south to rain, high humidity and heat haze in the north. Sub-surface conditions are also important. Tropical and sub-tropical waters can be opaque to visual and sonar search.

BRIEF HISTORY

.9 Historically and culturally, Australia has paralleled the Western world in air power development and experience. Changes in Western thinking were reflected in Australian thinking without divergence, and similarly were absorbed into the development of Australian air power concepts. There have, however, been few Australian theorists who have influenced arguments on the development of air power in a uniquely Australian context.

.10 Government recognition of the need for military aviation led to the establishment of the Central Flying School at Point Cook in 1914. Subsequently, the Australian Flying Corps (AFC) was despatched to New Guinea at the outbreak of
World War I. The AFC also saw action in the Middle East and France. In 1921, the RAAF was formed as the world's second independent air force (the RAF was the first in 1918).

Air power in Australia came of age in World War II. From a force of 3489 personnel and 246 obsolescent aircraft in 1939, by 1945 the RAAF had grown almost 50-fold, to a force of 171,095 personnel and 3187 aircraft, including 1800 front-line combat machines. RAAF air and ground crews operated such advanced aircraft as the Spitfire, Lancaster, Mosquito, Mustang and Liberator in each of the three air campaigns, in theatres throughout the world.

In the years since World War II, the RAAF has fought alongside its allies in Korea and Southeast Asia, as well as contributing to the success of the Berlin airlift and, more recently, to a wide and demanding range of United Nations sponsored peace-keeping missions. In peacetime, air power continues to play a significant part in the defence of Australia through air and ground radar surveillance, reconnaissance, and northern basing. It also makes a continuing contribution to regional stability through deployments, exercises and defence cooperation training.

AUSTRALIAN INTERPRETATION OF THE MAXIMS

The broad air power maxims, discussed in Chapter 3, are general truths drawn from experience. Universal in nature, they are subject to interpretation in their application to specific circumstances. In Australia's case, the interpretation is based, naturally enough, on its geopolitical circumstances and, in particular, its geographic isolation, national economy, relatively small population and government defence policies and strategies. These factors lead to a uniquely Australian view on concurrent campaigns, unity, professional mastery and balance.

Concurrent Air Campaigns

At some time in the future, aggression could be directed against Australia and its interests along several axes involving air, sea or land power. Initially, Australia could be expected to react by taking the defensive but, inevitably, precedent and strategy would suggest a shift to offensive action. This calls for a defence force capable of conducting a diversity of operations, according to the
prevailing strategic circumstances. For Australian air power, it demands a force structure with a degree of inherent flexibility permitting the conduct of all three air campaigns concurrently.

.15 **Control of the Air.** Control of the air is the prime campaign because, once attained, it provides an air environment in which the other two air campaigns can be conducted optimally. But control of the air is also vital to surface operations. It will provide a defensive umbrella for the surface forces, permitting them to operate to their greatest effect. Ideally, because Australia is an island nation, control of the air should extend into the air-sea gap where, in conjunction with control of the sea by naval forces, Australian sovereignty could be effectively maintained. This would provide control over the approaches to the continent and so be a prime objective of the ADF in meeting Australia's defence strategy.
.16 **Air Strike.** The need for air strike may seem inconsistent with Australia's traditional attitude of non-aggression. Logic shows this is not the case for a number of reasons. An enduring aspect of defence policy has been to safeguard Australia by exerting a presence in the air-sea gap and beyond. Substantial power projection beyond Australia's borders can be achieved in only one of two ways - either by naval or air forces. The ability to 'take the war to the enemy' in Australia's circumstances depends on the capability quickly to project power into the air-sea gap. Air power can do this well because it is immediate and has a frequent revisit capability. Conversely, naval power offers a longer on-station time. Air and naval forces are complementary and provide Australian political leadership with a wide range of military options, including offensive action. And, short of the actual application of force, the capability to project power acts as a deterrent, thereby providing a stabilising influence. This is an important aspect of the offensive balance of the ADF. A purely defensive force structure could invite provocation which would not be considered against a force with a strong retaliatory capability backed up by political will.

.17 **Air Support.** Australian defence policy acknowledges that 'air warfare is part of all forms of warfare'. Air support is crucial in areas as diverse as intelligence and surveillance, offensive action, airlift and resupply. Australia's barriers of distance and unyielding terrain reinforce the need for support, to enable the small forces of the ADF to move quickly and sustain operations in a potentially huge area of operations. Economic realities constrain the size of the ADF; therefore, the extent of support capability will be limited and the optimum use of available resources is essential. Australia must extract the maximum leverage through techniques and technology. A qualitative edge using force-multiplier techniques, high technology equipment and well-trained personnel will enable air power to support the ADF's combat forces and ameliorate the disadvantage of small size.

**Unity**

.18 The structure and size of the ADF, the economic realities, and the nature of the geography have resulted in an ADF which relies on an air force to exercise the major share of air power capability, complemented by specialist air arms which provide organic air capability for the parent surface force. Where necessary, the ADF's air power can be augmented
by the civil aviation system. While a substantial degree of unity pertains for organisational reasons, appropriate command and control arrangements are fundamental for the effective operational employment of national air power.
Professional Mastery

.19 To assure itself of achieving an optimum use of air power, Australia must retain a critical minimum mass within the RAAF, such that the organisation exists as an entity, with the ability to perform the breadth of air power roles. A high level of professional expertise and effectiveness pertains when the prime source of air power is sufficiently large and developed to function autonomously. While acknowledging the primacy of an air force in achieving the optimum military effectiveness from the use of the air, Australia clearly recognises the essential role of air arms and civil aviation.

Balance

.20 Balance for Australia means more than a correct mix of fighter, strike, reconnaissance, ground attack, maritime air and airlift capabilities. This mix must be set within a framework of support functions, must be conditioned by broader defence policy and strategy, and must be oriented towards the nature and level of threat. Of a more specific nature are considerations such as the inclusion of advanced technology against added complexity; emphasis on capital equipment against personnel; support and expansion capability against high readiness levels; forward basing against additional logistics resources; increased reliance on civilian contractors against flexibility, cohesiveness, military 'team spirit' and ethos.

THE ROYAL AUSTRALIAN AIR FORCE

.21 The Royal Australian Air Force provides the largest contribution to air power in Australia. It meets the objective of air power through adherence to the maxims as a unified, independent force, balanced to meet the air power demands of Australia's unique conditions and capable of conducting concurrent campaigns. However, as a small, non-nuclear air force, it does have operational and organisational limitations.

Function

.22 In addition to the broad functions of the ADF detailed in Chapter 1 (which can be thought of generally as joint force functions), there is also a single Service
function for the RAAF. This function is to conduct air campaigns for the most effective defence of Australia and Australian interests through the prosecution of air roles and provision of support functions.

.23 Realistic preparation for warfare is important when warning time is expected to be short. However, as long as Australia enjoys security and freedom from imminent threat, there are ample opportunities and, indeed, a strong incentive, to use military forces for constructive community and international activities. Such contributions promote Australia's standing as a reliable and competent nation and a natural participant in regional activities.

.24 The RAAF offers a range of options to Government for participation in peace-keeping, community assistance and regional activities. The community assistance that is provided falls into the categories of either Assistance to the Civil Community or Aid to the Civil Power. Civil aid is important, not only for the direct help provided, but also for the benefits of longer term public awareness of the RAAF.

.25 International activities in which the RAAF participates, can be placed into two broad categories: cooperation and projection of Australian influence. Both contribute to regional stability and security. Specifically, the RAAF is involved in several major areas which include:

a. regular participation in single Service, joint and combined military exercises in the region;

b. limited stationing of forces overseas, including detachments, exchange personnel and defence representation;

c. Defence Cooperation Program activities, including any military activity of mutual interest and benefit;

d. participation in bilateral and multilateral discussions; and

e. training of overseas forces in Australia.

.26 The objective of peacetime activities in regional countries is to gain a widely-based understanding of the various cultures, the nature and views of governments, and the capabilities and interests of the armed forces.
Organisation

Within the RAAF, command and control is exercised by the Chief of the Air Staff through the Commanders of three commands. The organisation and purpose of these components of the RAAF are briefly described as follows:

a. **Air Force Office.** Air Force Office (AFO) provides the staff functions for CAS in preparing, implementing and reviewing RAAF policy and contributing to ADF policy functions where appropriate.

b. **Air Command.** Air Command carries out the air operations of the RAAF under the direction of the Air Commander Australia (ACAUST). The force element groups that constitute Air Command are Strike Reconnaissance Group (SRG), Tactical Fighter Group (TFG), Maritime Patrol Group (MPG), Air Lift Group (ALG), and Operational Support Group (OSG).

c. **Logistics Command.** Logistics Command is responsible through the Air Officer Commanding Logistics Command (AOCLC) to the CAS for managing the majority of the RAAF's logistics resources.

d. **Training Command.** The Air Officer Commanding Training Command (AOCTC) is responsible to the CAS for all non-operational air and ground training conducted by the RAAF.

Operations

The RAAF must be capable of conducting the three air campaigns, concurrently if required. In order to undertake those campaigns, it follows that the RAAF must be capable of conducting all necessary air roles and support functions. Equal emphasis will not be given to each role and function. Because of Australia's unique environment, some activities must be strongly emphasised while others provide little more than a potential to expand should conflict escalate.

There are two other considerations that determine the emphasis placed by the RAAF on air roles and support functions. First, there will always be some economic restriction on size and capability; therefore, the RAAF must be able to operate within these constraints whilst accepting
some decrease in effectiveness. Second, because of size and economic restrictions, the RAAF must give priority to those activities which are most likely in all levels of conflict and are dependent on skills acquired from intensive and long-term training. Consequently, those skills which can be rapidly developed at short notice, by expanding existing levels and quickly bringing new assets into service, can be accorded lower priority.

.30 The roles and functions undertaken by different elements of the RAAF are described in Parts 2 and 3 of this manual. They are mentioned below only in passing.

.31 Importantly, the roles of Offensive Counter Air (OCA) and Defensive Counter Air (DCA) provide the wherewithal for the ADF to counter an enemy's air operations. OCA concentrates on destroying an enemy's air power on the ground, while DCA concentrates on attacking it in the air. The strike roles allow air power to be directed against enemy land and sea targets not directly in contact with friendly forces, while the interdiction role allows enemy lines of communications to be cut and the flow of resupply and support capability to be disrupted.

.32 Air power is used in anti-surface forces roles to provide firepower against enemy surface forces in contact with friendly forces. Close Air Support (CAIRS) and Battlefield Air Interdiction (BAI) pertain to coordinated air/land offensive operations, and Anti-Submarine Warfare (ASW) and Anti-Surface Warfare (ASuW) pertain to coordinated air/sea offensive operations. Force enhancement roles apply to enhancing the effect of combat air, land and sea forces. This can be achieved specifically through Air-to-Air Refuelling (AAR), Airborne Early Warning and Control (AEW&C), airlift, reconnaissance, surveillance and Electronic Combat (EC).

.33 Support functions encompass the following:

a. Appropriate command and control arrangements for a commander to give coherence, guidance and direction to develop plans, determine priorities, assign forces and allocate resources.

b. An efficient and rapid communications network to facilitate all phases of planning, direction and execution of air operations; and necessarily covering air defence ground environments, air traffic control systems and space-based communications systems.
c. An effective **intelligence** system that collects and processes information so that it can be collated, analysed, assessed and used; and includes an ability to counter an enemy's intelligence gathering efforts.

d. A **logistics** system that ensures adequate levels of operational readiness and sustainability and provides an essential capacity to meet increased demands.

e. A suitable **ground defence** system that affords protection to high-value, high-priority targets from ground-force threats.

f. The coordination of all **infrastructure** requirements, including civilian and military facilities and installations, that contribute to the operational effectiveness of all air roles and other support functions.

g. An organisation that aligns **personnel** practices with the demands of both peace and conflict, such that manpower resources are prepared in peacetime for their most effective use in conflict.
h. A training system that provides personnel with the requisite attitude, knowledge and skills to build on basic abilities.

**Air Base**

.34 These support functions come together at an air base to provide the essential springboard for air operations. In generating air power, the RAAF has two potential problems to overcome: to minimise the limiting dependence on prepared bases; and to maximise the flexibility in being able to operate from a limited number of geographically disparate air bases. By overcoming these problems, the positive attributes of air power can be maximised. This means that air base capabilities must be organised so that support is flexible, consistent and mobile to allow responsiveness in augmenting, deploying to, or activating different bases as the focus of a contingency changes. Geographic and socio-economic realities of Australia dictate this flexible approach to maximising the use of a limited number of bases and minimising dependence on any one prepared base.

.35 There are alternatives to the RAAF maintaining a flexible, responsive use of air bases. These alternatives in decreasing order of cost and readiness are:

a. full and continuous operation of all air bases;

b. the conduct of frequent major exercises which augment, deploy to and activate additional air bases while continuing operations from home bases;

c. drawing capabilities from home air bases and using a work-up period as part of an augmentation, deployment or activation of additional bases; and

d. the establishment of a standardised air base support framework from which elements can be drawn at short notice to augment selected home bases or deploy to bare bases.

.36 The RAAF's operational concept for augmentation and deployment is unique. For foreign air forces, combat elements usually deploy either taking their own home base support organisation or using, sometimes with augmentation, the host base support structure. In contrast, the RAAF's forward deployment concept centres on the activation of bare bases in addition to possible augmentation of northern air bases in the
Area of Operations. The support organisation for the affected bases will be manned by 'shadow posted' personnel deployed from the various established bases. Immediately on arrival, these deployed personnel are expected to form part of a combat-ready structure. Thus, evaluation of the alternatives above must take into consideration the RAAF's operational concept, which is predicated on the reality of limited resources, including manpower and the geography of widely dispersed areas of interest.

An evaluation of the alternatives shows that the first and second are unacceptable because of the manpower or budgetary impact. Air power is normally a first choice option required by Government to respond quickly to contingencies. This requirement and a work-up period of the third option are incompatible; therefore, the option is not suitable for Australia's needs. The final option, with a standard air base support framework, provides the consistency in organisation, systems and personnel to allow the integration and adaptation of different components with minimal disruption. Such a framework provides a practical, effective and efficient means to combine personnel from different bases in order to augment base support at any given air base. The way in which air base support is organised to meet the RAAF's unique needs directly affects RAAF operational capability.

Campaign Priorities

The functions of the RAAF in both peace and war have to be assigned priorities, because of limited resources. During tension and periods of conflict, the decision on which campaigns are to be conducted and their timing is the responsibility of the Chief of the Defence Force (CDF), acting on advice from the Chief of the Air Staff (CAS) and the Air Commander Australia (ACAUSt). Decisions would be based on the situation and priorities at the time. However, priorities for the conduct of air campaigns generally can be predetermined from air power theory and national strategic considerations. These form an essential part of air power doctrine.

Control of the Air is the prime campaign of the RAAF. First and foremost, the RAAF must be capable of opposing and defeating an air threat. Once Control of the Air is achieved, then other priorities can be considered. Air Strike — taking the war to the enemy and meeting aggression as far from Australian shores as possible — is compatible with Australia's strategy of defence in depth, traditional air power doctrine and successful historical experience. Air
Strike includes the pre-emptive strike option, a political choice that the RAAF must be able to offer. Air Support—that is, support for land, sea and other air operations—is the third campaign. Support for operations in the air-sea gap is always likely to be a high priority for the Air Support campaign.

**IMPERATIVES**

.40 With campaign priorities and maxims in mind, imperatives for the employment of the RAAF can be identified. The RAAF is small by world air force standards. It employs well-trained personnel, uses modern equipment, is armed with conventional weapons, and is reasonably well-balanced, given its limited resources. Because of these characteristics, the RAAF has to devote attention to specific doctrinal aspects in order to best achieve the objective of air power. These specific points of emphasis are termed the imperatives for the RAAF. They provide more specific guidance than the maxims and apply to all operations. While the imperatives may not be applicable to all air forces, they should apply to any small, conventionally armed air force. The imperatives for the RAAF are:

a. Command,

b. Qualitative Edge,

c. Attrition Management,

d. Centre of Gravity,

e. Timing, and

f. Preparedness.

**Command**

.41 **Command**: RAAF air power must be commanded at the highest practical level by a single, experienced commander with expertise in the application of air power.

.42 Command is the first air power imperative. The immense potency of air power requires command arrangements such that its power is not dissipated through the dispersal of discrete packages. Without appropriate command arrangements,
RAAF flexibility and the ability to concentrate air power would be lost. This imperative is reinforced by the general principle of unity of command, which is considered the most important principle of command in Australian joint doctrine.

Command is that authority exercised by a commander, by reason of his appointment, over his subordinate formations, units and individuals. An air commander must exercise judgment in providing positive guidance in the planning, direction and execution of air power application. A single Service Chief - the Chief of the Air Staff (CAS) - is responsible to the Chief of the Defence Force (CDF) for command of the RAAF. However, CAS is not in the operational command chain. Air Commander Australia (ACAUST) has permanent command of all operational RAAF assets and is directly responsible to the CDF (through Commander Joint Forces Australia (CJFA) if raised) for the conduct of joint and specified air operations and activities. ACAUST is assisted in planning by a 'battle staff' which draws on current operational expertise. ACAUST may delegate control of air assets as appropriate, and would actively seek to do so whenever possible.

Qualitative Edge

Qualitative Edge: A qualitative edge must be achieved by the RAAF through a balance between quality and quantity, exploitation of suitable technology, quality of training and expertise, and attitudes of personnel.

The RAAF must compensate for lack of size and resources by emphasising quality in application, use of technology, training and personnel. Qualitative edge is the relative advantage gained from the cumulative effect of excellence in how an air force operates, the assets it uses and the attitudes inculcated in its personnel. This qualitative edge contributes significantly to the effectiveness of the RAAF.

The assets of an air force are important for its qualitative edge. Quality can be achieved through high technology and through a 'smart' combination of new and older, but reliable, technology. However, there must be a sensible balance between quality and quantity in assets, as neither extreme is likely to be satisfactory in all cases. Quality weapon systems must be exploited by quality personnel if the relative advantage is to be extracted. This means that the RAAF's emphasis on high standards in expertise and
professionalism must be maintained. Both require considerable attention to training and continuing practice, as well as a positive attitude or frame of mind, if operations are to be consistently effective. These aspects, particularly positive attitudes, are ultimately dependent on leadership. Leadership must impart a clear sense of purpose and encourage initiative, resourcefulness, responsibility and a tenacity in getting the task done with the available resources.

It is vital that the RAAF continues to emphasise the quality and attitudes of its personnel. The need for quality weapon systems is well understood in Australia. Paradoxically, the need for the complementary quality in attitude and personnel is more difficult to sustain. Without a qualitative edge, the RAAF's capability will be markedly reduced.

Attrition Management

Attrition Management: The RAAF must be employed in such a way that the disproportionately adverse effects of the attrition of assets are minimised.

Avoidance of attrition is important for all military forces, but is critical for a small air force. Historically, in both peace and war, the larger proportion of attrition is non-combat related. Thus, in peacetime, unnecessary attrition can be avoided through the maintenance of capability levels, consistent with the potential threat, which is a balance between safety and operational capacity.

The RAAF must devise concepts and practices which minimise the risk of battle damage to its limited resources. The exploitation of Australia's unique geography and isolation is one major avenue. For example, an adversary may be allowed to advance in areas where he would have to overcome the barriers of a large and sometimes hostile environment. The RAAF must also exploit the characteristics of air power to derive an optimum positive effect whilst minimising its limitations, so that the risk to assets is lessened. This requires an effective preparation in peacetime, so that there is a reasonable expansion base for dealing with higher levels of conflict.

Investment of time and effort in the professional competence of air and ground crews (which includes training and effective preparation), and demonstrating ingenuity, imagination and innovation to operate in unexpected or
different ways can make a positive contribution to managing attrition. Lastly, the use of high technology such as stand-off weapons, PGMs and self-defence equipment offer great potential.

Centre of Gravity

Centre of Gravity: The central focus of a force is its centre of gravity. RAAF air power is best applied when matched offensively against an adversary's centres whilst defending its own centres of gravity.

The concept of centre of gravity (explained in Chapter 1), applies at the national level and concerns the application of combat power against an adversary. The RAAF must be able to determine at any particular time an adversary's centres of gravity. Two vital aspects must be resolved. First, it is necessary to determine whether the use of air power is appropriate against a particular centre in order to defeat it. Second, if air power is appropriate, the best method of application must be established.

When air power is considered appropriate, the RAAF must ensure that its offensive capability hits at vital centres. Like other small air forces, the RAAF has a limited capacity to sustain operations and is vulnerable to attrition. Since the first offensive initiative may be the only opportunity for a small air force, attacking the correct centre is critical.

Of equal importance, the RAAF must also know Australia's centres of gravity in any contingency. In order to get the most effective use from air power, the ADF must determine if and how air power can contribute to the defence of the most important national assets or sources of national power. Only by knowing the adversary's and Australia's centres of gravity can the optimum balance be determined between offence and defence.

Timing

Timing: The RAAF can concentrate combat power quickly in time and space. To be at the decisive point at the decisive time requires exploitation of speed and flexibility, as well as the close coordination of RAAF assets.
Concentrating the appropriate force, with the requisite sustainment, at the decisive point and time, is the essence of the art of war. The synchronisation of these four requirements is called timing. Timing does not just happen, it demands coordination, planning and direction. Because aircraft can move rapidly over long distances and respond quickly to changing circumstances (flexibility), air forces have some advantages in achieving timing. The RAAF has extensive freedom with which to respond to a wide variety of circumstances (such as time available, time required, day/night, weather, distances involved, payload required) and still concentrate force at the decisive point and time. The major determinant of decisive timing is the synchronisation of support functions with air roles. Timing is an imperative for all air forces because it allows the initiative and tempo of battle to be controlled. However, for small air forces, the chances to be decisive in conflict may be few as the limited number of assets cannot capitalise on all opportunities. Therefore, timing can be critical to those few decisive opportunities when the RAAF could gain a decisive advantage by hitting when an adversary is off-balance.

The RAAF must make the night a preferred operating option, using the cover of darkness whenever possible. Additionally, the capacity for 24 hour operations must be maximised. Both are essential if timing is to be put to best effect because each can give a disproportionate advantage. The former gives security and surprise; the latter increases the pressure on an adversary and offers the flexibility of hitting him when his resistance is lower. There is a significant cost in time and effort in inculcating the necessary discipline and training, and regularly assessing responsiveness. Furthermore, there is also a financial cost in the necessary purchase of essential equipment for these operations.

Timing for maximum effect requires central control and coordination to exploit the interrelated activities of air power. However, for any small air force, centralised control must not be allowed to reduce responsiveness. If this happens, the positive effects of timing will be negated.

Preparedness

Preparedness denotes the ability of forces to undertake operations in a timely manner and to sustain the activities involved in those operations. In order to respond effectively to credible air threats and be ready for the
unexpected, the RAAF must maintain a high level of preparedness, commensurate with available resources.

Preparedness involves readiness and sustainability. Readiness is the amount of combat air power available to the RAAF and how quickly that combat air power can be exercised. Sustainability is the length of time over which that planned level of combat air power may be maintained. To maximise the inherent responsiveness of the RAAF, force element groups need to be maintained at an appropriate state of readiness. Moreover, military air activities during any contingency would be at higher-than-normal rates of effort; hence RAAF forces would need to be sustained at higher rates.

Readiness for the RAAF demands a force which is trained, current and tested in any air operation it is likely to conduct. The implication is that if the RAAF does not maintain adequate levels of readiness, there will be a lengthy response time from when a request for air power is made until it can be applied effectively. A longer response time may lead to higher rates of attrition, as air power will have to be applied in less-than-optimum circumstances. Readiness implies the need for a certain attitude to responsiveness as well as having the necessary systems in-place during peacetime. Moreover, regularly testing readiness with realistic and appropriate evaluations serves to build expertise and develop confidence in these systems.

Sustainability is a critical factor in a small air force where economic constraints limit the levels of stockholdings. Attendant with the RAAF's capacity to respond in a timely manner to a threat must be the potential to sustain higher rates of effort as dictated by the threat. Sustainability can be improved through reliance on allies; however, there can be no guarantee that support would be provided in all circumstances. The capability to reach operational tempo in the early stages of conflict, with or without the help of allies, must be carefully planned and practised regularly.

THE FUTURE

The trend of technological innovation in air power will continue. Technological advances may shape not only the capabilities of air assets but also the strategies developed for their use. In this respect, innovation will always be critical to air power. However, as technology improves, the
boundaries between the traditional roles of air power become increasingly blurred. This reflects the continuing flexibility of air power and its pervasive influence on other forms of combat power.

.65 This blurring of traditional responsibilities may appear in several ways. Firstly, the strategic and tactical uses of air power have merged. Modern aircraft have capabilities covering the full spectrum of conflict. This demands even more careful control of the assets. For example, strategic control is generally exercised at a higher level than tactical control. The ability of air assets to change from one level to the other must be matched by a parallel agility in both the minds of commanders and the systems of control. Secondly, aircraft are developing a greater capacity for multi-role operations. While it is difficult to envisage an aircraft in the future that can achieve all air power roles, the trend is to move away from narrow specialisation.

.66 Since the 1940s, the acquisition cost of individual defence systems has increased rapidly. This is particularly true of air and space craft, where costs have multiplied much more quickly than the rate of increase of gross national product in Western countries, and also total defence budgets. If the unit costs of air power assets continue to increase in real terms, the generally constant defence budgets will not sustain large numbers of these highly capable platforms and systems. Yet, there is some evidence that the cost factor alone may plateau.

.67 Furthermore, there is evidence that widespread use of data processing in the technical community as a whole is bearing dividends as new efficiencies and applications are achieved with far less investment. Most countries, other than the major economic powers, will concentrate on retaining or adopting existing systems before considering investment in the attractive but more risky emerging technologies. Refurbishment and life extensions will be the norm.

.68 The vulnerabilities of air power will become a major concern for improvement as costs increase. Dependence on secure bases - the Achilles heel of air power - may be reduced in several ways. Effective early warning, either airborne or spaceborne, is already providing part of the answer. Greater dispersion capability and less dependence on fixed runways and support facilities are other future developments. Such actions will, however, be countered by improved static target location using space-based sensors. Attrition management could be aided by developments in training simulation, the
widespread use of air-to-air refuelling, and a real capability for 24 hour operations. Equally, improvements in stand-off capabilities using PGMs, and night and all-weather capabilities, may be offset by improved and cheaper surface-to-air missiles.

.69 Exploitation of computers in diverse fields, such as battle management and real-time communications, should have a significant influence on air power's capability to remain flexible and responsive. A quite different consequence of computer and technological innovation will be to make enhanced capabilities more accessible to a far wider range of military forces. In effect, the qualitative edge in hardware may become more difficult to achieve. However, personnel will still contribute significantly to that qualitative edge. Personnel will remain the crucial factor in the quality and capability of air power. Two consequences are likely to follow. Even greater investment in personnel will be required, and the future complement of suitable and capable personnel may be constrained by available numbers and quality, as well as competing demands.

AIRMEN

.70 Fine judgment in applying air power properly is the difference between success and failure. That judgment is gained from an understanding of air power and experience in meeting its objectives. Understanding air power is difficult and requires a continuing development of intellectual discipline. Applying it effectively requires skills and abilities that go beyond the technical expertise of meeting a task or mission objective.

.71 The professional approach is to understand the instruments of air power and comprehend the environment in which they are applied, at an appropriate level. For the military professional, this means a duality of professions - intertwining specialisations that develop together. One demands technical knowledge, the other military knowledge, as part of the profession of arms. The latter demands experience and knowledge in air power at successively higher levels, culminating in the strategic-level expertise of senior officers.

SUMMARY
Enduring environmental factors and Australia's historical experience have shaped the nation's interpretation of the broad maxims of air power. As the primary source of Australian air power, the RAAF fulfils a function and provides an organisation that are fundamental to the nation's ability to conduct the full breadth of air power roles.

In conducting the air roles, coupled with providing specific support functions, the RAAF has determined its campaign priorities and identified a set of imperatives to enhance its effectiveness. Moreover, it has focussed on developments for the future and the role of its airmen in the future.
PART 2

AIR ROLES

The business of the RAAF is to fly and fight and its mission is to gain maximum military effectiveness in the air. To do this, it must be capable of conducting the breadth of air power roles. For convenience, these air power roles can be grouped into four generic headings (Counter Air, Strike and Interdiction, Anti-Surface Forces, and Force Enhancement), and each group is discussed in this Part in its own chapter.

Counter Air roles can be offensive or defensive and are the prime contributors to gaining control of the air. Strike and Interdiction roles provide the wherewithal to seize the strategic and operational initiative - they are purely offensive and form the foundation of the Air Strike campaign.

Anti-Surface Forces roles embrace the firepower support which air power can provide for surface forces. These roles include Close Air Support (CAIRS) and Battlefield Air Interdiction (BAI) for land forces and Anti-Submarine Warfare (ASW) and Anti-Surface Warfare (ASuW) for naval forces.

Finally, Force Enhancement roles provide the essential support for combat forces to gain maximum effectiveness. Airlift, reconnaissance, surveillance and Electronic Combat (encompassing Electronic Warfare and Suppression of Enemy Air Defences) are the more well-known roles; but also included are the 'force multiplier' roles of Air-to-Air Refuelling (AAR) and Airborne Early Warning and Control (AEW&C).
CHAPTER 5

COUNTER AIR

An Outline

Counter air operations can attain and maintain the desired degree of control of the air through offensive and defensive action. Offensive Counter Air (OCA) operations are pro-active and achieve control, principally, by attacking enemy aircraft on the ground, whereas Defensive Counter Air (DCA) operations nullify or reduce the effectiveness of enemy air attacks. The RAAF may have to carry out both roles and, therefore, its capabilities must reflect this need.

To conduct OCA, aircraft with range, mobility and endurance are required, supported by efficient intelligence and command and control systems. To conduct DCA, a complex interdependent system comprising elements of control and reporting, Low Level Air Defences (LLAD), fighter aircraft, intelligence, communications and passive defence measures must be established, coordinated and closely controlled.

The skills required to conduct the two counter air roles are complex and cannot be acquired at short notice. Yet, an effective response to short notice military pressure or political tension is expected of these roles. The implications are clear in that appropriate training and exercising in the long lead-time skills need to be extant in the force-in-being.

Counter air capabilities are a measure of the determination of a nation to control the outcome of battle, whether in the air or on the surface below. Control of the air is the prime campaign and provides the key to success in the surface battle.
COUNTER AIR

.1 Counter Air operations are conducted to attain and maintain a desired degree of control of the air. Only in this way can an enemy's ability to conduct destructive and demoralising air attacks against military forces and centres of national importance be minimised, and the mobility of friendly surface forces exploited to the fullest. Therefore, the RAAF must be capable of both Offensive Counter Air and Defensive Counter Air roles since the requisite level of control of the air is unlikely to be achieved by just offensive or simply defensive means.

.2 In peacetime, the possession of demonstrably reliable capabilities to control Australian airspace and to strike at the source of air threats contributes to sound national deterrence. The requirements for the effective conduct of each role and their degree of achievement are pivotal to the defence of Australia.

HISTORICAL INVOLVEMENT

.3 Australians were involved in Counter Air operations as early as the aerial battle of France in 1940, where they operated as part of the RAF. In early 1941, Australia's first fighter squadron in the United Kingdom, No 452 Squadron, was formed with Spitfires and became one of RAF Fighter Command's top squadrons. Other RAAF squadrons were formed, and there were also individual pilots who continued to serve with RAF or Dominion squadrons over northern Europe.

.4 In the Middle East theatre, No 3 Squadron was the first RAAF unit to arrive, in November 1940. By May the following year, a second RAAF Fighter Squadron, No 450, had arrived. Both squadrons fought with distinction in the North Africa campaign and later during the invasion of Sicily.

.5 RAAF squadrons were also involved in the Pacific theatre, and once Allied forces began advancing during 1943 through New Guinea and New Britain, the contribution of those RAAF squadrons in conducting Counter Air operations was significant. This contribution continued throughout 1944 and enabled the Admiralty Islands, Hollandia Aitape, Biak, Noemfoor and Morotai to be retaken. The subsequent success of Australia's involvement in the 'Oboe' plan - the landings at
Tarakan, Labuan-Brunei Bay, and Balikpapan - was facilitated by the RAAF's Counter Air operations.
OFFENSIVE COUNTER AIR

.6 Australia's strategy for defence implies that military operations would normally be mounted from Australian territory and that such operations would be defensive in nature. However, if regional stability were at stake, the possibility of forward deployment to other countries for counter air operations cannot be discounted. In any event, a prime object of the Australian government would be to limit and to control the rate of escalation of any conflict, while fully exploiting the possibility of a diplomatic resolution. Yet, while predominantly defensive in nature, the ability to undertake offensive operations remains an integral part of Australia's defence strategy, providing the Australian government with the flexibility to exert the political will of the nation through a range of military options. Offensive Counter Air (OCA) operations constitute one such option.

.7 OCA operations are defined as those offensive airborne actions or initiatives which are directed towards the attainment and maintenance of the desired degree of control of the air. Essentially, OCA operations are designed to reduce, or to destroy, an enemy's potential to conduct its own control of the air campaign. In the past, these operations have generally amounted to airborne attacks against an enemy's air defence infrastructure and aircraft, while still on the ground. The history of air warfare provides some outstanding examples of such operations. Perhaps the most impressive was the destruction of more than 4000 Russian aircraft on the ground by the Luftwaffe in only nine days in 1941, completely destroying the Russian army air force. The current tendency to disperse aircraft and to house them in protective shelters is rendering such operations more difficult, but, as the Gulf War demonstrated, they still provide a prime method of reducing the enemy's capacity to fight in the air. Another effective OCA operation is offensive fighter sweep, which may be an appropriate option for the RAAF in combat.

COMMAND AND CONTROL

.8 The Air Commander Australia (ACAUST) should retain full command of the OCA role because he will control the DCA role (as National Air Defence Commander) and the strike roles, in which OCA assets could be used. Furthermore, OCA operations are related to national surveillance and intelligence activities and other maritime or land operations,
thus necessitating the exercise of command at a campaign level. Conflicts of interest can be resolved by ensuring that OCA, as with other campaign level operations that are controlled by ACAUST, is based on CDF's priorities (or CJFA's if raised).
Due to their flexibility, the principal assets for OCA will always be in strong demand, not only by ACAUST for DCA and air strike roles, but also by other joint commanders. While control of the air is the prime campaign, CDF's allocation of priorities must be sufficiently clear to resolve any disagreement between national and joint imperatives.

While ACAUST retains full command, the knowledge and expertise for planning and conducting OCA operations lie in the respective Headquarters of the RAAF's Nos 81 and 82 Wings. These organisations would be well placed to retain operational control of their assigned squadrons. Transfer of operational control of OCA operations to other commanders (such as the Maritime Commander Australia) generally would be restricted to specific missions and for specific periods.

OCA ROLES

In a prolonged contingency, the prime campaign for control of the air over the air-sea gap should be fought mainly through OCA operations. To allow an enemy to gain the initiative and force a defensive or reactive effort would result in a gradual lessening of the nation's air defence capacity. The objective should be to gain the initiative and present an enemy with those same problems that Australia would face if the ADF remained reactive. Fortunately, given Australia's most likely emphasis on limiting escalation, there are measures well short of overt aggression that can comprise an effective OCA strategy and they are particularly relevant to Australia's circumstances.

OCA Attack

The most widely recognised and most effective OCA role is to attack an enemy's air defence infrastructure and assets. Destroying aircraft on the ground has been traditionally regarded as the most effective means of conducting OCA operations; however, in the OCA attack role, as with any air strike role, selection of the right targets is most important. Care must be taken not to concentrate on aircraft to the exclusion of other, sometimes more suitable, targets such as command and control infrastructure, radars, and surface-to-air weapon systems. Other factors to consider are the degree of hardening of the target and the risk of attrition from enemy air defences. Aircraft in hardened
shelters are difficult targets whose destruction may only be possible through the use of PGMs with a stand-off capability.

.13 The political dimension will be important in OCA attack, as it will in any air strike role involving attacks on foreign territory. Operations might only be authorised in more substantial conflict, and then only after all other options have been exhausted. Nevertheless, as the level of conflict increases, it will be important for air planners to put forward a cogent case for timely approval of OCA attack.

Offensive Sweep

.14 The most flexible OCA option is the offensive fighter sweep. It is a particularly useful option for Australia throughout the air-sea gap and proximate land areas and can be employed across a range of situations, from the most benign to the most aggressive. Consequently, it provides the ADF and the Australian government with considerable flexibility.

.15 In its most benign form, an offensive fighter sweep consists of probes beyond a declared Air Defence Identification Zone (ADIZ) into international airspace, to intimidate a potential aggressor during periods of tension and to deter or interfere with his ability to mount similar probes in response.

.16 During low level conflict, these sweeps can probe a potential aggressor's ADIZ with the intention of retiring before being engaged. Again, this illustrates the flexibility that air power gives a government when dealing with contingencies while minimising the risk of escalation. In such circumstances it will be important to provide aircrew with adequate and sufficiently flexible Rules of Engagement to ensure that OCA assets are not exposed to unnecessary risk.

.17 Should conflict escalate, the range of offensive sweep options increases significantly. Random or dedicated sweeps over the air-sea gap, for instance, would serve the dual aims of demonstrating resolve and achieving local air superiority. The proven capability for Australia to control a particular block of airspace would force an aggressor to consider fighter interference when formulating attack plans, even if round-the-clock protection is not practical.

.18 Penetration of sovereign territory is a clear escalation of conflict, unlikely to be authorised by the
government at the lower levels of conflict. However, once authorised, offensive sweep provides a very effective tactic for area protection, either as a stand-alone operation or in conjunction with OCA attack. Any such operations must be so structured as to give the enemy no option but to react with its own DCA assets, because attrition of enemy DCA forces in traditional 'fighter versus fighter' engagements will only succeed if the enemy is obliged to engage.
Suppression of Enemy Air Defences

.19 Suppression of Enemy Air Defences (SEAD), which can be considered as an OCA role, is discussed more comprehensively in Chapter 8. SEAD is probably viewed mainly as suppression of ground-based air defence systems, but it also includes the fighter escort role and involves the protection of friendly air assets against interference from enemy fighters, either as a tied escort (in formation with the strike package) or detached (operating in close proximity).

REQUIREMENTS AND CAPABILITIES

Range and Endurance

.20 Even with Air-to-Air Refuelling (AAR), any air threat to Australia's sovereignty could be expected to involve aircraft staging through land masses close to Australia and operating over considerable distances at the extremes of their range and endurance. Similarly, should Australia face a threat and determine that offensive measures were required, then its OCA-capable aircraft would be presented with a similar problem. The RAAF's OCA-capable aircraft must have a substantial radius of action.

.21 This requirement has been recognised for many years and RAAF acquisition policy has been active in meeting it. However, with the likely distances to be traversed and, for OCA attack, the weight of weapons to be carried, sufficient in-built range and endurance will be almost impossible to attain. The need for operational air-to-air refuelling is compelling and must feature in all planning.

Mobility

.22 Mobility in this sense implies that OCA squadrons must generally be deployable so that they can operate from forward bases. This form of mobility would allow aircraft to operate well-forward of their customary support base and contribute to Australia's strategic reach. Deployability cannot be gained without resource costs, such as purchase of extra spares and ground support equipment; there are also additional operating, infrastructure and logistics costs.

Intelligence
Effective conduct of the OCA attack role would rely heavily on accurate intelligence. Close study of the locations and vulnerabilities of enemy aircraft and installations would be necessary to ensure mission effectiveness. Clearly, timely intelligence is essential. Aircraft may be moved frequently and enemy intentions varied at short notice. Moreover, for offensive sweep operations, knowledge of likely enemy ROE would be crucial if attrition is to be avoided when positive identification of possible targets is required. Australia must exploit all sources of intelligence as described in Chapter 9.

Surprise

The significance of the principle of surprise in an OCA context is that aircraft surprised on the ground are, unless heavily revetted or sheltered, more vulnerable and more easily targeted than when they are airborne. A graphic illustration was the success of the Israeli raids in 1967, when 196 combat aircraft destroyed 400 Arab aircraft on the ground in two days. Closer to home, in 1942 RAAF fighters and bombers deployed in Indonesia, and later in PNG, had little warning of Japanese attacks. On one occasion, a new shipment of 15 much-needed Hurricanes was largely destroyed on Palembang airfield shortly after their arrival. Airfields in Darwin suffered similar surprise attacks in 1942.

OCA attack sorties should be varied so that enemy defences are not alerted nor enemy aircraft redeployed. Subsequent OCA attack missions may be necessary as the enemy recovers; the tactical details should not be predictable if the element of surprise is to be retained.

Weapons

For OCA attack, a range of suitable stand-off weapons will be required if attrition is to be minimised. PGMs are necessary for attacking aircraft in hardened shelters and for bunkered command and control facilities. Cluster Bomb Units (CBUs) are suitable for aircraft in the open and for radar and communications antennae and arrays. Consideration should also be given to the acquisition of an Anti-Radiation Missile (ARM) for attack against air defence and SAM radar systems.
Offensive sweep requires suitable air-to-air weapons, in terms of both quality and quantity. Effective Beyond Visual Range (BVR) and all-aspect short-range missiles, as well as a gun, comprise a generally accepted package. Since air-to-air engagements can be short and intense, the ability to carry an adequate quantity of missiles will be important during such operations. For the same reason, base stockholdings and resupply must be carefully managed in a protracted conflict.

Multi-role Capability

Assets used in OCA attack, offensive sweep, SEAD and DCA will often be the same; they will be in short supply and always in demand. The ability to change roles quickly, even while airborne on a mission, can compensate for low numbers of aircraft and represents a key requirement for the ADF's force structure.

Naval and Ground Forces Capability

The utility of naval and ground forces in contributing to OCA attack should always be considered if they offer lower cost options for achieving the objective. Naval Gunfire Support (NGS) has proved useful in the past and may do so again in the future, although the distance of suitable targets from coastlines and the difficulties of navigation in archipelagic waters may restrict its widespread use. In some circumstances, for example if specific intelligence is imprecise, effectiveness and surprise might be better achieved by special forces. Special forces offer a low cost but viable alternative for small targets at the lower levels of conflict.

RAAF Capability

In most cases, the need for responsiveness and surprise will suggest the use of air power. The RAAF's OCA attack capability, which can be provided through the combat triad of the P-3C, F-111 and F/A-18, is particularly strong. Indeed, it is the RAAF's ability to perform OCA attack and offensive sweep in the same mission that provides the central element of the ADF's OCA capability, although AAR support will be a necessary adjunct for F/A-18 operations.

Security
Control of the air is crucial to all other military operations and to repel operations mounted by an adversary. Therefore, elements of Australia's OCA capability would make attractive targets. An enemy may use air attack, special forces action, or acts of unattributable sabotage. For these reasons, the security of OCA forces is paramount and both active and passive defence measures must be taken. These measures are explained more fully in Chapter 11, in the section on Ground Defence.

DEFENSIVE COUNTER AIR

Defensive Counter Air (DCA) involves the employment of a combination of passive and active measures to nullify or reduce the effectiveness of an enemy air attack. DCA, a term which is interchangeable with air defence, cannot achieve a lasting favourable air situation alone; it is reactive and should be considered only as one of several initial responses. A military strategy which is based solely on DCA operations concedes the timing, scope and tempo of air operations to the enemy; such a strategy entails considerable military risk.

REQUIREMENTS AND CAPABILITIES

As DCA operations have little scope to exploit surprise, initiative and offensive action, they should always be complemented by OCA operations to retain the initiative and authority in the air. The prolonged conduct of DCA operations without supporting OCA operations would result in extensive consumption of defence resources and the gradual degradation of defensive capacity.

In the early stages of increasing international tension, options for overt offensive action may be limited. Notwithstanding, Australia would still need to demonstrate a robust defence capacity and firm resolve. Offensive military options or retaliatory action might be initially limited by restrictive Rules of Engagement (ROE), which may not be modified until identifiable hostile acts have been committed against Australia or Australian forces. Consequently, DCA operations become a critical element of national defence in providing a secure defensive perimeter. This is especially so in the early phases of a deteriorating international situation, when the Australian government may be keen to
explore all diplomatic options while protecting national sovereignty against pre-emptive attack by the enemy.

.35 The provision of effective DCA is dependent upon the integration of sensors, weapons systems, secure communications, and the near real-time transfer of data. A centralised command and control infrastructure must be overlaid to provide both the direction and coordination of the many elements of an air defence system. The effectiveness of an air defence system is heavily dependent on its surveillance and early warning systems to provide time in which to marshal an appropriate response to the enemy's initiatives. This response usually entails committing a range of weapon systems against the threat via the medium of the control system. In practice, both surveillance operations and control systems utilise a common system known as a control and reporting unit.

.36 There is considerable intrinsic risk in DCA operations, as an enemy can be expected to exploit initiatives, surprise, and the tactical advantages of offensive action and concentration of force, either to avoid or defeat the DCA response. Maintenance of high alert states for extended periods by the DCA forces is also difficult to sustain. The degree of success of DCA operations depends upon such factors as the quality and timeliness of intelligence, the assurance of detection, response times of weapon systems, the capabilities of identification systems, the effectiveness of weapon systems and the ability of elements of the air defence system to remain operational while absorbing battle damage. The degree of serviceability and redundancy in the air defence command and control system is an especially critical factor. Finally, the 'fog of war' plays a major part in the outcome of DCA operations.

.37 The DCA response will rarely be mounted with sufficient timely warning or adequate intelligence of the enemy's action. In reality, the air defence commander will quickly assess available fragments of information and then immediately order a response using high alert forces. Further, as the numbers and availability of defensive assets will not allow an impenetrable screen across the vast aerial approaches to Australia, DCA operations should focus on achieving high degrees of control of airspace over specified areas: such areas include population, defence and infrastructure centres.

.38 Even though it would be extremely difficult to prevent an adversary penetrating national airspace, every effort should be taken to demonstrate a clear resolve to defend sovereign airspace and sensitive aerial approaches.
The inherent difficulty of maintaining a successful DCA posture over long periods dictates that heavy attrition be exacted upon an enemy at the first opportunity, and that flexible ROE be implemented to allow the risks involved in sustained DCA operations to be ameliorated.

.39 The ADF air defence system (which may include local air superiority over naval or land forces) should be structured to allow:

a. wide-area surveillance coverage and a control capability over the whole of Australia's airspace, extending to the boundary of the Australian Fishing Zone, but affording only a limited continuous level of control over that airspace;

b. high degrees of control of airspace around vital airfields, national assets, major ports and population centres;

c. an ability to inflict heavy losses on an enemy whose actions are threatening to Australia;

d. a mobile capability to establish and maintain high degrees of control of airspace over certain selected but limited areas, depending on the threat and resource levels available; and

e. sufficient system redundancy to ensure that battle damage will not significantly reduce sensor, data exchange or command and control functionality.

.40 In conflict, the advantage inherently rests with the offensive force. The attacker may choose the time, place, weight and means of attack. Importantly, the commander of the attacking force understands the objectives he wishes to achieve and plans accordingly. Conversely, the disadvantages rest with the defensive force. While strategic intelligence may be able to provide indications of the probable timing of an attack, a high degree of uncertainty will remain until more definitive information is available. The timeliness and availability of this information may not provide sufficient warning to re-focus the defensive posture of the air defence system.

.41 Consequently, an air defence system must include an extensive surveillance capability and an organic intelligence organisation to maximise the warning and detail of enemy initiatives. Tactical sensor systems need to be deployed well
forward of vital assets in order to provide maximum warning of air attack, and to provide the means for direction of DCA weapon systems. The deployment of one such system - Airborne Early Warning and Control (AEW&C) aircraft - would depend on consideration of the aircraft speed and sensor capability in conjunction with the orientation of the threat axis. Hence, great care should be taken in selecting the most appropriate AEW&C capability.

.42 In general, both the mobility and distant radar surveillance horizon of an AEW&C aircraft will usually ensure that it is not intercepted. Such a characteristic dictates that a substantial component of the air defence control system resides in the AEW&C aircraft, in preference to ground control centres, which are likely to be heavily targeted. The control of weapons and sensors should remain centralised to ensure that optimum overall direction is effected, although lower level commanders will be responsible for the tactical decisions relating to individual engagements.

NATIONAL AIR DEFENCE AND AIRSPACE CONTROL SYSTEM

.43 The National Air Defence and Airspace Control System (NADACS) provides a national system for air defence and airspace control which collates information from a variety of sources (sensors) and distributes that information to commanders to enable appropriate action to be taken. Thus, NADACS is the organisational framework which facilitates the translation of strategic objectives for the control of sovereign airspace into tactical action.

.44 The elements of NADACS can be grouped functionally as command and control, surveillance, and weapon systems. Individual components include:

a. Command and Control System:

(1) National Air Defence Operations Centre (NADOC),

(2) Sector Air Defence Operations Centre (SADOC):

(a) Sensor Coordination Centre (SCC),

(b) Control Coordination Centre, and
(c) Control Element.

b. Surveillance System:

(1) Over the Horizon Radar,

(2) Airborne Early Warning Aircraft,

(3) RAN anti-air warfare (AAW) ships,

(4) Ground-based air defence radars,

(5) Air Traffic Control surveillance radars,

(6) Electronic Support Measures (ESM) systems,

(7) Visual Observation Post (VOP) Reporting networks, and

(8) Aircraft that can identify hostile tracks.

c. Weapon Systems:

(1) Fighter aircraft, and

(2) Surface-to-Air Missile (SAM) systems.

.45 The establishment of an Air Defence Sector provides the focus for the tactical control of DCA operations. The SADOC controls surveillance and weapon systems, coordinates airspace control and conducts air defence operations. Surveillance information from individual sensors is collated at the SCC to form an air picture which classifies air tracks as friendly, unknown or hostile, and is then relayed to the SADOC. Tactical decisions made by the Sector Air Defence Commander (SADC) are translated into orders for the alert, scramble and direction of fighter aircraft as well as the control of Low Level Air Defence (LLAD), SAM systems and RAN AAW SAM systems.

.46 Sensors may provide a wide area surveillance capability, as is the case with the Jindalee Over-the-Horizon Radar Network (JORN), or more localised information through ground, sea and airborne microwave radars, a VOP reporting network and ESM systems. Intelligence and communications systems are overlaid on the air defence system.
Command and Control

.47 NADACS provides the organisational infrastructure which links the three levels of war and provides the mechanism for the translation of strategic objectives into national tactical action. Higher direction is provided by the National Air Defence Commander (NADC), with the support of the battle staff in the NADOC. The NADC exercises command and control at the operational level, overseeing the tactical actions of the SADC. In turn, the SADC is responsible for the direction and control of the tactical air battle in the Sector.

.48 Assets are normally assigned to the SADC under operational control for specific periods or for the conduct of particular operations. Should the need arise, the assets may be reassigned to other tactical level commanders. Alternatively, the control of multi-role assets that could support several commanders may be retained at the operational level and only assigned to the SADC for a particular operation. JORN, AEW&C and AAR aircraft are assets that may be controlled in this manner.

.49 Within the framework of NADACS, the SADC remains directly responsible to the NADC for the conduct of DCA operations. However, the SADC may also be responsive to the Joint Commander for:

a. the transfer of information derived from the surveillance systems; and

b. the effective management of Sector airspace over land and maritime operations.

Surveillance and Early Warning

.50 An effective surveillance system should provide information such that a pattern of normality can be established in the area of interest, ensuring that any unusual activity becomes readily apparent. Surveillance operations also provide the means for the conduct of airspace management in the Sector, without which the defence of sovereign airspace would not be possible. As the management of the airspace should not be interrupted, surveillance needs to be continuous.

.51 The integration of a number of diverse sensor systems is necessary to achieve an effective level of early warning. Layered surveillance operations provide for the
optimum use of sensor systems that have significantly different, but complementary, capabilities. VOPs and airborne, ship and ground radars should be interconnected with links capable of rapidly transmitting electronic data, as well as voice information. In this, secure digital links are important. While civilian radars can also assist, particularly in correlating tracks with known flight plans and in identifying friendly aircraft, they are of limited utility since they are optimised for secondary rather than primary radar. Naval air defence radars, whether the ships are in port or at sea, can also contribute significantly to the air picture. Effective integration must exploit the benefits and minimise the disadvantages of each type of sensor.

JORN, while ideally suited to surveillance of the vast area to the north of Australia, is limited in the prosecution of detected tracks due to its positional performance. However, the long ranges at which JORN can detect inbound tracks should normally provide sufficient early warning to position AEW&C aircraft which have excellent mobility and the capability to respond quickly to areas of specific operational interest. They also have sufficient endurance to provide an extended fighter control capability for DCA operations that are remote from northern airfields. Airborne microwave radars have extended line-of-sight horizons and, consequently, the detection capability of AEW&C radars against low-flying aircraft is most impressive. In concert with fighter aircraft that are supported by AAR, AEW&C aircraft have the potential to provide an effective response against unidentified aircraft that intrude into the more remote areas to the north of Australia.

RAN AAW ships, with their microwave radars and ESM sensor systems, are a potent component of the early warning system. However, during a contingency, AAW ships may be employed on maritime operations that preclude their dedicated commitment to surveillance or air defence tasks. Nevertheless, the contribution that these ships can make to the air picture requires their integration into the surveillance system.

Ground-based microwave radars experience line-of-sight limitations against low flying aircraft but, in contrast to AEW&C platforms, are relatively inexpensive. They are ideal for point defence of areas that contain military and civilian infrastructure; the presence of these radars will funnel intruding aircraft into specific areas or altitudes as they attempt to avoid detection. Such an effort may impact negatively on the payload range of intruding aircraft and
cause them to be more predictable. Ground-based tactical ESM systems and VOP networks can complement these radars. Both are relatively inexpensive and can cover gaps in the radar coverage while at the same time contributing to the identification of low-flying aircraft.

**Intelligence**

.55 Intelligence is discussed more fully in Chapter 9. For effective air defence, early warning of the launching of enemy aircraft and their intentions, once airborne, is of great value. Collateral sources, such as allied reports and clandestine observations, can be very useful and satellite reconnaissance, whether by infra-red, radar or photographic means, is also valuable. There are many more intelligence aspects that enhance the air defence system, such as knowledge of an adversary’s equipment, communications and tactics.

**Communications**

.56 During PNG operations in 1942-45, deployed radar units such as 305 and 333 Radar Stations on Goodenough Island were able, shortly after their deployment, to detect air traffic along the New Britain axis. However, reports of these movements relied on encoded morse messages over HF radios. As these were unreliable in the early stages, the great investment of effort and personal sacrifice was to no avail, until better communications were established.

.57 Without reliable communications, the most carefully developed system will be useless. All links, from aircraft to ship or shore, from an operations centre to a SAM battery, or from the Air Commander to subordinate commanders, must be completely reliable and, in the ideal case, secure. Communications links employ various combinations of satellite, landline, microwave and HF radio bearers. For reasons of flexibility, area coverage, and immunity from enemy attack, satellite communications would be the preferred option. Recent enhancements to the strategic network have improved the situation, but long-range control and reporting using HF links is still often unreliable. The effectiveness of NADACS depends on an integrated secure communications network.

**Concealment and Deception**
Concealment and deception are essential elements in the preparation for, and conduct of, operations. They can also be inexpensive to implement whilst remaining highly effective. Furthermore, resorting to relatively simple measures, such as the use of decoys and camouflage, is encouraged by the theory of warfare discussed in early chapters. Sun-Tzu, in particular, elevated deception to the status of a fundamental principle, which should not be taken lightly.

Many examples could be quoted, from the Trojan Horse to the bogus D-Day invasion force which was suggested by the Allies dropping `window' (radar-reflective strips, now known as chaff) to indicate a large scale air attack. These are examples of active measures. Passive measures which include camouflage of runways and operational readiness areas by surface tone-down, dispersal of assets by using natural cover, and a wide range of electronic counter measures to confuse the adversary, are also valuable.
Electronic Warfare

.60 Electronic Warfare (EW) is covered in some detail in Chapter 8. Of importance to this section however, is that DCA operations are especially vulnerable to EW because of the reliance on sensors to provide information in an accurate and complete form, and for that information to be communicated in real-time. Air defence radars are therefore, designed for resistance to EW measures; such resistance includes frequency agility for the radar, and encryption for the support systems. Irrespective of the availability of Electronic Counter Measures, standard operating procedures should assume that operations will be in a hostile EW environment.

Control of the Air

.61 A surveillance system, when supported by an effective intelligence infrastructure and supplemented with information from the civil aviation flight planning network and other civilian agencies, such as Coastwatch, enables the detection and identification of the majority of aircraft movements within the Air Defence Operations Area (ADOA). Those tracks which cannot be identified in this manner may need to be intercepted and identified by fighter aircraft, an internationally accepted practice within a declared ADIZ.

.62 Fighter Aircraft. The primary task of fighter aircraft is to intercept, identify, and take action in accordance with promulgated rules of engagement. To achieve this, RAAF aircraft, primarily the F/A-18, exhibit rapid response, high speed, long range with the support of AAR, good airborne radar, navigation and communication equipment, and appropriate weapon systems. Depending on the tactical situation, they must be capable of area searches, including large height blocks, usually under the guidance of the SADOC. Multiple tracks may have to be prioritised. The nature of air intercept is most often transient, and even with the extended range and on-station endurance that AAR can provide, continuous Combat Air Patrols (CAP) are expensive on resources and must be used judiciously. In general, the more efficient the surveillance system and identification processes, the lower the alert status that is required for fighter aircraft.

.63 Low Level Air Defence. Unlike fighter aircraft, some LLAD systems using SAMs, do not have an identification capability. However, the unit cost of such systems is much lower. SAM systems provide area or point defence against hostile aircraft, and may be widely deployed with ground
forces. The Australian Army is responsible for providing surface-based air defence and is currently equipped with the Rapier Blindfire radar and optically-guided missile and the RBS-70 man-portable laser-guided missile. LLAD is integrated and controlled within the total air defence system under the command of the SADC. Due to the difficulty of effective control of both friendly aircraft and LLAD, special control measures are often required. These measures include positive fire clearance, designation of zones—such as Missile Engagement Zones (MEZ) and Fighter Engagement Zones (FEZ)—or time-space limitations.

**TRAINING ACTIVITIES**

.64 The RAAF is required to deal effectively with tasks and military incursions that could arise with little warning. Control of the air is an important feature of Australia's defence strategy, even in the lowest levels of conflict. The ability to achieve requisite levels of control of the air calls for reliable and consistent performances by all elements of the air defence system.

.65 In addition, aircrew and air defence controller skills in manoeuvres relevant to high contingency levels, should be practised regularly. This includes advanced air-to-air combat manoeuvres and the control and tactical direction of fighter formations. The need for such training stems not so much from strategic determinants but from the nature of air-to-air operations themselves.

.66 Defensive air-to-air operations call for skills such as air situation awareness and maximum performance handling. These skills are fundamental to RAAF operations and are best taught in demanding air combat exercises. Training must include advanced fighter tactics to ensure that long lead-time skills are not lost. Moreover, the RAAF's pilots must be ready and capable of defending themselves, including full exercise of the right to self-defence, when the first intrusion into Australian airspace occurs.

**SUMMARY**

.67 Control of the air is the prime campaign. It will not necessarily win wars but without freedom of the air,
surface campaigns may be seriously hampered. Counter air is at the heart of this campaign.

.68 An offensive stance is generally more effective in achieving control of the air, protection and defence of targets permitting. Political restraint may limit OCA operations during periods of tension or the initial phases of conflict. However, throughout all phases of tension or conflict, DCA operations would be prominent in securing sovereign airspace. All elements of the counter air system, particularly those of DCA, must therefore, be well developed and practised. The extent of the air-sea gap and national airspace demands wide ranging and flexible assets, including a variety of sensors and secure, redundant long-range communications.
CHAPTER 6

STRIKE AND INTERDICTION

An Outline

The three roles of Land Strike, Maritime Strike and Interdiction are essential for effective prosecution of the Air Strike campaign. Despite the RAAF's breadth of experience in all three roles in World War II, operations in conflict since have focussed mainly on interdiction. Notwithstanding this, the RAAF retains a capability to prosecute all three roles.

Because the strike roles can be pre-emptive, and even extend to enemy sovereign territory, the strategic implications warrant a command and control arrangement that keeps decision-making at the highest appropriate level and execution at the lowest practical level. In exploiting strike and interdiction roles, the RAAF must emphasise particular characteristics, especially in its weapons, weapon effort planning, aircraft capability, communications, intelligence, responsiveness and communications.
STRIKE AND INTERDICTION

.1 The concept of attacking targets not directly related to operations on land or at sea originated in World War I. Air bombardment occurred on a larger scale during the later stages of World War II. At this time, air power was seen as providing an independent means of defeating the enemy through a sustained offensive against his homeland. Yet, the bomber offensive of World War II was not regarded as the sole means of achieving the Allies' aim. Since that time, USAF operations in Vietnam (specifically during Operations Linebacker I and II), and the Coalition air campaign in the Gulf War, have reinforced the importance of strategic strike, but with much smaller forces than was evidenced in World War II.

TAKING THE WAR TO THE ENEMY

.2 Strategic strike, as a means of attacking the 'heart of an enemy', could range from a few aircraft to a few hundred. This idea of attacking the 'heart of the enemy' is designed to weaken his capacity and will to fight, by attacks on targets under his sovereignty. In weakening an enemy's capacity to fight, air power would aim to degrade that enemy's command and control, key production facilities, infrastructure, logistics support capability and, ultimately, combat effectiveness.

.3 The RAAF maintains the capacity to conduct strategic strike through a numerically small force. This capacity to conduct strike operations provides the Australian government with an offensive option, which by itself, acts as a deterrent.

.4 In presenting the Australian government with strategic options, as well as offering a powerful pre-emptive or retaliatory weapon, strategic strike operations provide:

a. A graduated response to enemy action from demonstrating a capability, proficiency or presence, at one end of the spectrum, to attacking selected targets in the enemy's homeland, at the other end.

b. An ability to minimise friendly losses through surprise, which can be used to great effect, especially in pre-emptive strike.
c. An ability to minimise collateral damage.

d. A high probability of success when coupled with surprise.

e. The major contribution to an Air Strike campaign through continued application over an extended period.

In summary, strategic strike amounts to the ability to control the conflict, and to maintain the strategic initiative by moving the focus to a time and place of Australia's choosing.

.5 Australia has a long historical involvement in Air Strike campaigns which provides some clear observations for command and control arrangements, and for the three roles of Land Strike, Maritime Strike, and Interdiction.

**HISTORICAL INVOLVEMENT**

.6 From the earliest days of World War II, Australians participated in strategic bombing missions with RAF and RAAF Squadrons of RAF Bomber Command. For example, Australia's first bomber squadron in Britain, No 455 was formed in June 1941 with Hampdens, and RAAF heavy bombers contributed to the four major attacks on Berlin in December 1943. Many RAAF squadrons engaged in interdiction. No 462 Squadron, for instance, became well-known for its attacks on Tobruk in 1942 - attacking enemy ports, bases, railways and shipping, to prevent supplies reaching the Afrika Korps. Later, No 462 Squadron joined the RAF and USAAF in strategic bombing during the Italian Campaign of 1943-45. These operations were, however, not without cost; for example, the RAAF's No 460 Squadron, based in the UK, lost over 1000 aircrew in three and a half years.

.7 Closer to home, RAAF squadrons were heavily involved in attacking Japanese air bases in New Guinea and New Britain to prevent the enemy using land-based aircraft in the Coral Sea Battle. In the Allied air assault on New Britain during 1943, the RAAF interdicted the enemy's lines of communication from Rabaul to his bases at the western end of New Britain and successfully conducted strikes against well-defended land bases. The RAAF also conducted interdiction and maritime strike operations in the Timor, Banda and Arafura Seas.
The RAAF became most proficient at conducting strategic strike operations throughout World War II, and the significance of what that proficiency means to the successful defence of Australia has never been lost. Since then, the RAAF has used Lincoln, Canberra, F-4E Phantom and F-111C aircraft for strategic strike. Although involved in the Korean War, the Malayan Emergency, Confrontation and Vietnam, the RAAF was called on to apply only one of the three roles of strategic strike operations - interdiction.
AIR STRIKE CAMPAIGN

.9 The Air Strike campaign offers a wide range of options, from sustained, mass bomber raids which were a feature of World War II, to a single strike with few assets, exemplified by the Israeli raid on the Iraqi nuclear facility at Al Tuwaitha in 1981. As demonstrated in the Gulf War of 1991, it also offers the potential to degrade the war-making capacity of a nation without destroying that nation.

.10 For Australia, the Air Strike campaign offers the capability to project power into the air-sea gap and beyond if necessary. This capability provides, in itself, a significant deterrent effect. Moreover, it provides the Australian government with options for using a pre-emptive or retaliatory strike, should the need arise. Because the Australian capability for strategic strike operations is so far-reaching, the command and control arrangements must be unambiguous, direct and responsive.

COMMAND AND CONTROL

.11 While the decision to conduct strategic strike operations will be made by the Australian government, on the advice of CDF and CAS, command of operations should be vested in the Air Commander Australia (ACAUST). Since air campaigns may have to be conducted concurrently, ACAUST must have the flexibility to commit aircraft, for example, to Control of the Air and Air Strike campaigns simultaneously, as deemed appropriate.

.12 The nature of strategic strike in Australia's environment may call for a small force involving one or two aircraft, rather than large formations. This places great responsibility on the aircrew in the execution of the task. The operational responsiveness and political implications of strategic strike operations necessitate reliable, secure, real-time communications between the aircrew and higher command authorities. This direct command link will enable revised intelligence and executive command decisions to be passed to the aircrew. However, it should not be used to hinder devolution of responsibility or to apply positive control at the tactical level.

STRIKE AND INTERDICTION ROLES
.13 The three roles of Land Strike, Maritime Strike, and Interdiction are necessary capabilities for Australia. The RAAF can undertake all three with the multi-role assets of the Strike Reconnaissance Group (SRG) and the Tactical Fighter Group (TFG). Maritime Patrol Group (MPG) could also be used for Maritime Strike and Interdiction against sea lines of communication when control of the air is held. The use of multi-role aircraft in Australia's large area of interest suggests the potential for conflicting priorities in tasking which can only be resolved through appropriate higher command and control arrangements.

.14 While Maritime Strike and Interdiction against sea lines of communication are discussed below, two other roles/tasks are implicit within the ability to prosecute offensive maritime air operations independent of friendly naval forces. They are Anti-Submarine Warfare and minelaying, which are discussed in Chapters 7 and 13.

**Land Strike**

.15 In an Australian context, Land Strike is the application of air power against land targets not directly involved with enemy forces in contact. The most effective use of air power in land strike occurs when it is concentrated in unpredictable ways against targets of high value, perhaps thought to be immune from attack. It uses the element of surprise as well as the concentration of firepower to disrupt and confuse an enemy - it adds to his 'friction of war' and would contribute significantly to the operational objective of weakening an adversary's capability and will to fight.

.16 The RAAF must capitalise on compounding the enemy's 'friction' and, perhaps as importantly, minimising attrition of its own relatively small fleet. The RAAF is likely to use only few aircraft in coordinated attacks, as opposed to mass raids. Therefore, techniques, tactics and procedures that enhance stand-off capabilities, night capability, 'smart' weapons, self-defence and thorough training are essential. Moreover, the use of pre-emptive strike should be considered as a positive method of curtailing hostilities and hence preserving assets. Pre-emptive strikes rely on timely and accurate intelligence as acquisition and identification of targets at low-level are difficult without precise planning information.
There are political and diplomatic considerations that argue against pre-emptive strike. Yet, the possibility of aggressive activities against Australia cannot be ignored. Confronted by irrefutable intelligence of impending hostilities, an Australian government could use the pre-emptive strike option to demonstrate national resolve and attempt to settle the dispute.

A Land Strike capability allows the RAAF to be discriminatory; firstly, in selecting targets, and secondly, in limiting collateral damage through the use of Precision Guided Munitions (PGMs). That is, attacks could be prosecuted without necessarily escalating a conflict. Furthermore, possessing the potential for discriminatory strikes provides great deterrent value and may even preclude having to conduct a strike. This is most relevant for low-level contingencies which Australia would not wish to escalate. Also, such strikes can be mounted from home bases, offering two advantages. First, surprise is maintained while a threatening build-up of deployed forces is avoided. Second, after the strike operation, routine activities at home base can mask intentions for further strikes.

In low-level contingencies, while operations would probably be limited to harassment or attacks against tactical targets, the RAAF may need the capacity to sustain operations at higher than peacetime rates of effort. Furthermore, while the use of precision weapons may obviate the need for re-attack, in any conflict, there would be many targets. Hence, the need for sustainability is a vital aspect of effective land strike operations. The RAAF must be capable of low-level, all-weather, day-night, terrain-masked ingress and egress. Additionally, strike aircraft should be supported by Electronic Warfare (EW) systems or be capable of providing adequate electronic suppression and infra-red detection from integral equipment or weapons. Electronic Support Measures for threat-warning and Electronic Counter Measures for penetration and survival are essential for strike operations across the spectrum of conflict. EW is discussed in more detail in Chapter 8.

Within Australia's defence strategy, the RAAF may be tasked to conduct Land Strike at the outer margin of the defensive umbrella, possibly against enemy-occupied staging bases. RAAF strike assets could also be tasked to attack the source of an enemy's combat power. In this respect, it is a doctrinal imperative for all strike aircraft to be AAR-capable.
Maritime Strike

.21 Maritime Strike for Australia is the application of air power against enemy naval targets not in contact with Australian or allied forces, but posing an indirect or longer term threat. The clear distinction is that the enemy surface and sub-surface forces are not yet in contact. For example, SRG, TFG and MPG assets could be used to conduct maritime strikes against enemy surface vessels, or for mine laying, while MPG aircraft could also be used against enemy submarines. When these assets are used against enemy naval forces in contact with Australian or allied forces, then they are conducting Anti-Surface Forces roles. These are described in detail in Chapter 7.

.22 The element of surprise which is so important to Land Strike is less likely to be achieved in the Maritime Strike role. Enemy naval forces could be expected to be at alert status. The possibility for surprise would be further reduced if enemy naval forces were augmented by air power. Stand-off weapons which permit the strike aircraft to remain outside the defensive perimeter of enemy shipping throughout the launch sequence are crucial if attrition is to be minimised. If such weapons are not available, then surprise becomes fundamental to success. In any event, to exploit the element of surprise as far as possible, close coordination of the assigned ADF assets will be necessary.

.23 Any future conflict would initially be predominantly maritime in nature. This means that the most likely strike role that the RAAF would be involved in at the outset would be Maritime Strike. Therefore, the RAAF must give added emphasis to coordination between air assets directly and indirectly involved in the strike operation, between sources of tactical intelligence supporting the operation, and between RAN and RAAF elements involved in execution of the strikes.

.24 The ability to contain escalation through precise offensive actions that do not unduly jeopardise assets is a capability which the RAAF must possess because of its limited resources. This will necessitate, as with Land Strike, an emphasis on attrition management through stand-off capability and crew training. Direct control weapons, as well as high reliability in target discrimination, are germane to maritime operations in the archipelagic waters to Australia's north and east. Given the high probability of neutral shipping and the prevalence of islands and atolls which could seduce missiles, fire-and-forget, non-discriminatory stand-off weapons have
limitations in such areas. Despite the offensive aspect of Maritime Strike, the role is consistent with Australia's defence strategy.

**Interdiction**

.25 Interdiction is the application of air power against enemy lines of communication, to cut and disrupt the flow of resupply and support assets. The effects of interdiction, while impacting directly on the enemy elements under attack, may not immediately affect the surface battle underway. However, interdiction of enemy supply lines would enable ADF forces to determine and control the tempo and timing of battle.

.26 The RAAF could expect to perform interdiction against enemy lines of communication, primarily in the air-sea gap. Interdiction can be conducted by all three Groups - SRG, MPG and TFG; however, the presence of any armed escorts for enemy surface vessels will determine which assets are used. Since interdiction will most likely be against armed targets, the criteria for attrition management must be observed.

.27 The RAAF is generally well structured for conducting interdiction. It has the capability to penetrate enemy rear areas, including staging bases, and to attack enemy lines of communications as it seeks to deny movement of appreciable quantities of personnel and materiel to the surface battle area. In Australia's circumstances, where the ADF may have to defend against and defeat a larger aggressor, or where it may be faced with widely dispersed defensive operations, then that aggressor must not be permitted the freedom to commit fresh troops and supplies to the battle area.

**REQUIREMENTS AND CAPABILITIES**

.28 Before examining the specific requirements and capabilities of the RAAF's forces in prosecuting strike operations, broad comment on the main advantages and limitations of those forces is warranted. The RAAF's strike forces offer timeliness and reach, mission flexibility, and concentration of force, through swiftness of application, range, flexibility, and rapid concentration. The other advantages addressed in Chapter 3 also apply, but to a lesser degree. Similarly, limitations also apply: specifically, the degree of political and higher headquarters involvement,
weapons availability and fit, vulnerability to enemy air defences, and the need for accurate and timely intelligence.

.29 In order to capitalise on the advantages and minimise the limitations in conducting strike operations, the RAAF must emphasise the following:

a. suitable weapons fit and training (including PGMs and crew experience with the carriage and release of such weapons);

b. an ability to conduct operations at night and in all weather, thus providing the capability for 24-hour operations;

c. responsiveness;

d. reliable, secure, real-time communications;

e. the impact of force multipliers, eg. AAR, computer support for mission planning;

f. training at appropriate levels to acquire the diverse skills necessary for the three roles;

g. instructions and procedures to optimise the mutual support from conjoint operations;

h. effective self-protection equipment to reduce aircraft vulnerability; and

i. an integral aircraft system to record the position and date/time of any significant event for later exploitation and interpretation.

Weapons

.30 Compared to unguided bombs, PGMs afford a decisive improvement in accuracy and survivability (that is, reducing the risk to delivery platforms). Significantly fewer PGMs are needed to inflict the required level of damage, hence fewer sorties are needed. Moreover, fewer weapon stations are required, thus allowing self-defence weapons to be carried. Anti-radiation missiles could offset rapid increases in an enemy's EW capability. If target discrimination at stand-off ranges is not viable, PGMs that afford direct control until impact are necessary to minimise the risk of attacking a wrong target. A combination of advanced weapons, and updated and
reliable platforms, offers the RAAF the means to maintain effective capabilities in the future. For example, the incorporation of Pavetack and PGMs into the F-111 has provided a greatly enhanced capability.

.31 The RAAF's dependence on small strike packages emphasises the need for suitable self-defence and air-to-ground weapons and an effective EW suite. Again, by way of example, the F-111 could provide a capable force package, able to be employed in several roles. However, the increasing proliferation of relatively cheap but effective shoulder-launched missiles, as well as more complex SAM systems, demands that RAAF strike aircraft be armed with stand-off weapons.

Weapon Effort Planning

.32 Despite the utility of stand-off PGMs, the weapon effort planning cycle must be strictly observed so that capabilities are optimised. This cycle follows a logical sequence:

a. defining the theatre objective,

b. target selection and functional analysis,

c. determining the optimum weapon and fusing for the target,

d. estimating the 'over-the-target' requirement, and
e. post-flight analysis.

Aircraft Capability

.33 The RAAF strike force must be proficient in low level and night operations. Strike aircraft, because they are most likely to be operating over enemy or enemy-held territory, must enhance their survivability by exploiting the cover of darkness and operating in poor weather. The capability to conduct 24-hour operations will ensure that an enemy does not have any respite from the threat of attack.

Intelligence
An independently verifiable source of accurate and timely intelligence is required so that the strike force is not totally dependent on the release of the information by external agencies. Furthermore, the strike force must train with all types of imagery and targeting information that will be used in conflict to assure competency during conflict.

**Responsiveness**

The strike force must also be able to react quickly, over long distances, and retain the flexibility to alter its mission at short notice because of the political sensitivity of strike operations. Therefore, the aircraft must have adequate range, appropriate weapons and suitable communications.

**Communications**

Reliable and secure real-time communications are needed to ensure adequate response times by providing in-flight direction on tasking. This would not obviate the need for in-depth crew briefing prior to take-off, but would allow for amplification of briefing details, and enable the crew to be responsive to sudden changes in the tactical battle, rules of engagement or direction from higher authority. Furthermore, such communications would provide a link with the command and control network so that the Air Commander and his battlestaff would have an enhanced perspective of the air situation.

**Force Multipliers**

An enduring goal for all organisations, especially in times of stringent budgets, is to enhance operational effectiveness without significant increase in personnel or equipment - 'doing more with less'. The philosophy of force multipliers applies to those assets and systems that can expand capability relatively cheaply. Force multipliers, like the multi-role aircraft, Airborne Early Warning and Control Aircraft (AEW&C) and PGMs, are congruent with the attributes of air power - they exploit speed, range, flexibility and pervasiveness. The range of combat aircraft can be further extended through AAR.

**Training**
The complexity of weapons used by RAAF strike aircraft carry an attendant training requirement. Retention of these complex skills requires high training rates. Crews must train with, and maintain expertise in, the weapon systems they are likely to use in conflict. The concept of aircraft being fitted 'for but not with' certain weapons - which implies the intention to acquire weapon systems at short notice during conflict - has implications for training. While this philosophy may save money in peacetime, in conflict it may increase the risk of attrition and degraded accuracy through the lack of familiarity and expertise with those weapons.

Procedures and Tactics

Strike aircraft are generally most vulnerable at the point of weapon release, and are therefore, best used in a benign air environment. Maritime Strike, against vessels armed with surface-to-air missiles, would pose serious risks for aircraft not armed with stand-off weapons. Similarly, Land Strike would be difficult over hostile battlefields or well-defended territory. Therefore, appropriate procedures and tactics used in conducting the roles must be developed for, and aligned with, the needs of attrition management by the RAAF. A major consideration for the RAAF in managing attrition is the mutual support that conjoint operations can provide. Tactics and procedures should be continuously reviewed so that various combinations of the different multi-role assets can cooperate effectively. An example of conjoint operations is an F-111 strike force escorted by F/A-18 aircraft.

SUMMARY

The emphasis by the RAAF on strategic strike operations must take advantage of the positive characteristics of air power and recognise the necessary command and control issues associated with such politically-sensitive roles. The requirements and capabilities provide broad guidance for the particular needs of the RAAF to successfully conduct strike operations. The RAAF's ability to conduct an Air Strike campaign provides the Australian government with strategic options and the wherewithal to implement them.
CHAPTER 7

ANTI-SURFACE FORCES

An Outline

Aerial fire support for friendly surface forces has always been well-understood in Australia, with navy and army commanders viewing such air support as essential. In the maritime environment, the relevant roles are Anti-Submarine Warfare (ASW) and Anti-Surface Warfare (ASuW).

In the land environment, the roles are Close Air Support (CAIRS) and Battlefield Air Interdiction (BAI). CAIRS involves air attacks against the enemy in contact with friendly forces. BAI involves air action against enemy forces (including supply lines) which are in a position to directly affect the outcome of the land battle, but which are not in contact with friendly land forces. That is, BAI aims to isolate the enemy on the battlefield. Both roles, but in particular CAIRS, require detailed integration with the firepower and manoeuvre of friendly land forces.
ANTI-SURFACE FORCES

.1 In future contingencies for the ADF, the emphasis on air operations is likely to be in support of a maritime or land battle, rather than engaging in a level of air warfare reminiscent of World War II. However, control of the air will still be an essential precursor to these operations. Achieving and maintaining control of the air may involve a continuing dedicated campaign and remains the RAAF's highest priority. In parallel with this campaign, the RAAF will also concentrate on Anti-Surface Forces' roles. The priority accorded such roles will reflect the relative urgency of tasks as determined by the Joint Force Commander (JFC) and existing threats.

.2 In the maritime environment, air power continues to support naval forces through Anti-Submarine Warfare (ASW) and Anti-Surface Warfare (ASuW). In the land environment, the air-land battle calls on the roles of Close Air Support (CAIRS) and Battlefield Air Interdiction (BAI).

MARITIME ENVIRONMENT

.3 Unrestricted maritime warfare is likely to be encountered only in global and general war. In limited war, maritime activities, both surface and sub-surface, would be restricted to geographic areas of direct consequence to the conflict. While this may concentrate the focus of maritime warfare in particular areas, these same areas can be quite distinct and widespread. Thus, the advantage of known, likely focal areas and shipping routes enables an air force to concentrate its forces in the protection of shipping. The disadvantage, particularly for Australia with its vast ocean surrounds and widespread sea lines of communication, is that the focal areas and shipping routes are separated by huge distances. Transit and revisit times place excessively high demands on the scarce numbers of RAAF aircraft and trained crews. This dilemma is relevant to both ASW and ASuW, but the consequences are greater for the ASW battle.

Anti-Submarine Warfare

.4 The ASW role involves operations against enemy submarines that directly threaten or are in contact with friendly surface forces. The RAAF has had considerable
experience in such operations extending back to World War II. During that war, for example, 11 submarines were destroyed by three Australian squadrons, Numbers 10, 455 and 461, in the Atlantic and Mediterranean theatres. Additionally, many Australians served in RAF Wellington and Liberator squadrons engaged in ASW operations.

The need to hunt and kill submarines may not be paramount in the lower levels of conflict in which Australia may be engaged in future; however, the use of the submarine by an enemy in low-level conflict for infiltration purposes should not be overlooked. One submarine could seriously disrupt coastal or international shipping over Australia's area of direct military interest, as well as posing a threat to naval ships and other submarines. In general, the mere inclusion of a submarine capability in an enemy's Order of Battle necessitates an ASW capability, especially for an island nation such as Australia that relies so heavily on seaborne trade. Furthermore, this capability is dependent upon a high level of expertise in the use of specialist aircraft and equipment; it cannot be acquired quickly or easily. This makes it imperative that the RAAF maintains a high level of proficiency in its ASW capability.

The problem posed by the modern submarine is formidable. It can cruise submerged at high speed for long periods and, by virtue of its high underwater speed, can maintain contact with surface forces while submerged, and attack without unduly advertising its position. The problem is further compounded by the threat posed by the missile-firing submarine.

A skilfully conducted submarine offensive is a highly flexible threat which can be switched rapidly from one area to another: the main weight of the offensive can be deployed from one side of the ocean to the other, or individual submarines can be switched at reasonably short notice from one target to another. While timing is not of the same order as could be achieved with air offensives, a submarine force is able to deploy and re-deploy in almost complete secrecy. To counter this form of offence, an equally mobile and flexible defensive force is needed to detect, identify and localise enemy submarines and, in wartime, to attack and destroy them. Such operations are dependent on cooperation from several sources and, therefore, the use of air power in the ASW role has direct implications for joint command and control considerations for the ADF.
.8 **Operational Considerations.** ASW operations depend on collateral intelligence, are asset-intensive and require state-of-the-art technology. To expand:

a. ASW requires the use of collateral intelligence; such intelligence can place the Maritime Patrol Aircraft (MPA) in the vicinity of the submarine from the outset. Therefore, the success of this form of warfare will depend, in the first instance, on the accuracy and timeliness of all Australian maritime intelligence inputs, and intelligence from allies.

b. ASW is asset-intensive, requiring many fully serviceable aircraft and highly-trained, capable crews to maintain 24-hour coverage of a particular area of ocean. As mentioned earlier, the most critical limiting factor for ASW is trained aircrew. More than 30 man-years of training are needed to train aircrews sufficiently to man modern MPA in an ASW role. A high operational aircrew to aircraft on-line ratio - of the order of 1.5:1 - should be sought in peacetime, to overcome this limitation.

c. The contest between the submarine and ASW aircraft to obtain technical superiority continues, with the technology of today's submarines providing a decided advantage. ASW air forces must rely on highly capable aircraft employing modern state-of-the-art sensor equipment, just as much as on collateral intelligence and highly-trained crews. A failure in this area will tip the scales even further in the submarine's favour.

### Anti-Surface Warfare

.9 Traditionally, attacks against enemy ships by airborne assets have been described variously as Anti-Surface Shipping Warfare, Anti-Ship Warfare or Anti-Surface Warfare. To be consistent with ADF terminology, this Manual refers to the role as Anti-Surface Warfare (ASuW).

.10 To confuse the issue even further, the role has also been described in Australian terminology as Maritime Strike. However, both terms have been used to convey the meaning of airborne attacks against enemy ships that are directly threatening or in contact with friendly forces. This manual uses the term Anti-Surface Warfare for this activity only, and
uses Maritime Strike in a different context, explained in Chapter 6.

.11 Australian aircrews have been involved in the ASuW role since World War II. Australians were involved in the destructive attacks on the surface ships "Scharnhorst", "Gneisenau" and "Prinz Eugen" in February 1942. Additionally, the Hampdens of Number 455 Squadron conducted torpedo attacks against armed and escorted merchant vessels along the Norwegian coast in July 1942. By 1943, Number 455 Squadron was part of an anti-shipping wing based in Northern Scotland and played a significant role in the allies' sinking of over two million tonnes of enemy shipping in north-western waters.

.12 In the event that enemy warships pose a threat to Australian merchant shipping or RAN warships, they may have to be sunk or neutralised. The responsibility for this offensive action could involve surface or sub-surface elements of the RAN or appropriate RAAF assets. The choice between RAN and RAAF assets would be determined by the circumstances, such as reaction time available and the priority of the threat measured against assets available. Similarly, the use of either strike, fighter or MPA assets of the RAAF would be determined by judgment, based on the circumstances such as capability of the threat, priority and availability of air assets. In these conditions, attrition of air assets may be unavoidable and ought to be balanced against the consequent overall reduction in ADF air power capability.

.13 The development of anti-ship missiles, with extended range and high probability of kill ratios, has allowed the RAAF to increase the number of aircraft which are effective against surface shipping. Generally, the RAAF has used MPA for shadowing enemy surface forces and for providing targeting information for RAAF strike aircraft or RAN ship-launched attacks. The inclusion of stand-off 'smart' weapons on MPA now allows these aircraft to complement strike/attack multi-role assets in the ASuW role.

.14 While the use of MPA provides a considerable amount of combat power, the vulnerability of MPA platforms is high. The assets are not inherently self-defensive. They are vulnerable to guns and SAMs and would be in danger should close visual identification of the target be necessary. MPA therefore require sensors which provide a high capability of target identification and discrimination at long range and certainly beyond conventional Missile Engagement Zones (MEZs) of naval ships. If these systems are not fitted, then the use of MPA in the ASuW role should not be contemplated unless the
consequences warrant accepting a significant reduction in RAAF ASW capability.

**LAND ENVIRONMENT**

.15 The air-land battle contribution of air power has developed in two separate ways. The first, starting during World War I, used the versatility of aircraft to achieve two tasks. Aircraft could gain a degree of control of the air and then quickly change roles for 'ground attack' tasks. The experience of the Allies in World War II developed along similar lines, where versatile fighter aircraft first gained control of the air and then re-armed to support troops on the ground, either directly or close to the battle front. The flexibility of the aircraft as a weapon system was the key to this. The second development, characterised by the Luftwaffe, was specialist aircraft working directly with the ground forces. Control of the air was achieved first by specialist aircraft which then allowed an aircraft like the JU87 'Stuka' to support ground troops.

.16 In both situations, several conditions were common. A degree of control of the air was a prerequisite; coordination with surface forces was a necessity for mutual safety; and the shock effect of air power could compensate at the critical moment for inferior numbers on the ground. Since World War II, technological development in the self defence of surface forces, including radar-controlled Anti-Aircraft Artillery (AAA) and Surface-to-Air Missiles (SAMs) has placed a stronger defensive 'umbrella' over ground forces, making the use of increasingly more complex aircraft a necessity, and consequently, has led to a greater diversion of resources. The Israeli experience in the Yom Kippur War, when Egyptian surface-to-air defences effectively denied Israel control over the battlefield, marked the maturity of a new phase in the air-land battle. Control of the air by the Israelis had to be regained using ground forces.

.17 The air power contribution to the air-land battle is in the roles of Close Air Support (CAIRS) and Battlefield Air Interdiction (BAI). The basic difference between them lies in the proximity of targets to friendly forces and the control arrangements which are therefore needed. The RAAF has a long history of involvement in these roles, through the intrinsic versatility of its air power assets. The role of No 77 Squadron in Korea using Meteors in the 'ground attack' ie CAIRS and BAI roles, is characteristic of this versatility.
However, the modern balance favours the inexpensive but effective SAM and the sheer mass of small arms fire against the capable, high speed, but still vulnerable, modern multi-role air asset. The balance can be swung in favour of the air asset through the use of stand-off techniques and weapons and judicious use of attack helicopters, but over-the-target chances still favour the defence.

**Close Air Support**

.18 CAIRS is defined as air attack against hostile targets which are in close proximity to friendly land forces and which require detailed integration of each air mission with the fire and movement of those forces.

.19 CAIRS is a classical role of tactical air forces that provides a visible and immediate contribution to the land battle. However, less obvious forms of offensive air support, such as Counter Air, Interdiction and Reconnaissance may be of greater value to the overall effort. There will seldom be sufficient tactical aircraft available to meet all tasks; therefore, CAIRS should not be employed on targets which can be dealt with by weapons organic to surface forces unless:

a. surface-to-surface weapons are incapable of accomplishing the task or are less suited to the particular task than available air-delivered weapons, or

b. the urgency of the situation demands fire support from all available weapon systems.

.20 Effective CAIRS necessitates immediate acquisition of the target, and accurate attacks. The problem of target acquisition is sometimes compounded by the increased speed of aircraft employed in the CAIRS role, the terrain in the vicinity of the target, and the hostile air defence ground environment which may necessitate one-pass attacks at extremely low-level. Historically, Forward Air Controllers (FAC) or Air Contact Officers (ACO) have been part of air power; for example, in the North African campaigns during World War II, and through the Korean and Vietnam campaigns. They have necessarily been employed in the air and on the ground, to bridge the target acquisition and communications gap in controlling CAIRS. Limitations such as terrain, visibility, communications, ground fire, proximity of friendly forces, ordnance type, and aircraft type used to provide CAIRS, will dictate whether air or ground FAC/ACO are
necessary or indeed feasible. If FAC/ACO are not feasible, then one-pass attacks will need to be conducted, with probable reduction in effectiveness.

.21 There are further considerations of CAIRS. The traditional method of providing CAIRS, via low-level operations over the battlefield, can prove difficult in bad weather or at night. Further, there is always a risk to the friendly forces that are being supported. Finally, CAIRS aircraft, particularly armed helicopters operating over the battlefield, are highly vulnerable to modern, easily accessible, shoulder-fired SAMs. Aircraft used in the CAIRS role can suffer heavy losses, particularly aircraft that are not designed specifically for this role. The role has traditionally been conducted by specialised fixed-wing aircraft or armed helicopters, with the latter having more success due to their capacity as visual platforms, their manoeuvrability, and their better response times. Western air forces have attempted to minimise attrition by introducing role-specific CAIRS aircraft into their inventories.

.22 When these constraints are viewed in the light of Australia's defence strategy and the most likely contingencies in which the ADF may be involved, CAIRS becomes a role whose priority will need to be balanced against competing demands. Certainly, this is the case for ADF fixed-wing assets which, because of their multi-role capability, would probably be engaged in the competing priorities of counter air and strike operations, with emphasis on maritime strike and interdiction.

Less-capable aircraft which are normally used for training, but which have the capability to carry appropriate weapons, could also be considered for CAIRS.

.23 Should the ADF be called on to fight a major land battle however, either in Australia or out-of-area, CAIRS would be a priority role of offensive air support for the RAAF. Provision of the necessary support will then be required using aircraft of the RAAF's Tactical Fighter Group and Strike Reconnaissance Group, assigned to the appropriate air component commander. For this reason, CAIRS remains an important role which the RAAF continues to develop.

.24 Notwithstanding the problems inherent in the traditional application of CAIRS, the RAAF should be able to provide air support in most weather conditions, day or night, with minimal risk of aircraft loss. By using technologies such as precision weapon systems (including PGMs), Global Positioning System and ring laser gyros, ground forces and aircrews should be able to coordinate CAIRS from much greater
distances and altitudes. That is, aircraft will be able to remain outside the range of battlefield SAMs, without loss of accuracy.

Of note is the fact that the RAAF has only a training, rather than an operational, FAC capability. Should CAIRS be tasked, then the FAC or ACO may have to utilise Army Aviation aircraft already in the Area of Operations (AO) to provide a suitable airborne FAC or ACO platform. Given the essential requirement of marking the target and the position of friendly forces, the use of such aircraft in the interim may be warranted. Aircrew of strike aircraft operating on one-pass attacks at extremely low level must know clearly the position of targets and friendly forces.

**Battlefield Air Interdiction**

BAI is interdiction within the broad land battle area and is defined as air action directed against enemy forces and resources that are in a position to directly influence and affect the land operation. Like interdiction, BAI is most effective when friendly ground forces maintain pressure on enemy forces compelling them to expend stores at a faster rate than their resupply. However, BAI can also have a more direct influence on the surface battle through the timing of its effect. Whether the enemy reinforcements are denied access to, or diverted from, the immediate battle, the outcome would be similar - an advantage accrues to friendly forces.

Another aspect of BAI is that, like CAIRS, there must be coordination of effort and effective air-land communication to achieve the desired results from the air effort. While precision in coordination is not as critical as in CAIRS, impediments to close cooperation between friendly land forces and air assets can cause the initiative to be lost. Because BAI is conducted at a distance from the confusion of the land battle, it is potentially the most effective form of offensive air support.

The RAAF maintains a significant capability for BAI through the intrinsic capacity of its combat assets. As the level of conflict increases, the availability of those aircraft best suited to BAI may become more limited as they are assigned to strategic objectives with a higher priority. The RAAF must, therefore, consider alternatives to providing BAI under these circumstances. The first would be to use combat assets on an opportunity basis, in transit to, or from, primary missions. Another alternative would be to use
training assets that have been modified for a limited BAI capability. While this option carries the risk of high attrition, the level of conflict and the consequences may well warrant the decision.

**SUMMARY**

.29 Anti-Surface Forces' roles provide the air-delivered firepower characteristic of the Air Support campaign. That is, they represent the offensive aspect of the campaign. Australia is dependent on sea-borne trade and hence any threat to that trade would require a swift response. If the situation deteriorates to an extent where hostile action occurs, the RAAF would be required to conduct ASW and ASuW.

.30 In the land environment, situations could well occur which are beyond the means of a ground force's organic firepower capability to contain. The RAAF would be required to provide the necessary roles of CAIRS where opposing ground forces are in close contact, and BAI against targets further removed from forces in contact.

.31 Despite the prospect of high attrition in all four roles, the RAAF must maintain a significant capability to respond to the requirements of a joint force commander. In all four roles, close coordination and cooperation will be fundamental to success. The issue of cooperation is discussed comprehensively in Chapter 13.
CHAPTER 8

FORCE ENHANCEMENT

An Outline

Force enhancement roles provide a cornerstone of the Air Support campaign. Specifically, they encompass airlift, reconnaissance, surveillance, Electronic Combat (EC), Air-to-Air Refuelling (AAR) and Airborne Early Warning and Control (AEW&C).

Airlift is at the heart of Australia's defence strategy. It provides mobility to project air power over long distances and enhances manoeuvre for surface forces. While it affords these significant mobility and manoeuvre advantages, it does so at a cost. It relies upon infrastructure, including handling equipment and large fuel reserves; it is limited by the effects of weather; and it is highly vulnerable to enemy action. While civil resources can be used to augment the overall military airlift system, they are not tailored to military applications and often require different facilities, handling equipment and safety measures.

The ability to observe an enemy from afar provides an edge over that enemy and counters his capacity to surprise. Elevation allows an observer to see further. Airborne observation combines elevation with the ability to go deeper and faster into enemy territory to provide timely intelligence. Reconnaissance involves the observation of specific targets, while surveillance is a systematic and repetitive observation of broader areas of interest. EC also provides a degree of observation. Its main component - Electronic Warfare (EW) - is concerned with the gathering or denying of information by electronic means. Unlike reconnaissance and surveillance, EW is both active and passive. The other component of EC - Suppression of Enemy Air Defences (SEAD) - is offensive.

The last component of Force Enhancement roles is the grouping known as 'force multipliers'. These include AAR and AEW&C which, while incurring high costs for procurement and maintenance, enhance RAAF operations by enabling valuable and scarce air assets to be better employed, with a consequent reduced likelihood of attrition.
FORCE ENHANCEMENT

.1 Force Enhancement roles cover the spectrum of air activity supporting all three combat environments. The orientation of roles has historically been along environmental lines, primarily due to the philosophy of cooperation by air power with surface forces. This is developed further in Chapter 13. Of singular relevance in this context is the support provided by airlift, reconnaissance, surveillance and Electronic Combat (EC). Additionally, Air-to-Air Refuelling (AAR) and Airborne Early Warning and Control (AEW&C) provide a force-multiplier effect and are also classed as Force Enhancement roles.

AIRLIFT

.2 Airlift provides a military commander with the capability to deploy forces quickly and over considerable distances. It also assists those deployed forces in applying their military effort effectively and affords the capability to sustain that effort. Speed and reach are the distinguishing characteristics of airlift. It also allows a commander to use the principle of manoeuvre in war to exploit an enemy's weaknesses, or reinforce areas which are under threat.

.3 Spare airlift capacity can be used in peacetime to provide administrative airlift and military assistance, either internationally or domestically, to further national goals. Because it deals with the rapid movement of military resources, often over long distances, airlift is one of the most enduring and pervasive of all air power roles. This is certainly the case for Australia, where the defence strategy calls for a substantial national strategic reach.

Historical Perspective

.4 Since the beginning of World War II, airlift has become increasingly critical to battlefield success. This may have been due to the global nature of superpower involvement in security issues, but it is equally true that manoeuvre, as an element of combat power, is highly important for small forces; and indeed airlift has equal importance outside the combat arena.
Requirements for airlift have usually been greater than expected. Losses and usage rates have been underestimated and this has sometimes limited operational flexibility. Conversely, as commanders sought new ways to upset the enemy's balance (or induce friction into the planning cycle), airlift allowed the focus of concentration to be changed rapidly. Thus, it is not difficult to see why requirements for mobility have expanded to absorb the airlift capacity available. Similarly, as the intensity of conflict has increased, so too has the variety of missions performed by airlift.

Airlift has sometimes been the lifeline where other lines of communication have been cut, such as the Berlin airlift in 1948 and at Khe Sanh some 20 years later. However, this should never be a basis for planning, as other factors may intervene to cause failure; such as that witnessed in the siege of Dien Bien Phu in 1954 where French aircraft were shown to be vulnerable during approach to the besieged airfield.

There is nothing to suggest that these lessons from the past will not apply in the future. In short, future airlift operations can be expected to increase in importance to the success of the surface battle, to be in greater demand, to demonstrate more flexibility, and at times, to provide the only means of transportation for military forces and supplies.

Characteristics

Unlike some other air operations, airlift in the ADF is called upon for virtually any substantial military activity which occurs away from the confines of fixed bases, most of which are located in the populous coastal regions. Increased sea, land and air activities by the ADF may need to cover a broad area in remote parts of Australia or its surrounding region. During periods of tension and subsequent conflict, forces would be deployed and their supporting logistics requirements prepositioned or built up. As intelligence reports clarify the situation, units or force elements may need to be redeployed to more appropriate locations. While Australia would not wish to be forced to redeploy in response to every probe or skirmish, mobility is a clearly identified necessity.

At higher levels of conflict, the volume and frequency of tasking would increase, but the nature of airlift would be largely unchanged. Sea and land transport would
feature prominently in the logistic operation but airlift would also be used to great extent. In some circumstances, airlift may be the only means available, or the only means which can meet a certain time limit.

.10 Movement by air allows the rapid conquering of large distances. Also, subject to the availability of suitable airstrips, intervening terrain obstacles present little problem because of improved aircraft performance. In contrast, during World War II, the ridges in Papua New Guinea between Port Moresby and Buna were a significant barrier to the supply and maintenance of the advancing Australian 7th Division and units of the RAAF's No 9 Operational Group. Despite the advantages offered by modern airlift, there are some constraints which need to be identified.

a. **Reliance on Infrastructure.** Some RAAF airlift aircraft rely on established airfields of sufficient strength and size, and particular ground handling facilities. Emergency, meteorological and air traffic control services are also desirable. Without these facilities and services, operations may be hampered.

b. **Weather.** All air operations are susceptible to the effects of bad weather; however, using modern navigational aids, radar, instrument approach aids and sound training philosophies, military airlift operations are seldom disrupted by adverse weather conditions. The main problem in Australia is the reliance in some areas on runways which cannot sustain movements during extended periods of heavy rain due to the softening of the surface or sub-surface layers.

c. **High Consumption of Fuel.** Aircraft carrying large loads over the long distances typical of travel in Australia consume considerable amounts of fuel. In a contingency, fuel, oil and lubricants may be in short supply in parts of northern Australia. Aircraft from southern bases may have to carry sufficient fuel reserves to return to staging bases near railheads, such as Alice Springs or Mount Isa. As bulk cargo, fuel is not suitable for air transportation and should be prepositioned by surface means if possible.

d. **Vulnerability.** Military airlift aircraft are rugged but generally unarmed and limited in their
They are, therefore, vulnerable to attack by enemy aircraft, surface-to-air weapons and to visual and electronic detection. Some measure of control of the air must be established in airlift operating areas to avoid the possibility of loss of assets. The risks to airlift aircraft operating under threat in a combat environment can be reduced by employing tactics and self-protection technology.

**Civil Resources**

.11 Defence policy recognises that for substantial levels of conflict, significant force expansion would be necessary. Even in lower levels of conflict, augmentation would be essential. Civil airlines and other allied organisations could provide some of the requisite effort, necessitating regular peacetime consultation and planning for possible contingencies. However, civil airlift resources are not the panacea for military deficiencies and will not be able to provide for all needs; their use involves special considerations:

a. **Cargo.** Civil aircraft normally have limitations in their cargo-carrying capability, especially in relation to bulky or heavy items of military equipment.

b. **Infrastructure.** Modern civil aircraft are designed to utilise well-established terminal and maintenance facilities. They require good runways and taxiways and appropriate navigation aids. Special ground handling equipment is also needed.

c. **Safety.** Commercial airlines would be restricted in conflict by many factors which stem from safety considerations. Insurance and indemnity provisions, Civil Aviation Authority (CAA) regulations, legal requirements demanded by aircraft owners, and civilian involvement in danger areas would pose problems.

d. **Legislation and Costs.** In the absence of government legislation to take up civilian assets for defence, high costs could be anticipated, particularly in peace or periods of tension. Therefore, over-reliance on civil air transport should be avoided in the absence of legal obligations to respond to defence requirements.
Airlift As A System

.12 Airlift involves more than just transport aircraft and must be considered as a system which comprises several types of aircraft used in a variety of tasks, supported by a range of ground elements. It may also include the use of civil air and ground resources. As with any operational system, success for the whole system depends on smooth running of each of its components.

.13 Command and prioritisation of airlift resources must be at the highest practical level to ensure appropriate allocation of scarce resources to all users. The cost of each hour of airlift flight time is high, the airlift aircraft numbers are limited, and aircrew cannot remain on duty indefinitely. Consequently, the system of preparing, ordering, loading and unloading of people and cargo must be designed for flexibility, smooth operation and simplicity.

Airlift Categories

.14 The tasks of the airlift role can be described as either strategic or tactical in nature with a degree of overlap often existing. Many transport aircraft can effectively perform both roles which tends to add confusion to attempts to categorise airlift.

.15 Strategic airlift is normally conducted to support a broad strategic or operational goal, while tactical airlift provides for rapid and responsive movement within an Area of Operations (AO) to meet specific tactical goals. Strategic movement, therefore, usually involves long distances in relative terms but, more importantly, it is movement to or from one theatre, AO, or communications zone. For example, this would include deploying personnel and equipment to a forward airhead from a rear echelon or garrison area. The forward airhead may be either an international airport or a remote, short, unsealed strip which forms a Point of Entry (POE) into an AO. Redeployment within the AO would then be a tactical airlift task.

.16 The purpose of the task or the objective of the mission is also a criterion. That is, whether airlift provides support for military forces in contact with enemy forces or not has a bearing on whether the mission is tactical or strategic. Tactical airlift tasks are more likely to be in
direct support of current operations, either land, sea or air and, therefore, in direct support of forces in contact with the enemy. The threat to airlift assets is more likely to be high in these circumstances. Similarly, strategic airlift tasks may terminate in a tactical situation if the forces carried are likely to enter into combat or provide direct support. For example, a strategic deployment to a major airport which was insecure could be accomplished by airlanding or airdropping forces to secure the airfield; a tactical mission. Virtually any airlift task can therefore be either strategic or tactical, depending on its scope and nature.

**Airlift Tasks**

.17 The tasks performed by airlift vary widely and may need to be conducted in a hostile environment. Special training, equipment and tactics are required to complete tasks in such an environment. The particular tasks encompass strategic mobility, scheduled services, aeromedical evacuation, airborne missions, air logistic support, special operations, Search and Rescue (SAR) and AAR.

.18 **Strategic Mobility.** Strategic Mobility is a prime task of the airlift force. It involves the deployment, redeployment and resupply of ADF elements in all contingencies. Strategic mobility may include various sub-tasks such as air transport for securing a POE, prepositioning essential supplies, deploying a main force, and maintaining deployed forces. As indicated earlier, this role would have immediate relevance in a period of increasing tension. For example, the declaration of an Air Defence Identification Zone (ADIZ) would require control of the air to be increased. Air defence assets, together with supporting units, ground defence and spares, may have to be moved for operational reasons. Strategic mobility calls for the maximum speed of operation, as it is usually necessary to concentrate the force in the shortest possible time. Because many tasks may be conducted in areas beyond normal transport routes, the airlift forces employed should be largely self-contained, flexible, and capable of operating with the minimum of ground support.

.19 **Scheduled Services.** Scheduled Services are regular point-to-point air services which are conducted primarily to provide a well-planned and regular means of transportation. They can be conducted either on a strategic or tactical basis. Prior notice assists forward planning and reduces the need for negotiation and inquiry regarding times of movement. On
the other hand, flights cannot always be timed to suit the peak demand and, therefore, may not be fully utilised. To be effective, Scheduled Services must be regular and reliable.

.20 **Aeromedical Evacuation.** Tactical Aeromedical Evacuation (Aeromedevac) is the evacuation of casualties from the combat zone either to a forward casualty clearing area or back to the logistic support area, by either fixed or rotary wing aircraft. Strategic Aeromedevac is the evacuation by air of casualties from first aid posts and field hospitals in operational areas to facilities outside the AO. Aeromedevac requires special preparation, training, equipment and personnel, and can be a demanding task. Evacuation by air accelerates medical care, enables medical resources to be concentrated for best effect and relieves demands on forward areas.

.21 **Airborne Missions.** Airborne Missions are concerned with the movement by air of combat forces and their logistic support into an objective area. The combat forces and their support may be delivered by airlanding or airdrop and from fixed or rotary wing aircraft. On dispatch from the supporting aircraft, forces may be required to engage in combat immediately or they may develop operations against an enemy in a nearby objective area. Combat forces delivered into an objective area normally require subsequent air logistic support until a surface link-up is effected or withdrawal is accomplished. Recovery of combat forces after insertion may be carried out under fire.

.22 **Air Logistic Support.** Air Logistic Support includes those tasks, other than Airborne Missions, conducted within an AO to deploy and recover troops, equipment and supplies. It differs from Airborne Missions in that Air Logistic Support does not usually involve the carriage of troops ready for immediate combat. However, any of the delivery techniques used in Airborne Missions may be employed. Air Logistic Support tasks include the resupply of delivered airborne forces until a surface supply link-up is established; and the augmentation, as appropriate, of surface transportation systems for the movement of personnel, including prisoners of war, equipment and supplies, and the recovery of equipment and vehicles.

.23 **Special Operations.** Special Operations involve the deployment, support and withdrawal of special forces whose mission is covert or highly specialised. This may include inserting agents or troops into enemy-occupied territory without detection. These tasks are usually carried out at
night and may employ airdrop or airland techniques. Special training and night vision equipment may be needed to complete the mission successfully. Some of these tasks may have to be carried out regardless of the total air situation and under conditions not normally considered suitable for airlift. Aircraft used in these tasks may require modifications or special equipment fits.

.24 **Search and Rescue.** SAR is a task designed to preserve lives and can be allocated to airlift forces in both peacetime and in combat. Airlift aircraft can usually be configured quickly for SAR duties, and their range and endurance make them highly suited to the task.

.25 **Air-to-Air Refuelling.** AAR is an important task conducted by airlift aircraft and is described in detail later in this Chapter.

**RECONNAISSANCE**

.26 Reconnaissance is the collection of information via a specific mission, usually conducted over a limited period and directed against specific targets. The effectiveness of modern military operations depends, to a large extent, on being able to determine an enemy's strength and intentions through reconnaissance of his order of battle. Aerial reconnaissance involves the gathering of information by airborne means using photographic, radar, infra-red, electronic, acoustic and visual methods. This data is used in the intelligence assessment of capabilities and intentions. RAAF aerial reconnaissance contributes to the deterrent value of air power by denying surprise to a potential enemy.

.27 The RAAF reconnaissance force can respond quickly, accurately and at long distances, at night and in poor weather. Its aircraft can reconnoitre the vast area of primary strategic interest to Australia and provide a permanent record of developments or changes in a potential adversary's posture. During conflict, aerial reconnaissance becomes more important by continually reporting changes to the surface picture for detailed planning to proceed. Target identification and Bomb Damage Assessment (BDA) through an indigenous, independently verifiable intelligence system is essential.

.28 A future consideration for Australia is the use of satellites for reconnaissance. Satellites can provide
coverage and security especially suited to Australia's circumstances for geographic, environmental and meteorological purposes. Australia may exploit space-based systems for a more effective strategic and tactical capability in the future.

The Reconnaissance Role of the RAAF

The reconnaissance role of the RAAF is both strategic and tactical in its objectives. In peacetime, the strategic objective for the RAAF is the collection of data which is assessed to establish a basic pattern of activity in the area of interest, from which significant departures from the basic pattern, or trends, might be observed. In times of conflict, strategic reconnaissance would focus on those areas which are required to develop and sustain military forces, such as command and control nodes, key production and infrastructure support. Tactical reconnaissance will be required to provide enemy disposition, accurate targeting and bomb damage assessment. Strategic and tactical reconnaissance will usually be performed by high speed, multi-role platforms with long range and endurance. Centralised direction and decentralised execution will facilitate the expeditious transfer of information. The RAAF can expect heavy demands from Army and Navy, as well as requiring significant reconnaissance for its own operations.

Once the airborne mission has been completed, the effectiveness of aerial reconnaissance is dependent primarily on interpretation of reconnaissance information by the intelligence staffs. These staffs must possess skills in interpretation of the imagery, analysis of the information and dissemination of the intelligence to those with a need to know.

Future Reconnaissance

Unmanned Aerial Vehicles and Remotely Piloted Vehicles. Unmanned Aerial Vehicles (UAVs) and Remotely Piloted Vehicles (RPVs) are used by some nations for autonomous reconnaissance missions, involving automatic position-keeping, target identification, data-link transmission and range-spotting for artillery. The advantages of UAVs and RPVs are low initial price and relative cost of attrition, long ranges, and technological advances which markedly enhance their capabilities. UAVs and RPVs can perform so-called 'dull, dirty and dangerous' missions where
the crew and aircraft would be at risk in manned aircraft operations.

.32 The difference between the two essentially is that an RPV involves a ground operator controlling the air vehicle which is used to gather reconnaissance information; whereas a UAV is more simply an unmanned vehicle similar to a target drone. That is, the RPV necessarily carries mission equipment, more sophisticated sensors, and is supported by elaborate ground station equipment.

.33 **Space-Based Reconnaissance.** The use of space-based reconnaissance involves enormous expense which the ADF cannot support in the shorter term. However, affordable systems that are attractive to regional nations may be produced in the future. The RAAF, therefore, needs to maintain an awareness and knowledge of space-based systems - for its own future use and to be aware of potential capabilities that could be directed against Australia.

**Law of Armed Conflict**

.34 The existence of imagery may help diplomatic activities and in meeting Law of Armed Conflict (LOAC) considerations. Perpetrators of hostile acts may need to be recorded 'in the act', and commanders will require up to date imagery and assessments to support their operational planning. Moreover, public support may depend upon full and frank disclosure of key aspects of reconnaissance data. A capability to obtain data such as target latitude/longitude and time will be central to winning international support for the use of military force. This emphasises the need for an independently verifiable intelligence capability with electro-optical sensors and a real-time data link, either to ground stations or via a communications satellite to command centres. Maritime patrol, tactical fighter and strike aircraft may also be used in aerial reconnaissance if it is afforded a higher priority than other air operations.

**SURVEILLANCE**

.35 Surveillance is the systematic observation of areas, persons or objects by any available sensor. Surveillance information is processed by intelligence staff to provide accurate and timely knowledge of a potential adversary's capabilities and intentions and involves the gathering of
information by photographic, radar, infra-red, electronic, acoustic and visual means. Information gained from surveillance is mainly used to support strategic peacetime intelligence or operational intelligence in times of conflict.

Surveillance is fundamental to Australia's foreign and defence policies. The technological developments in the Jindalee Over-the-Horizon Radar Network (JORN) and satellite communications provide a capability to detect air and sea activity in and beyond Australia's sovereign air and sea space and to communicate that information to the appropriate agencies. These systems are well suited to broad-area surveillance and, coupled with aircraft, provide a potent information gathering capability.

The use of aircraft for surveillance can also be extended beyond Australia's national air and sea space to that of regional nations who desire RAAF assistance. Small island nations have different security concerns to Australia, but the characteristics of air power lend themselves to air power assisting such nations to protect their interests, while enhancing Australia's active involvement in the region.

Air Environment

Surveillance of Australia's national airspace is coordinated through the national system of air defence and airspace control. This system integrates information from sources such as JORN, civil and military microwave radars and strategic intelligence sources.

While the RAAF's air defence and airspace control radars provide a secondary function of early warning, they do not offer the significant capability afforded by Airborne Early Warning and Control (AEW&C) aircraft. The elevation and mobility of the AEW&C radar platform provides much greater detection coverage than ground-based microwave radars. Additionally, AEW&C aircraft can respond quickly to, and monitor accurately, the movements of a target and direct an intercept, if required.

Surface Environment

Maritime Patrol Aircraft (MPA), JORN and Coastwatch form the main detection elements of Australia's system of surface surveillance in the air-sea gap. However, JORN is limited to a detection capability; interception and
identification tasks still have to be carried out by ships or aircraft. The RAAF's MPA possess the long range and endurance necessary for surveillance missions and modern electronic and sonar support measures to facilitate the detection and classification of emitters.

**Satellite Surveillance**

Satellites are attractive propositions for broad-area surveillance but are expensive to acquire and operate. The predictability of their orbits can be a limitation. Additionally, data links to earth-based receiver stations, which are usually fixed installations, are vulnerable to attack. Attacks on satellites or ground stations however, would be considered equivalent to invasion and retaliatory action would be justified. The high costs of satellites may demand that they be shared among several nations, thereby raising the question of control. Any evaluation of a satellite for surveillance purposes must consider the effect of weather on its performance.

**ELECTRONIC COMBAT**

Electronic Combat comprises Electronic Warfare (EW) and Suppression of Enemy Air Defences (SEAD).

**ELECTRONIC WARFARE**

The objective of EW is to gain or exploit control of the electromagnetic (EM) spectrum, and to deny its effective use to the enemy. EW was first applied in combat during World War II. Britain developed radar and used it with great effect. The Germans applied the Lorenz airfield approach principle to the 'Knickebein' system to improve navigation accuracy. Electronic countermeasures were designed to reduce the effectiveness of these and similar systems. Enormous technological advances have been achieved in the performance of EW systems; operations in the 1991 Gulf War demonstrated the dominance of EW in modern warfare.

In any conflict, the conduct of EW by the RAAF would involve the ability to identify an enemy's communications and radar transmissions while protecting friendly transmissions from exploitation. Once enemy transmissions had been
identified, they would be subject to decoding and countermeasures. The RAAF's Electronic Intelligence (ELINT) and Communications Intelligence (COMINT) assets are essential elements that must be regularly updated to retain their effectiveness in the dynamic field of EW.

While an enemy's electronic transmissions can be intercepted passively, broadcasting one's own presence may provoke the enemy into activating his electronic systems, thus providing the listener with valuable information. The process of collection, collation and analysis of an enemy's EW capabilities is known as Electronic Support Measures (ESM). While the effectiveness of an enemy's use of the EM spectrum equipment can be lessened through Electronic Counter Measures (ECM), he could also be expected to use ECM. The techniques devised to counter ECM are known as Electronic Protective Measures (EPM), or Electronic Counter Counter Measures (ECCM).

Electronic Support Measures

Electronic Support Measures (ESM), while enhancing the effectiveness of RAAF air operations through the identification and assessment of the capabilities of an enemy's electronic emitters, can also provide invaluable intelligence information. RAAF aircraft may not be able to avoid operating within enemy radar cover and so passive EW measures like ESM may be critical. The two main functions of ESM are intercept and passive warning.

Intercept. Intercept involves detecting, listening to and analysing enemy emissions and transmissions to determine identity, location and intentions. Any electronic emission is potentially at risk from intercept. While the RAAF's MPA provide a limited vehicle for intercept, ground stations also contribute to this task.

Passive Warning. Passive warning of any immediate threat to RAAF aircraft is required. RAAF combat aircraft require ESM receivers which will warn when the aircraft is being illuminated by an enemy, indicating for example, that an enemy's Air Intercept (AI) radar has been activated or that a missile has been launched. ESM equipment must be capable of analysing the electronic signatures of systems so that the crew is aware of the source and identity of enemy transmissions. Since modern ESM systems compare the parameters of incoming signals to an electronic data base, collation of the characteristics of electronic transmissions for equipment must be a peacetime priority.
Electronic Counter Measures

.49 The use of Electronic Counter Measures (ECM) is an offensive activity which can be considered as either deception or jamming. The application of properly planned deception and jamming by the RAAF can reduce the effectiveness of enemy air operations. Furthermore, use of ECM in an offensive role will often be critical for successful penetration of enemy air defences.

.50 **Deception Measures.** Deception measures represent a potent method of conducting ECM, but are expensive in terms of manpower and equipment. They involve:

a. simulating operational system noises, eg. in air-to-ground communications, to deceive enemy interceptors;

b. mounting electronic attacks as feints, aimed at making an enemy commit his defences at a time and place of our choice;

c. intruding into an enemy's communications system to plant false information; and

d. launching active decoys that simulate, for example, infra-red or radar sources, to lure a homing device away from its original target.

.51 **Jamming.** Jamming involves the exploitation of an enemy's electronic transmissions to confuse his tracking and homing devices. It may be electronic or mechanical in nature. Electronic jamming involves degrading transmissions such that they are unusable (noise jamming) or feeding false information into radar systems (deception jamming). Mechanical jamming involves the use of chaff or decoys to confuse the enemy's radar systems. The use of mechanical and electronic jamming are interwoven into the tactics of air warfare. RAAF combat aircraft need effective ECM systems to enhance survivability in a hostile EW environment. Use of ECM requires careful judgment. The use of jamming on an inadequate scale may expose aircraft to greater risk than if jamming had not been used. Avoiding the source of the enemy's electronic transmissions may be more effective than actively jamming his systems.
Electronic Protective Measures

.52 Electronic Protective Measures (EPM) are concerned with taking action to reduce the effect of enemy activities through operational techniques and equipment that are resistant to ECM. Additionally, RAAF operators can provide EPM by observing communications security procedures. 'Spoofing', or inserting erroneous information, may also be used to deceive an enemy.

Command and Control

.53 The elements of EW need to be coordinated at an appropriate centralised level. Consistent with command and control doctrine, execution of the various EW tasks should be decentralised. Furthermore, close links with intelligence organisations will facilitate the exploitation of an enemy's electronic orders of battle. Finally, a specialist organisation will ensure that operations, intelligence, specialist and planning staffs coordinate their EW activities.

SUPPRESSION OF ENEMY AIR DEFENCES

.54 The primary purpose of SEAD is 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 weapons. SEAD would be used predominantly to support aircraft in the OCA role, or in Strike operations. SEAD may employ physical or electronic means to attack the radar component that is an essential part of many air defence weapon systems.

.55 Electronic means of suppression involve jamming. Physical means of suppression incorporate the use of traditional unguided bombs, or an array of 'smart' weapons, primarily anti-radiation missiles, which home on the emissions of the target radar.

.56 In large air forces such as the USAF, specialist aircraft are dedicated to SEAD, using ECM and High-speed Anti-Radiation Missiles (HARM). However, the use of dedicated aircraft is not a practical proposition for smaller air forces such as the RAAF. Notwithstanding the problems associated with conducting SEAD, the RAAF must expect that any target worth attacking will be defended, therefore requiring some measure of enemy air defence suppression.
The solution for the RAAF is to use the multi-role capability of its main combat aircraft and equip them with the weapons that have a SEAD capability. For example, the strike force could be employed with a mixed weapons load, including suppression weapons such as HARM, together with an improved on-board ECM suite. A stand-off capability is also an essential SEAD asset. Thus, the capabilities described in Chapter 6 for strike also have application in this role, again underscoring the versatility of air power.

**FORCE MULTIPLIERS**

Improvements in aircraft design and weapon technology have led to an increasing reliance on air power to affect the outcome of conflict. This is partly due to the development of supporting aircraft and systems which enhance and extend the capability of combat aircraft. Known variously as 'force multipliers', these roles such as AAR and AEW&C are normally in direct support of air power.

**AIR-TO-AIR REFUELLING**

AAR extends the range, payload and flexibility of air operations and improves the response of air assets. An AAR capability for the ADF accords with Australia's defence policy, in that it reduces dependence on foreign forward operating bases and the capabilities of allies. Australia must anticipate having to conduct operations in low level contingencies at extremely long ranges. As the level of conflict increases, so would the need for a refuelling capability to enable provision of the air cover that would be needed in the sea and air approaches to Australia. In essence, AAR allows for increased range, greater response time and increased flexibility of the RAAF's aircraft. It also causes Australia's potential enemies to expend disproportionate effort in their defensive measures. On the other hand, AAR requires protection from enemy air operations.

Increased Range. AAR can increase the range of aircraft up to the limits of crew endurance. This is particularly relevant for Australia with few tactical fighter aircraft and a potential Air Defence Identification Zone (ADIZ) of immense proportions. The reach of RAAF strike aircraft can also be increased considerably by AAR.
Response Time. Australia's commitment to long range military operations, the sheer size of its area of military interest and the desired characteristics of the ADF of responsiveness, reach and endurance are well-documented in Chapter 1. These factors alone demand an AAR capability for the ADF which allows RAAF aircraft unencumbered reach with rapid response across the full expanse of the area of direct military interest. Without a dependence on staging bases, either national or foreign, RAAF aircraft with AAR support can reach their destinations or targets with few or no stops enroute, thereby improving their response. For aircraft engaged in Counter Air operations, AAR allows for increased airborne alert, also greatly reducing response time.

Increased Flexibility. The flexibility of RAAF aircraft is increased significantly by AAR. The payload and range gains for combat aircraft resulting from AAR permit greater weapon loads to be carried and allow improved flexibility in choice of flight profiles and target approaches. Aircraft can divert to avoid weather or known enemy threat areas, they can operate for extended periods at low altitude, and can loiter over targets in benign areas until the most opportune time for weapon release. Furthermore, the flexibility to choose transit routes and final approaches to targets causes difficulties for an enemy who, no longer being able to accurately predict attack flight paths, has to prepare for all contingencies in his defensive plan.

There is an even greater impact on potential enemies from an AAR capability for Australia. Extending the radius of action of Australia's offensive air assets means potential enemies will need to expend a disproportionate amount of resources and effort in protecting rear areas which are not normally within the unrefuelled radius of action of RAAF aircraft. This is true of any nation defending against this type of capability; it was a major factor in the Falklands War, when the Argentinians realised the vulnerability of their homeland to RAF strike assets after the British attack on Stanley airfield by an aircraft launched from Ascension Island.

Vulnerability. The most vulnerable time for air-to-air tanking operations is when the fuel transfer is taking place. AAR missions must be carefully planned and coordinated to ensure that refuelling support is provided when and where required and with minimum complications. In a hostile air environment, planning of AAR missions may involve
the use of special tactics, rendezvous in safe areas or allocation of escort aircraft to protect the tanker force.

.65 **Lead Time.** AAR requires specialised equipment and dedicated aircraft, trained crews, and well-versed procedures for its efficient use. An appropriate combat AAR capability for the RAAF that will support all its offensive aircraft will take the commitment of resources, time and planning to acquire. The method presently adopted to reduce the lead time is to retain a limited AAR capability within the force to allow for training of crews, maintenance of procedures, and a base for expansion in conflict.

**AAR Options for the ADF**

.66 Two principal methods of airborne refuelling are in widespread use - the 'probe and drogue' method and the 'flying boom' method. With the 'probe and drogue' system, fuel transfer occurs after the tanker extends a conical drogue into which the receiving aircraft slots a fitted probe. More than one aircraft can be refuelled at the same time, provided multiple systems are fitted to the tanker. Considerable flying skill and accuracy are required by all crews.

.67 The 'flying boom' method requires an operator on the tanker to move a refuelling boom by remote control and make contact with a receptacle on the receiving aircraft. This method allows much greater fuel transfer rates than does the 'probe and drogue' method, although only one aircraft can be refuelled at a time.

.68 The ADF should consider fitting future airlift aircraft with an AAR capability, ensuring that airlift capability is not compromised. Modification at the production stage would be significantly cheaper than retrospective fitting.

**AIRBORNE EARLY WARNING AND CONTROL**

.69 Advances in technology have produced highly accurate and destructive air-delivered weapons which have rendered static installations most vulnerable. Thus, some form of early warning of impending attack is necessary to reduce the likelihood of surprise attack and to concentrate air defences in time and space to achieve maximum effectiveness. Airborne systems have proved very effective in providing early warning
and control, as can be witnessed from experience in the Arab-Israeli conflicts, the Falklands War and more recently the Gulf War of 1991. Indeed, these conflicts have underscored the necessity of AEW&C for successful prosecution of war in the air.

Defence of the air-sea gap is predicated on an ability to control the air and sea environments. Part of that control must be the ability to counter short-term surprise. While warning time, reconnaissance and surveillance are integral to that control, so too is the ability to detect a specific threat and react to it appropriately.

A limited ground-based microwave radar capability and the Jindalee Over-the-Horizon Radar Network (JORN) provide the ADF with an early warning capability. However, offensive aircraft are able to penetrate at very low altitudes and high speeds, thus reducing the detection distance and warning time of surface-based microwave radars. JORN does not offer the degree of control necessary for immediate response. Even with considerable increases in microwave radars and a fully-mature JORN, adequate control will not be forthcoming. Dedicated national space-based systems are prohibitively expensive. The only real alternatives are to accept the limitations on control in the air-sea gap or develop a mature AEW&C capability.

In a fast-moving and complex air defence and surface plot, effective offensive and defensive air power capability is dependent on positive control exercised through reliable and secure communications. This has been the experience of the ADF in peacetime exercises and was a clear observation from Coalition air operations in the Gulf War. In the widely dispersed areas of northern Australia and the air-sea gap, force-to-space ratios will be low and coordination of offensive and defensive defence assets will depend on quick-reacting, secure and comprehensive control.

Sufficient numbers of AEW&C aircraft are needed to allow for coverage of more than one area of operations at any one time. Multiple threat axes could be expected which would necessitate establishment of more than one Air Defence Operations Area (ADOA). Characteristic requirements of AEW&C aircraft include long endurance, a complete communications system (with anti-jammable, secure networks on all frequency bands), a complete suite of navigational aids (including satellite navigation systems), and a state-of-the-art radar and data processing system.
SUMMARY

.74 The Force Enhancement roles are numerous and diverse. For simplicity, they have been divided into airlift, observation and force multiplier groupings. On first glance, airlift appears quite straightforward, yet the categorisation of airlift into strategic and tactical is more complex than has been accepted traditionally. In terms of observation, the conduct of reconnaissance and surveillance has continued in a traditional sense. However, Electronic Combat is a complex area. The EW component differs from reconnaissance and surveillance in that it covers active as well as passive measures, while SEAD is an offensive air operation.

.75 The Force Multiplier grouping covers the specific roles of AAR and AEW&C. Their fundamental importance relates to the increased reliance on air power to affect the outcome of conflict and hence the value that pertains from extending the capability of combat aircraft.

.76 Force Enhancement roles provide the fourth and final set of air roles discussed in Part 2 of this manual. Together with Anti-Surface Forces roles, Strike and Interdiction, and Counter Air, Force Enhancement provides the full breadth of air power capability demanded of an air force.
PART 3

SUPPORT FUNCTIONS

The nature and importance of air power are discussed in earlier chapters: so too are the principal roles of air power clearly articulated in Part 2. However, these air roles exist within a more complex system than their individual examination might suggest. That is, there are readily identifiable support elements which provide the wherewithal for the roles to be conducted. Those elements are discussed in this Part as support functions and are grouped under four main headings.

First is the integration of command, control, communications and intelligence. This grouping essentially provides commanders with 'their eyes, ears and whole nervous system' which allow air operations to be prosecuted. Second is logistics which provides the readiness and sustainability framework for air operations. Third is the essential infrastructure to support air operations and the necessary security afforded through ground defence. Fourth is the amalgam of dedicated personnel and effective training.

Air power is a complex entity that requires synchronisation of all its elements. While the focus is often on the ability to conduct the air roles themselves, there is a clear understanding of the need to sustain these air roles. Such sustainment can only be provided through the support functions.
CHAPTER 9

COMMAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE

An Outline

Appropriate command and control arrangements are needed to ensure that the RAAF develops in accordance with strategic guidance and that forces are trained and equipped accordingly. Detailed arrangements are also needed to develop plans, determine priorities, assign forces and allocate resources. Effective conduct of air operations hinges on appropriate command and control arrangements at the three levels of war.

Command and control cannot operate effectively without efficient and rapid communications, both on the ground and in the air. That is, communications must form part of a network which facilitates all phases of planning, training for, equipping, directing and executing air operations.

Intelligence allows effort to be focused on an enemy's centre of gravity, but also demands stringent security measures to prevent enemy intelligence gathering. The underpinning element here is that of communications - for the effectiveness of communications networks has a direct impact on the effectiveness of command and control and the timeliness of intelligence.
COMMAND AND CONTROL

.1 Command is the most important attribute of successful military operations. Command of RAAF elements is exercised through headquarters which deal with operations, intelligence, personnel administration, logistics and finance. Furthermore, each Commander conducts his administrative and financial affairs in line with guidance from the Secretary of the Department of Defence. Command is that authority vested in an individual of the armed forces for the direction, coordination and control of subordinate formations, units and individuals. Command is exercised at three levels: strategic, operational and tactical.

.2 The term 'Control' is that authority, less than full command, that a commander exercises over part of the activities of subordinate or other organisations. In the legal sense, it allows delegation of command to a subordinate, and ensures compliance with higher orders. In the operational sense, it provides the means for implementing the commander's decision and monitoring the results.

.3 At all levels, command is indivisible. A commander has ultimate responsibility for the conduct of operations by his subordinates. The commander remains responsible to higher authority and may delegate duties but cannot share that ultimate responsibility.

LEVELS

Strategic Level

.4 The strategic level of command involves close, direct links between the ADF and the Australian government. It is concerned with the generation and application of military power within a national, political, diplomatic, economic, legal and social framework. CDF has full command of the ADF and, as the strategic level commander, has responsibility for the application of military power so that it accords with national requirements in the resolution of conflict. In so doing, the strategic level commander must translate political objectives and constraints into unambiguous guidance for military activities. Forming policy
relationships with Coalition partners can be a crucial aspect of this level of command.

**Operational Level**

.5 The operational level of command involves the planning and direction of operations. It is concerned with positioning, sustaining and providing security for forces assigned. The Joint Commander (in this case the Air Commander) is the operational level commander who has the responsibility to ensure that the concept for the conduct of air operations accords with the guidance received from the strategic level. In doing so, the operational level commander must translate that higher level guidance into more specific instructions and directives that can be used at the tactical level.

**Tactical Level**

.6 The tactical level of command involves the application of air power to gain military objectives in the most effective manner, and requires timely control and coordination. At wing and squadron level, the tactical level commander has the responsibility to ensure that the actual conduct of operations accords with the instructions and directives received from the operational level. In doing so, the tactical level commander translates those instructions and directives into tactical procedures.

**GENERAL PRINCIPLES OF COMMAND AND CONTROL**

.7 Any command and control structure within the ADF must reflect the six fundamental principles accepted in Australian joint operations doctrine; namely, unity of command, span of command, chain of command, continuity of command, delegation of authority, and control of scarce resources.

**Unity of Command**

.8 Command of all air power assets should be centralised at the highest appropriate level in a single authority proficient in the application of air power; namely, an air commander. By virtue of its flexibility, air power
lends itself to being parcelled out to satisfy a variety of users. With a force similar in size to the US military, this can be achieved successfully. However, in war, if Australia is to make the most of its limited air assets and be capable of concentrating force at the right time and place, air power needs to be unified under one commander.

Operational control, on the other hand, should be delegated to the most appropriate level to achieve organisational effectiveness and combat potential. Organisational effectiveness places particular emphasis on a small defence force which needs to minimise costs, while maximising flexibility and the ability to concentrate force. Combat potential emphasises the specialist nature of air power systems, the need to develop innovative techniques and the need to move vital combat groups quickly to the area of greatest need. Delegating control allows exploitation of the characteristics of air power without loss of effectiveness or efficiency.

Whilst an air commander will have combat forces assigned, he will still be reliant on external agencies for intelligence and communications support. In effect, the air commander will have to exercise judgment in planning operations as he balances his allocation of forces, the varying degrees of authority, operational limitations and political constraints. At the tactical level, a squadron commander should be given full responsibility for his own actions.

The employment of air power requires a full appreciation for, and understanding of, air power capabilities themselves. Only through unity of command can all elements of Australia's air assets be truly coordinated toward a common military objective. Centralised direction or command of all air power capabilities should be vested in a single airman or air commander, while decentralised execution or control of these assets should be vested in the joint force commander, his nominated air component commander, or other subordinate commander, if appropriate.

Span of Command

The principle of Span of Command requires that the number of subordinate elements be limited. While automated systems may assist in coordination, and possibly increase the range of responsibilities, the ability of the commander to absorb the relevant information and make timely decisions will
ultimately limit his span of command. At the strategic and operational levels, the key factor is the range of activities for which the commander has responsibility. At the tactical level, the key factor is the number of immediate subordinates. The span of command should be kept as narrow as possible.

**Chain of Command**

.13 Command and control effectiveness relies on a hierarchical chain of command in which orders and instructions are passed downwards, and information flows upwards. The principle of Chain of Command ensures that a commander and his staff respond to directions from higher authority and exercise responsibility for subordinate elements. More lateral command structures may be required for specific capabilities.

.14 In responding to higher authority, the commander should report to only one superior headquarters. At each level in the chain, commanders should identify a subordinate-level commander for a task, specify his mission, allocate the required resources, and delegate the requisite authority to use those resources. The chain of command should be kept as short as possible.

**Continuity of Command**

.15 The principle of Continuity of Command ensures that there is no interruption to command. That is, each commander should nominate an alternative commander, and headquarters, in anticipation of either one being rendered inoperative.

**Delegation of Authority**

.16 The principle of Delegation of Authority ensures that a commander always has appropriate control and authority over forces assigned, and that he may delegate that authority where appropriate. Delegation of authority does not divest the higher-level commander of responsibility. The purpose of delegation is to allow a subordinate commander the benefit of direct control over the employment of his forces without recourse to higher authority. Air power components of a Joint Force should be grouped as an Air Component under an Air Component Commander, with an appropriate air staff. In a Joint Force, the air commander must be able to mass and concentrate his forces, at the right place, at the right time,
in the right numbers, to counter an enemy threat or contribute to the Joint Force Commander's initiative.

.17 The RAAF command and control system, while centralising the ability to shift, deploy and redeploy forces, should ensure appropriate delegation of authority and decentralised execution to the maximum extent possible. That is, the Air Commander should delegate detailed planning, tasking and execution for missions to his tactical commanders. The scope and variety of air operations are such that no one commander can perform all detailed planning and execution tasks.

**Management of Scarce Resources**

.18 The principle of Management of Scarce Resources leads to the notion of centralised command at the highest level, permitting the capabilities of those resources to be used effectively. The intent is not solely to prevent over-commitment, but also to avoid under-utilisation.

.19 Traditionally, aircraft have been regarded as a scarce resource; this has even more significance for multi-role aircraft. Assignment of such aircraft to one role only would automatically preclude their use in other roles. Hence, maximum flexibility is achieved by managing these scarce resources from Air Headquarters.

**Operational Imperatives**

.20 The Air Commander's task is to develop operational strategies and plans, determine priorities, assign forces, allocate resources and control his assigned forces, based on CDF's objectives and priorities. He also functions as the central authority for national air defence and airspace control. In this capacity, he coordinates and integrates air and surface defences to counter an enemy attack. Similarly, he coordinates strike, reconnaissance, maritime surveillance, close fire support and airlift forces. He is able to mass defences and direct them as appropriate, and avoid unnecessary duplication and dissipation of effort.

**COMMUNICATIONS**

.21 An air force cannot operate effectively without reliable, adequate and rapid communications. Furthermore, any
communications network in Australia must be able to sustain widely dispersed operations, while being flexible and responsive. Fundamental to any comprehensive communications network is the ability for efficient data transfer as well as voice communications. The RAAF communications system encompasses strategic and operational communications, tactical communications in air operations, Air Traffic Control (ATC) systems, and the Air Defence Ground Environment (ADGE). Efficient communications will enhance mission effectiveness of the RAAF; hence, the network must be protected using Communications Security (COMSEC) measures. The RAAF is tasked with specific responsibilities in Chapter 10 of ADFP 2.

**Strategic and Operational Communications**

.22 Strategic and operational communications encompass ground-based and space-based communications, and rely on some external agencies. Irrespective of basing, such communications should offer a discrete, dedicated facility for the ADF, with redundancy being provided through access to civil agencies, and high-frequency (HF) systems.

.23 Ground communications are provided by the Defence Integrated Secure Communications Network (DISCON), which is managed and controlled by HQADF. This network provides the primary means of command and control and offers a facility for passing administrative and other messages quickly.

.24 Space-based communications could be provided by transponders carried on civil satellites, giving the ADF reliable long-range, broad-band communications to remote areas. Integrating all elements of the communications system and surveillance system (including Jindalee Over the Horizon Radar Network (JORN), civil and military surface and airborne radar detection data) is of paramount importance. The Air Commander's national responsibility should, therefore, extend to space-based military communications systems. Australia's economic circumstances and limited defence communications infrastructure necessitate considerable dependence on civil resources for the provision of strategic communications. Therefore, interoperability between RAAF, ADF systems and civilian communications agencies is important.

**Tactical Communications**

.25 Both fixed and transportable tactical communications are vital for the effective conduct of air operations in
Australia. In air defence operations, for example, rapid and effective communications are necessary, to the extent that information obtained from air intercept (AI) radars may be communicated to the aircraft's self-defence weapon system automatically. Facsimile (FAX) and commercial telephones provide an additional capability in meeting broad air defence requirements and contribute to the health, morale and welfare of deployed forces. However, security of these communications may be an issue in conflict.

.26 Strike and reconnaissance operations rely primarily on information from radar reconnaissance, navigation and bombing aids being communicated to the weapon system or aircraft. Additionally, early warning of a threat and electronic countermeasures are increasingly important. Air-to-surface operations, because of their joint nature, will rely on a joint communications organisation; for example, linking the Maritime Command Centre with RAAF maritime patrol aircraft and RAN ships. The Tactical Air Control System provides transportable tactical communications, air coordination, mission control, tasking requests and confirmation, and intelligence updates.

.27 Airlift operations depend primarily on radio and radar navigational aids, with radar beacons often being used to indicate landing or dropping zones. With continuing technological improvements, Global Positioning Satellite Navigation System (GPS), with its proven accuracy and passive nature, will be used more and more.

.28 The Air Operations Communications System (AOCS) is used for communicating with aircraft deploying from the main support area to an Area of Operations (AO), maintaining a flight following watch, and for operational control of aircraft within a designated area of activity. The AOCS should use satellite communication where possible and HF communication in other cases.
Air Traffic Control (ATC)

.29 Control of aircraft in the vicinity of airfields must be assured, such that risk of collision is negligible and aircraft can be recovered rapidly by day and night in all weather. This assurance depends on accurate and continuous knowledge of the position of all aircraft in the area and is provided by surveillance radar, while the control of traffic is assisted by various homing and fixing systems.

.30 Ground aids must be calibrated with airborne radar and radio equipment so that aircrew obtain the accuracy necessary for instrument approaches and landings. Ground Controlled Approach (GCA) radar, Instrument Landing Systems (ILS) and Microwave Landing Systems (MLS) are used in this regard. While GCA provides flexibility due to its deployability, it needs careful siting and calibration whenever moved. Maintenance of GCA is more manpower intensive than ILS and MLS. MLS is tactically deployable, requires only minor calibration, and offers precision guidance from any nominated point to the runway.

.31 Military ATC provides safe, orderly and efficient control of aircraft in the air and on the ground, in all weather conditions, and effective management of military controlled airspace. This involves providing assistance to all users in emergency and search and rescue situations.

Air Defence Ground Environment

.32 The basis of the RAAF ADGE is a control and reporting system. This system comprises a number of fixed and mobile ground radar stations supported by a communications network for their control and coordination. JORN provides broad-area surveillance and offers an important adjunct to the national defence network in maintaining the integrity of Australia's air and sea approaches. However, JORN's performance characteristics limit it to detection and localisation functions. Identification can be gained only by airborne systems. Airborne Early Warning and Control is discussed in Chapter 8.

.33 The control and reporting system is part of an integrated National Air Defence and Airspace Control System (NADACS) under the single authority of the National Air Defence Commander (NADC). The NADC has responsibility for the national Air Defence Operations Area (ADOA), which encompasses the airspace over continental Australia and to a distance 200
nautical miles beyond the coastline. This ADOA is sub-divided into broad areas which are further sub-divided into sectors. The Sector Air Defence Commander is responsible for ensuring that all users of sector airspace can safely and efficiently operate in that airspace. NADACS is discussed in Chapter 5.
Communications Security

.34 All forms of communications may be intercepted by an enemy. These systems must be protected by effective Communications Security (COMSEC) measures to prevent valuable information from being collected by enemy monitoring organisations. It is vital to the success of air operations that communications security is achieved. COMSEC measures include the correct use of security classifications, rigid adherence to security restrictions, protecting cryptographic systems and safeguarding the physical security of cryptographic facilities.

Satellite Communications

.35 The ADF places considerable emphasis on satellite communications systems for both strategic and tactical operations. The systems provide reliable, high capacity, secure voice communications and offer a high data transfer rate. They also allow data to be transferred from a forward operating base within an AO, without relying on vulnerable landlines. Satellite communications are more difficult to intercept because they use compact and directional transmission beam paths. That said, however, advances in fibre optics allow multiple redundancies and high data transfer in landlines.

INTELLIGENCE

.36 Intelligence may be defined as the product of collection, evaluation, analysis, integration and interpretation of all available information on foreign countries, their resources, capabilities and intentions. Accurate, complete, and timely intelligence forms the basis for sound planning and is essential to the conduct of air operations.

.37 Only through the role of intelligence can Australia be sure that it will not be surprised. This requires a commitment to training and preparation in peacetime, and during conflict, to monitoring enemy capabilities and intentions. Moreover, the speedy assessment of damage to enemy facilities and capabilities will be necessary. Australia's combat forces will be dependent on an effective and efficient intelligence capability to regain and maintain the initiative in combat. Intelligence and counter-
intelligence can be strategic, operational or tactical in nature. The steps involved in the intelligence cycle and the sources of intelligence provide a solid basis for understanding the intelligence function.
TYPES OF INTELLIGENCE

Strategic Intelligence

.38 Strategic intelligence is required for the formulation of policy and military plans at national and international levels. Australian air capabilities may be used to gather information on patterns emerging in the area of direct military interest. Long-term analysis of these patterns, in consultation with regional friends and allies, may reveal potential threats.

Operational Intelligence

.39 Operational intelligence is that knowledge of enemy strengths and dispositions, weather and geographical features, required by a commander, in the planning and conduct of operations. This implies keeping abreast of weapon systems capabilities. In peace, this is a very broad field. In time of conflict, the focus of attention would be narrowed to those capabilities of immediate or potential danger to Australia's interests. Operational intelligence also implies gaining a deep understanding of Australia's natural environment and the surrounding air-sea gap. The RAAF is responsible for the coordination of all air reconnaissance and air surveillance operations. A more detailed list of specific responsibilities is included in joint doctrine (ADFP 2, Chapter 19).

Tactical Intelligence

.40 Tactical intelligence is that knowledge required at the tactical level of war for the detailed planning and execution of missions and tasks. Tactical intelligence provides the information needed for the targeting process to begin in detail. Likewise, information on the effectiveness of air strikes is also required for additional planning purposes for Bomb Damage Assessment (BDA).

Counter-Intelligence

.41 Counter-intelligence is that aspect of intelligence devoted to destroying the effectiveness of hostile foreign intelligence activities. It involves the protection of individuals and information from espionage and subversion; and installations, equipment, records, and material from sabotage.
THE INTELLIGENCE CYCLE

.42 The intelligence cycle comprises those steps by which information is assembled, analysed and transmitted to users. There are four phases: direction, collection, processing, and dissemination, each of which is enhanced through the use of appropriate specialist intelligence staff.

Direction

.43 Direction involves the determination of intelligence requirements, preparation of a collection plan, issue of orders, and monitoring of collection agencies. Commanders at all levels continually need new information on forces and activities in their area of operations. Their requests for information or assessments may steer new studies or collection efforts. As systems become more capable, so too does the demand for information. Other factors, such as the law of armed conflict, will also have direct impact upon the type of intelligence that is to receive the highest priority.

Collection

.44 Collection involves the exploitation of sources of information by various agencies and the delivery of this information to an appropriate organisation for the processing of intelligence. Air power can contribute greatly to this effort. Intelligence gathering may be a specific role to which an entire mission is devoted. Often, it will be an adjunct to the primary mission, such as airlift or surveillance. The importance of a constant flow of information must be kept in mind by air and ground crews alike, all of whom can have an important part to play. Collection does not necessarily mean the clandestine gathering of secret information, since a vast amount of important information can be gathered from open sources in routine operations.

.45 Formal intelligence collection is very manpower intensive and requires computing support for storing and collating data. Intelligence analysts separate the normal from the abnormal. Moreover, air intelligence staffs forecast future developments in other air forces so that adequate and timely preparations may be made for operations. Also, the air intelligence staffs must keep abreast of future plans and special requirements of the RAAF.
Processing

.46 Processing is the conversion of information into intelligence through evaluation, analysis, integration, and interpretation. This is normally conducted by specialist staff. At the strategic level, RAAF intelligence staff are located in joint civil-military areas. Operational intelligence may be prepared in these agencies or at commands.

Dissemination

.47 Dissemination involves conveying intelligence to those who need to know. Clearly, timely intelligence is so important to the conduct of operations that the intelligence chain itself will be an attractive target for disruption and subversion. Attempts to destroy the means of dissemination may be made. Specific counter-intelligence measures combined with constant vigilance minimise this danger.

Roles of the Intelligence Staff

.48 The roles of the specialist air intelligence staff at either a strategic or operational level headquarters include:

a. collection, processing and dissemination of intelligence;

b. provision of intelligence support and allocation of priorities;

c. provision of target information; and

d. conduct of counter-intelligence and security programs.

Sources for Intelligence Collection

.49 There are three primary sources for intelligence collection; namely, Signals Intelligence, Human Intelligence, and Imagery Intelligence.
Signals Intelligence

.50 Signals Intelligence (SIGINT) is a passive, covert and reliable source of intelligence information. It relies on the target to activate sensors and communication transmitters. However, if the collection target becomes aware that his signals are being intercepted, he may inject disinformation to deceive the interceptor.

.51 SIGINT comprises Communications Intelligence (COMINT) and Electronic Intelligence (ELINT):

a. COMINT is intelligence information derived from the intercept of communications by other than the intended recipients; and

b. ELINT is intelligence information derived from electromagnetic radiations emanating from other than atomic detonation or radioactive sources.

Human Intelligence

.52 Human Intelligence (HUMINT) is intelligence gathered by the overt or covert use of people. Overt collection occurs when an organisation gives out information purposely for foreign intelligence purposes. Covert collection (or spying) occurs when the target organisation is unaware that intelligence is being collected.

Imagery Intelligence

.53 Imagery Intelligence is the use of remote sensing to acquire intelligence. The entire light spectrum can be used to collect imagery intelligence from the third dimension, including space. Sensing systems are usually classified according to the sensor's axis orientation (vertical or oblique), lens system (single or multiple), spectral range (infra-red, radar, visible), and scanning mode (single frame, continuous strip, panoramic etc).

SUMMARY

.54 Command is the most important attribute of successful military operations. In an Australian context, command of operational air assets is vested in an airman.
Command is exercised at three levels: strategic, operational and tactical.

.55 Control is that authority, less than full command, that a commander exercises over part of the activities of subordinate or other organisations. The RAAF command and control structure must reflect the six fundamental principles accepted in Australian Joint Military Operations Doctrine. Unity of command ensures that command is centralised at the highest appropriate level. On the other hand, delegation of authority ensures that a commander always has appropriate control and authority over forces assigned, and that he may delegate that authority where appropriate.

.56 The RAAF Command and Control system allows the Air Commander to develop operational strategies and plans, determine priorities, assign forces, allocate resources and control his assigned forces based on CDF's objectives and priorities.

.57 An effective communications system must include an ability for strategic, operational and tactical communications, with ATC and ADGE being essential parts of the system. In this, the Air Operations Communications System must be able to communicate with all military aircraft. Furthermore, COMSEC measures are needed to protect all communications. The use of fibre optic networks and satellite communications can provide high levels of data transfer and accuracy. Satellite communications have the added advantage of flexibility.

.58 Intelligence activities must be given priority to prevent an enemy from achieving surprise. Intelligence is applicable at the strategic, operational and tactical levels. Counter-intelligence is also important. The intelligence cycle must be responsive to the needs of combat and must allocate stringent priorities to needs, with the direction, collection, processing and dissemination phases benefiting from the presence of specialist intelligence staff.

.59 All members of the RAAF can contribute to intelligence collection, although there are quite specific formal sources of intelligence collection. Intelligence is vital to the conduct of operations and is an attractive target to a potential enemy. Vigilance will help prevent disruption or subversion.
Logistics for the RAAF centres around sustaining air operations in the air-sea gap to the north and north-west of Australia. Yet, the system must retain flexibility to react to other contingencies and must be characterised by a robustness and resilience that will see it endure in times of adversity or crisis. Logistic support for air operations is fundamentally dependent on the maintenance and supply requirements for weapon systems. In a country such as Australia with a large geographical expanse and, at times, adverse environmental conditions, the reduction of maintenance commitments with the aim of lessening the overall logistics burden is important.

While logistic support will vary depending on the nature and level of conflict, and in this respect, will mirror the level of air operations themselves, there are enduring considerations for logistics that could be expected to pertain in all circumstances. These include Preparedness, Organisation, Requirements Determination, Logistics Information Systems, Engineering and Maintenance, Stockholding, and Movement.
LOGISTICS

.1 Logistics forms an essential element of the art of war. A force is only as combat capable as the effectiveness of the logistics support it receives. The ability of the RAAF to meet endorsed preparedness objectives is largely dependent upon well-planned and executed logistics support. Preparedness encompasses readiness and sustainability, which together allow combat power to be generated and maintained. Readiness is the capability to undertake specific roles and tasks for a specified duration, within a specified timeframe, deployed if necessary. Sustainability encompasses the length of time over which that planned level of operations may be maintained.

.2 Set within enduring environmental conditions and extant defence policy, are peculiar features which characterise air operations and which help determine how logistics supports air operations in Australia. While the logistic support required will differ at the various levels of conflict, there are enduring philosophical considerations pertaining to logistics which can be identified.

UNIQUE FEATURES WHICH CHARACTERISE AIR OPERATIONS

.3 Logistic support for air operations is more complicated than that entailed for other types of operations due to the unique attributes of air power, which are discussed in Chapter 3 as flexibility, swiftness of application, ubiquity, range and shock. Principally, these attributes affect logistic support in terms of technological complexity of weapon systems, the need for timely replenishment to exploit the advantages of speed and surprise, and the necessary siting of bases.

Technology

.4 Technological developments have led to modern aircraft being more reliable, more maintainable and able to undertake a greater diversity of roles. Greater reliability ensures that fewer weapon systems, and generally, fewer repairable items and spares are required to generate the same level of air operations. As well, a simplified support infrastructure is possible. Maintainability improvements lead to decreases in turn-around times and reduction in
maintenance-induced errors. Improvements in system redundancy allow aircraft to continue operating with unserviceabilities or battle damage, and greater modularisation permits more rapid turnaround of aircraft with damaged or failed systems.

.5 Aircraft have become more complex over time which potentially results in more items in the logistics pipeline. However, as a counter-balance, improvements in equipment reliability and maintainability, leading to reductions in maintenance requirements, tend to reduce the level of logistic support required. These improvements flow from the application of technology and sophisticated design processes.

.6 Increased equipment complexity generally leads to more complex maintenance arrangements. Such maintenance requires sophisticated and costly fault-finding systems, test and calibration equipment and skills, all of which normally confine comprehensive maintenance support to centralised repair facilities. These facilities will normally be located in industrialised areas well away from the forward bases. Hence, there is an inherent lengthening of pipelines associated with greater complexity.

.7 Logistics activities associated with modern weapon systems require sophisticated methods of storing and transmitting technical data - electronic form is used increasingly. The use of technical data in electronic form has the potential for streamlining logistics processes which in turn should positively influence preparedness. The provision of technical data in electronic form has major implications for information systems, which need to have the capacity and the functionality to undertake a broad range of associated activities. Finally, the quality of technical data and the availability of information systems will have an effect on the quantity of physical resources (such as technical manuals) required to support aircraft operations and the quality of the logistic support provided.

.8 Australia needs to have a degree of self-sufficiency in its ability to utilise technology. There are two major issues involved. First, there is a need to establish technological solutions to Australia's air power needs and to maintain a technological edge. An example of this is the application of ionospheric transmission techniques in the case of the Jindalee radar network. Second, there is a need for the adaptation and rapid development of modifications for technical equipment. Thus, a specialist capability for Research, Development, Test and Evaluation (RDT&E) must be
maintained to enable the RAAF to innovate as necessary, and to meet the challenges of technology in the most effective way.

Timely Replenishment

.9 The aforementioned advantages of speed and surprise, associated with air power, rely on some Force Elements (FEs) being maintained for operations at short notice. This carries the concomitant requirement to maintain large and sometimes idle stockpiles of support resources and to effect timely replenishment in the event of contingency. The rate of replenishment can be tied directly to rates of effort and their variability. Increases in rates of effort can result in shorter supply lead times, higher resupply frequencies and throughput, and a requirement for increased resource levels. Timely replenishment directly influences aircraft availability; hence, replenishment activities should focus on optimising preparedness, while maintaining an appropriate balance of all logistics elements.

Siting of Bases

.10 Bases, comprising airfields, support services and facilities are central to the generation of air power. Thus, their siting impinges directly on the attributes of air power. A network of bases is necessary, sited to underpin the Government's priorities while affording redundancy, security and economy. Bases may be located in a forward Area of Operations (AO) or in the Main Support Area (MSA). Bases in the MSA still provide pivotal support for sustained operations from airfields in the AO.

.11 During periods of conflict, many air operations would be conducted from deployment airfields. This has implications for activities such as scheduled maintenance, major repairs (although battle damage repair practices could be adopted to effect some repairs), and supply of spares and other support equipment. Accordingly, there would be a requirement to maintain secure pipelines to each Force Element Group (FEG) home base, as well as to civilian and overseas sources. The vulnerability of deployment bases and Lines of Communication (LOC) demand a prudent mix of security and redundancy measures, which in turn place further demands on the logistics system. Thus, only those minimum facilities and other support resources required to assure mission success should be deployed forward.
LEVELS OF CONFLICT

.12 In lower levels of conflict, the logistic system would have to cope with a marked and sudden increase in demand for goods and services such as fuel, water, transport, accommodation and spares. Planning must include the aggregation of demands and the means to satisfy these needs so that shortages of goods and services can be avoided. The planning and coordination of logistic support demands close consultation between RAAF planners and HQADF, the Defence Department, Army, Navy, Government, other government departments and civil agencies and companies.

.13 Higher levels of conflict are likely to be preceded by a period of tension, which if recognised, should allow for appropriate logistic support to be prepared. Agreements to overcome restrictions on, or denial of, supply from overseas could be critical. In the event of a major conflict, Australian involvement in a coalition would be likely with logistic arrangements determined on the basis of strategic advantage and international factors. Common weapon systems would probably be supported by the major alliance partner, and non-standard equipment supported by each Service individually.

TRAINING AND EXERCISES

.14 During any level of conflict, discipline, leadership and personal versatility are just as important as technical training. Therefore, RAAF training and exercises must incorporate military skills training as well as realistic logistic considerations, and RAAF operations should be exercised within the limitations of realistic logistics capabilities. Therefore, logistics personnel should receive training under simulated combat conditions and logistics units and processes should be exercised under such conditions.

.15 The allocation of resources may limit the extent and realism of some exercises in peacetime. However, a balance between resource costs and the training benefit gained needs to be determined. Moreover, realistic and innovative techniques need not necessarily be resource-laden. Explicit in any capability to surge, sustain or expand must be an ability to realistically test and evaluate the logistics system as a whole. The use of combat modelling techniques, including wargaming and dynamic simulation, will often be a cost-effective solution to training needs.
.16 Short of actual war, only an objective appraisal of capability by RAAF specialist personnel in peacetime can begin to prepare the logistic system for the challenges of a real crisis. To achieve realistic training, every opportunity should be taken to exploit improvement and innovation, and to encourage a military emphasis through the comprehensive evaluation of war preparedness. This will provide commanders with an objective assessment of shortfalls so that the planning process can have added value.

LOGISTICS CONSIDERATIONS

.17 The principal issues underlying RAAF logistics can be grouped conveniently as follows:

a. Preparedness,
b. Organisation,
c. Logistics Information Systems,
d. Requirements Determination,
e. Engineering and Maintenance,
f. Stockholding, and

PREPAREDNESS

.18 A sound planning base is essential to ensure that RAAF logistics is capable of meeting operational preparedness requirements in the event of conflict, and of coping with surge requirements in ongoing peacetime operations, such as peacekeeping missions, Defence Force Aid to the Civil Power, or Defence Force Assistance to the Civil Community. Australia's traditional stable environment has led to RAAF logistics being developed around peacetime operations from main bases. In any defence contingency or civil emergency, the requirement to deploy and to continue providing effective logistic support to meet operational preparedness objectives would be far more demanding. To that end, logistic support should be available to meet endorsed contingency rates of effort.
.19 Because prescribed levels of readiness and sustainability have implications for logistics, some formal link is required between operational objectives and support requirements. That is, the RAAF needs a methodology for converting endorsed preparedness objectives into clearly-defined logistic support requirements. Furthermore, this methodology should not be unique to the RAAF but should be applied across the ADF, as there is a need for consistent reporting against the ADF's preparedness objectives.

.20 The use of logistic capability assessment techniques allows logistic staff to ascertain the implications on preparedness of a certain mix of logistic resources. Access to adequate support data for this purpose is fundamental to establishing the right mix of logistic resources to achieve preparedness objectives. Additionally, there is a need for information systems and decision support systems which allow the processing of support data for logistic capability assessment purposes.

.21 **Readiness.** Advanced warning of air operations, especially from deployed locations, will allow lines of communication, the transportation network, and the civil infrastructure to respond to the expected increase in demand. Since there will be a reaction time for this response, any deployed forces should be as self-sufficient as possible, supported principally by minimum deployment stocks and Fly-Away Kits (FAKs). A greater capacity for industry expansion and minimum lead times will reduce the requirement to deploy military logistic systems and services. One other issue is that contract procedures must be responsive to the variations in contingency needs. Finally, it is important to note that high levels of equipment reliability will favourably influence system readiness.

.22 **Sustainability.** RAAF combat force elements will normally deploy to forward bases to undertake their respective missions, extending the replenishment corridor. This may increase the replenishment delivery time unless the urgency of need is adjusted. Usage of fuel, spare parts, and ammunition in contingency operations, whether from deployment bases or not, is also likely to increase significantly compared with established peacetime usage patterns. Therefore, such increases should be factored into both readiness and sustainability objectives with particular attention to the following aspects:
1. Replenishment should aim to minimise the quantity of stocks positioned forward to lessen the risk of attrition and to afford more flexibility for rapid redeployment.

2. Repairable item lead times should be minimised.

3. Local civilian infrastructure should be used to the maximum practicable extent.

4. Secure staging areas and terminals for transportation must be provided.

.23 Industrial Preparedness. In order to maintain an acceptable level of self sufficiency, Australian industry must have the capacity to support a defence effort in time of conflict. For credible contingencies, the industrial capacity to manufacture, maintain, repair, modify and adapt defence equipment to satisfy ADF requirements will be of fundamental importance to the ADF's combat sustainability. From an industry standpoint, fulfilling RAAF readiness and sustainability requirements requires sound planning, coordination, and cooperation if the requested support is to be provided in a timely manner. Force structure, capabilities and investment in reserves need to be balanced against industry expansion capacity and lead time.

ORGANISATION

.24 To ensure that logistic support is comprehensive, effective and efficient, all logistics-related functions should be organisationally integrated and managed as one. A philosophy of integrated support that provides a disciplined and iterative approach to the management and conduct of activities is necessary to satisfy weapon system preparedness requirements at minimum life cycle cost. It should accomplish this by:

a. causing logistic support considerations to influence weapon system design requirements,

b. defining logistic support requirements that are optimally related to the design and optimising the logistic support required by the design consistent with preparedness objectives,

c. acquiring the required logistic support, and
d. providing the required logistic support during the in-service phase.

.25 The application of such a philosophy should continue throughout the life-cycle of the weapon system, from the identification of the need for a new equipment to its final disposal. The philosophy should be reflected in functional integration within the organisation, ideally locating logistics activities as close as possible to weapon system operating sites. Functional integration facilitates understanding between the various specialists in all logistics activities. It also promotes the integration and use of support data for the management of the total weapon system.

.26 Because RAAF logistics will operate within a joint framework, standardised or compatible systems need to be developed. Logistic management arrangements, in which one Service provides a particular aspect of support to satisfy a common requirement, will ensure efficient use of resources and minimal duplication between the Services. Logistic systems should be flexible enough to operate with those of prospective alliance partners to the maximum practicable extent. Plans and policies must be cohesive, and mutually agreed logistic support arrangements must be established as early as possible with the other Services and any allies.

LOGISTICS INFORMATION SYSTEMS

.27 Automated systems are essential to manage the large amounts of information that exist within the logistic systems. For effective and efficient information management, there is a need for a significant level of integration of data within logistic systems. In achieving such integration, responsive and standardised systems are essential.

.28 Logistics information systems can enhance the effectiveness of logistics through:

a. integrating logistics information at the one point for use by different functional specialists,

b. providing ready access to information for decision-making,

c. enabling more accurate and comprehensive planning for support requirements,
d. allowing flexible response to operational requirements in contingencies,

e. reducing manpower-intensive tasks, and

f. reducing the amount of paper used.

.29 National communication networks provide an ability for data transfer between information systems. However, there is a significant amount of data and information which must be subject to high levels of security (both from a physical and electromagnetic point of view) and, therefore, defence-unique networks are also necessary for both local and wider-area communications. The underlying principle should be to acquire systems that will enhance logistic support in meeting preparedness objectives.

REQUIREMENTS DETERMINATION

.30 The logistic support requirements for a weapon system need to be determined on the basis of operational objectives. In meeting those objectives, cognisance must be taken of any support constraints; for example, stockholding policy. This overall process is known as requirements determination.

.31 Requirements determination demands an understanding of the operational environment for weapon systems, including mission profiles and system operating cycles. Additionally, an understanding of the logistic support environment is necessary.

.32 Logistic support can be optimised through requirements determination. In particular, maintenance requirements, the size of repairable item and spares inventories, technical data, ground support equipment, packaging, handling, storage, transportation, manpower, training and facilities can be traded-off against each other depending on strategic considerations. For instance, higher levels of training for personnel at the operational level can often be traded for a reduction in deeper level maintenance capabilities. However, in this example, there are implications for issues such as the level of support equipment and facilities at the operational level.

.33 The requirements determination process needs to be undertaken continually throughout the life of the weapon system. Because operational environments change over the life cycle of the weapon system, changes to logistic support
requirements will occur. Hence, automated logistic capability assessment systems are needed to gauge the interaction between preparedness objectives and logistic support requirements.
ENGINEERING AND MAINTENANCE

Engineering

.34 Engineering is defined as the practical application of science to create a weapon or role-functional system that satisfies an operational or other need and the possible enhancement of that system throughout its service life. Further, engineering is an essential ingredient in the preservation of weapon systems.

.35 In general terms, the discipline of engineering is pertinent to the whole range of RAAF capabilities including domestic facilities, medical, plant and commercial vehicles, such that it contributes to all aspects of operations. However, the predominant form of engineering conducted in the RAAF is the determination of specifications and standards governing the design, development, construction, test, evaluation, repair and maintenance of aircraft and technical equipment in order that their airworthiness (in the case of aircraft), mission capability and technical integrity can be assured. Any equipment directly affecting RAAF operations is prescribed as technical equipment.

.36 In terms of the logistic support of weapon systems and other role-functional equipment, the most important engineering responsibility is to ensure the worthiness of those equipments for their intended operations. This results from the fact that the worthiness of technical equipment has a direct impact on the safety of personnel involved in its operation. However, the worthiness of the system is not confined to the issue of personnel safety. It also influences the ability of weapon systems to achieve mission success.

Maintenance

.37 The important aspect of maintenance is that once commitments have been ascertained, then other logistic support requirements can be determined. A means of establishing the failure modes applicable to a particular design (as well as the criticality of the failures identified), and a means of establishing the maintenance schedules applicable to a particular weapon system based on system reliability (including fatigue considerations), are required.

.38 Maintenance covers inspection, servicing, repair, overhaul, calibration, testing, rebuilding, reclamation, modification incorporation, and recovery and salvage of
technical equipment. The term is also used in a wider sense to cover planning, control, execution and coordination of maintenance activities which impinge on configuration management requirements and engineering standards.

.39 Levels of maintenance should be as few as possible to simplify the organisation, planning and execution of maintenance. This also has the effect of providing a high degree of responsiveness for operations. The RAAF has adopted a two-level maintenance system for major weapon systems. These levels are Operational Maintenance (OM) and Deeper Maintenance (DM). OM encompasses all activities whose primary focus is mission generation, whereas DM has a primary focus of asset preservation. DM may be deferred indefinitely during operations, with contingency maintenance schedules being employed.

.40 The object of contingency maintenance is to maximise the availability of aircraft during increased rates of effort. Under contingency maintenance conditions, normal aircraft servicing schedules may be suspended and the aircraft maintained according to a separately issued schedule which specifies different requirements for servicing content and intervals, and component replacement periods. When contingency maintenance is no longer needed, there will be a requirement for post-contingency recovery. The format for this recovery is dependent on maintenance policies for particular aircraft and the circumstances of the contingency maintenance period.

**Battle Damage Repair**

.41 To maximise availability of both aircraft and combat-related technical equipment (such as air defence radars, automated test equipment and ground support equipment) during operations, a crucial requirement in combat would be to restore battle-damaged aircraft and technical equipment to a mission-capable status as soon as possible. The RAAF's Battle Damage Repair (BDR) capability should include the following specific requirements:

a. all operating squadrons and supporting maintenance organisations should be capable of performing a degree of BDR appropriate to their role;

b. a centre of expertise should be maintained to conduct formal training courses, develop repair techniques and maintain publications;
c. technical data must be readily available to repair organisations so that battle damaged aircraft can be repaired expeditiously;

d. BDR manuals of both a generic and specific-to-type nature must be available for aircraft and combat-related equipment;

e. appropriate engineering authority should be delegated to unit level to allow BDR to be authorised expeditiously; and

f. spares, materiel and equipment should be assessed and procured on a contingency basis to support BDR.

STOCKHOLDING

.42 Aircraft availability can be highly sensitive to off-the-shelf availability of particular items, which may need to be held. In many instances, the items held would be ones for which suitable civilian equivalents do not exist and for which sources cannot be guaranteed. Suitable candidates for stockholding should result from formal analysis, preferably using automated tools.

.43 Stockholding can be a costly proposition and result in inefficient use and ineffective distribution of resources. Thus, priorities for stockholding need to be applied rigorously. Clearly, essential stocks for short-notice contingencies should be afforded priority over those for longer-term contingencies.

.44 In peacetime, military forces sometimes operate at higher than normal rates of effort, for a limited period, to meet a previously unspecified task or role. Routine stockholdings must be sufficient to meet the increased demand from any surge in operations.

.45 For deployments, stockholding may be achieved through prepositioning and caching, while minimum deployment stocks would provide certain levels of self-sufficiency. Care should be exercised to ensure that stockholdings in an AO are based around the speed and robustness of LOCs. In this, risk analysis will be vital to avoid over-insurance, yet ensure minimal likelihood of stock-outs. Stock levels must have regard to the usage profiles, usage rates, mission
criticality, storage capacity, replenishment time and the risk of replenishment delay.

.46 Prepositioning and Caching. The prepositioning and caching of equipment and stores well forward allows in situ logistic support activities to be conducted in a timely manner to support air operations and to activate bare bases. Furthermore, scarce transport resources can be conserved for operational force deployment requirements and more time can be afforded to initiate re-supply. Prepositioning and caching are expensive in terms of facilities and manpower and will consume resources which could be used elsewhere. Benefits would accrue if cached and prepositioned stocks could be used in day-to-day operations and be replenished regularly. That is, practices and procedures could be refined before combat operations begin. Additionally, some form of environmental control may be required to preserve the equipment and stores, and security would have to be afforded.

.47 Minimum Deployment Stocks. Minimum deployment stocks will be needed to ensure that each Force Element (FE) which deploys can be self-sufficient in its stock requirements. In particular, weapons, fuel, Liquid Oxygen (LOX), nitrogen and mission equipment such as external fuel tanks, pylons and weapons racks will need to be deployed with the FE. Additionally, appropriate levels of certain repairable items and consumables will need to be deployed.

MOVEMENT

.48 Due to the great distances that are involved in supporting operations throughout Australia, planning for effective and efficient logistic support is inseparable from movement planning. Specifically, logistics is dependent on three aspects of movement: mode of transport, mobility and lines of communication.

.49 Mode of Transport. Strategic transport is needed to move between home bases and an AO. Such movement will depend on priorities, taking into account the competing requirements of all elements of a joint force. In most cases, the northern airfields lie at the furthest point in the transportation network. Furthermore, the transportation network is limited through its finite capacity. Thus, all available modes of transportation, including the use of civil assets, must be considered when planning the transport resources needed to satisfy operational and support requirements. Moreover, planning should take into account redeployment for tactical
reasons during conflict and the recovery phase afterwards. In the event of protracted military operations, recovery may consist of a return phase for a proportion of the deployed force and a continued presence in the AO of the remainder.

.50 **Mobility.** The mobility of operational forces must not be encumbered by a logistic system which is incapable of rapid deployment. Therefore, certain elements of the logistics support infrastructure must be mobile. Specifically, command and control, maintenance (and elements of supply), air movements, telecommunications, and base and airfield services need to be structured for deployment.

.51 **Lines of Communication.** RAAF aircraft are likely to operate from remote airfields and during the initial stage would have to rely on their organic logistic support to continue operations. Should the contingency extend beyond the period encompassed by organic support, pipelines would have to be established along lines of communication to ensure that continued logistic support could be provided. Depending on the level of conflict, the pipeline might extend as far back as the parent unit, civilian infrastructure, or allied nations. Isolated, but important centres, have developed in northern Australia and are linked by well defined transport corridors. These established corridors and the centres of civilian development should be used to the maximum extent practicable.

**SUMMARY**

.52 The underlying philosophy which governs the ability of the RAAF to mount and sustain air operations using allocated resources has its genesis in the links between RAAF logistics and the unique characteristics of air power. From a synthesis of these characteristics, the peculiar requirements of the RAAF's logistic system, government policy, and enduring environmental conditions, specific doctrinal considerations may be derived for the most effective and enduring logistics support.

.53 The emphasis for these doctrinal considerations must be on simple, flexible, efficient and effective systems which are capable of supporting operational forces. To that end, the support must be comprehensive, must make effective use of available resources, and must avoid unnecessary duplication.
GROUND DEFENCE AND INFRASTRUCTURE

An Outline

Aircraft on the ground, airfields and associated installations constitute high value, high priority targets and consequently must be protected against air and ground attack. Therefore, a suitable ground defence system is needed to complement the passive measures of DCA discussed in Chapter 5. A ground defence capability affords protection from ground force threats and encompasses both active and passive defence measures, as well as physical security measures.

Inner zone and outer zone defence have different requirements and Army support and operating doctrine are essential contributors. Apart from specified elements of the ground defence force, such as Airfield Defence Guards and RAAF Police, all personnel have a responsibility for the security of Defence assets.

Airfields and installations are only part of the infrastructure which may need to be defended. Infrastructure involves civil as well as military assets, installations and facilities. National infrastructure elements are fundamental to the support of air operations; transportation, communications and specific elements of production and supply are the most relevant.
AIR BASES

.1 Static air bases are essential for the projection of air power, but because they are difficult to conceal and are open to surveillance, they become prime targets in any level of warfare. As an integral support system and springboard for the generation of air power, they must be protected against air and ground attack.

.2 Protection against air attack is afforded by air defence forces, with protection against ground attack being afforded by ground defence forces. Attacks from enemy ground forces, terrorist attacks, or acts of sabotage could cause damage and casualties out of proportion to the probable small size of the attacking force. Moreover, with aircraft operating from bare-base airfields, the problems of protecting them on the ground are exacerbated.

ELEMENTS OF GROUND DEFENCE

.3 Ground Defence encompasses active defence, passive defence and physical security measures. Active defence measures include those which deny the enemy the ability, from the ground, to attack the airfield, its associated installations and aircraft, and the employment of aggressive offensive action to deny a contested area to the enemy. The objective of active defence is to defend air operations through detection and destruction of the enemy, at a distance far enough away from a base, to prevent his utilisation of stand-off weapons and the completion of any ground reconnaissance mission.

.4 Passive defence encompasses those measures necessary to sustain air operations during, and subsequent to, an attack. Passive defence may be divided into pre- and post-attack components. During the pre-attack phase, measures would be undertaken to limit the effectiveness of any attack. Such measures would include the use of decoys, camouflage, bunker construction, revetments, construction of barriers and obstacles, and training of personnel. Post-attack measures would include damage control, runway recovery and Explosive Ordnance Disposal (EOD).
Physical security measures include those policing activities designed to safeguard the interests of personnel; to prevent unauthorised access to equipment, facilities material and documents; and to safeguard them against espionage, sabotage and theft.

Responsibilities

The RAAF is responsible for the protection and internal security of its own airfields and installations in both peace and war. In peacetime, routine control of access and general security may be conducted or augmented by civilian security agencies.

In any level of conflict, the RAAF will rely on assistance and reinforcement from the Australian Army. The Army is responsible, under ADFP2, for external security of air bases as part of its role in Vital Asset Protection (VAP). The external area is known as either the outer or patrol zone. The outer zone is the area beyond the inner zone, out to a distance which equates to the range of man-portable stand-off and indirect fire weapons, nominally five kilometres from each key point.

The RAAF is responsible for the provision of its own counter-penetration and counter-attack force within the inner zone. The inner zone encompasses the area from the key points to the range of small arms that are deployed for the defence of the key point. Under normal circumstances, the RAAF Airfield Defence Guard (ADG) element together with Base Combatant Personnel (BCP) would constitute the inner zone force, but they may be required to provide outer zone forces in the absence of Army support.

Since ground defence operations have their basis in Australian Army Infantry Doctrine, aspects of Army doctrine which are relevant to inner zone defence must be taken into account in training. Moreover, the RAAF Base Commander must have all ground defence forces, including Army personnel in the inner zone, under his operational control. The command chain extends upwards to the Land Commander for defence of the airfield. Importantly, only the Base Commander can re-task forces responsible for inner zone defence.

An airfield is the 'centre of gravity' of RAAF operations; thus, quick reaction to any threat is paramount. Immediate response should be provided through a Quick Reaction
Force (QRF), specialised in ground combat. Static defence, on the other hand, should be provided by non-specialist BCP under the control of a specialist RAAF Ground Defence Officer. BCP must receive regular active and passive ground training to enable them to respond rapidly and effectively.

**Security Measures**

.11 Security measures for RAAF assets must be directed towards deterrence, detection and reaction to threats. The priority given for protection depends on the importance and vulnerability of those assets. For example, power generation or fuel supplies may be critical nodes to be protected. The main security measures involve counter-intelligence, prevention and detection of crime, defence against attacks (either covert or overt), prevention of wilful destruction, damage or theft, and fire safety. Airfields are, by their nature, very large areas to defend and secure. Perimeter defence is therefore difficult and may be inadequate. Thus, identification and protection of vital points is the prime responsibility of all RAAF personnel, since the fundamental duty of all is to survive in order to fight.

.12 The tasks to be undertaken by a force assigned to defend a RAAF Base include:

a. aggressive patrolling for area reconnaissance and surveillance;

b. active defence against a range of possible attacks, such as conventional or terrorist attack;

c. counter-penetration, counter-attack, and control of entry;

d. detection of intruders and provision of physical security, post-attack recovery, rescue and fire safety services;

e. policing; and

f. counter-intelligence.

.13 The ground defence force comprises ADGs, RAAF Police, Firefighters and those Army elements concerned, all of whom would be under the operational control of the Base Commander. All other RAAF personnel also have a responsibility to defend the base and should be allocated appointments for activation
in war. This innovative use of available manpower supplements
ground defence personnel in protecting vital assets on bases
and assisting with first aid, security and control activities.
Such personnel should be clearly identified and given war
roles which are regularly practised and reviewed. The Base
Commander exercises command and control through a Ground
Defence Operations Centre (GDOC) which should be collocated
with the base Air Operations Centre.

**Equipment**

.14 The equipment required for the proper security and
defence of air bases will need to be carefully balanced
against the threats likely to emerge during operations. The
capability and readiness of a ground defence force may depend
on timely procurement of adequate and appropriate equipment,
as well as on its manpower.

.15 Equipment requirements, such as the provision of Night
Vision Goggles (NVG) and other essential war-fighting
capabilities, may mean the difference between success or
failure in times of crisis. Since the centre of gravity of
air operations will be the airfield and its associated
facilities, every effort must be made in peacetime to prepare
realistically for war and provide appropriate equipment.
Identifying the right equipment, and its timely procurement,
must be the concern of all those involved; but carrying out
frequent and realistic training, which is properly evaluated,
and which involves all personnel, must be afforded a high
priority.

**INFRASTRUCTURE**

.16 The combat power of the RAAF depends upon effective
integration with the civilian infrastructure. Separation of
forward operational areas from main support bases in the south
of Australia, together with major government initiatives to
tap into the civil infrastructure for essential support,
present a major challenge to infrastructure planning.
Increasingly, the prime source of support to operational
forces is the civilian infrastructure.

.17 The support available from the national infrastructure
depends on Australia's capabilities: namely, transportation,
communications and specific elements of production and supply.
The term 'production' encompasses engineering, works,
accommodation, services and amenities. The term 'supply' refers to provision of spare parts and major equipment, as well as provision of power, water, food, and fuel.

Transportation

.18 The national transportation system affords road and rail support, coastal shipping and air transport which can be used by the RAAF in generating and sustaining its air operations. High volumes of routine supplies such as water, ammunition, maintenance and replacement spare parts, petrol, aviation fuel, oil and food would be better carried overland or by sea. Air transport should be used to carry high priority, valuable and perishable goods, and personnel.

.19 Air transport is particularly relevant to the RAAF and cannot be examined in isolation from the contribution afforded by airfields and associated base facilities.

Airfields and Base Facilities

.20 An extensive infrastructure of bases, airfields, communications stations, training and other facilities is needed to support the RAAF and its air operations. A string of RAAF bases across the north has been established for this purpose. Although there are some heavy engineering repair and maintenance facilities in mining towns, such as Mt Newman, and some local communications facilities, most RAAF demands will be beyond civil capacity in remote areas. The aviation infrastructure must provide adequate aeronautical information services, control services, navigation aids, radar, communication and airfields.

.21 To improve old airstrips when required for operations in the north and north-west of Australia, the RAAF would need a minor airfield construction capability. The capability to maintain local infrastructure and engineering services in support of aircraft operations in an Area of Operations is detailed in ADFP 2(A).

.22 Information on a vast number of airfields is already available from various sources. The 'RAAF FLIP Enroute Supplement Australia' is a civil and military publication which is updated regularly and contains information on significant airfields. Air Command also maintains information on unsealed airfields capable of supporting C-130 operations and updates the information regularly. As the operational
capabilities of these airfields are subject to seasonal conditions, Airfield Survey Teams would need to be despatched to update information prior to any use.

.23 Bases, comprising airfields, support services and facilities are central to the generation of air power. Thus, their development must afford resilience, redundancy, security and economy. Resilience is that capability which allows an air base to recover from an attack or other disruption and continue operating. It encompasses redundancy of operating surfaces, including satellite airfields; an ability for rapid runway repair; an ability for Explosive Ordnance Disposal (EOD); sufficient back-up of critical stores such as fuel, spares and weapons; redundant maintenance facilities; robust, secure communications and command and control centres; and the ability to restore essential services such as water and electricity.

.24 The permanent infrastructure of an air base is tailored to the anticipated frequency and scale of air operations. Remote and infrequently used bases will have limited facilities, and any deployment to remote northern bases must address the shortfall between the facilities and services required, and those available. Additional facilities required for substantial maintenance and repair will have to be provided by other permanent bases. For economical reasons, some airfields and base facilities may lie dormant year-round, until required for a particular operational need.

Communications

.25 National communications are complex, pervasive and continually evolving in terms of physical infrastructure and organisational responsibility. National telecommunications networks and satellite communications must offer comprehensive support for military operations.

.26 Strategic Defence communications nodes in the north and north-west of Australia underpin the RAAF's capability. Communications support must be deployable to remote airfields, and robust tactical communications systems are essential. In this, the development of Electronic Support Measures is fundamental.

.27 The physical capability to maintain communications in any emergency must be a feature of the overall system. Thus it must be characterised by a series of networks, with transmission diversity and in-built redundancy. Just as important are the organisational arrangements that can be
activated in emergencies. Such arrangements must be comprehensive, cohesive, flexible and responsive to coordinating all elements of the communications infrastructure.

**Production and Supply**

.28 Infrastructure for production and supply is required to support RAAF and ADF operations, in both peace and conflict. Such capabilities encompass medical services, civil electrical and mechanical engineering facilities, food, water, civilian supplies and warehousing, and accommodation. These goods and services exist, to some extent, in the mining 'company' towns throughout northern Australia.

.29 Three additional areas of production and supply capability are Australia's industrial base, energy and manpower supplies.

.30 **Industrial Base.** Australia's industrial capacity should be capable of supporting a comprehensive defence effort. The degree to which Australia can mobilise, or even surge, depends largely on the effectiveness of the industrial base. Direct assistance for selected vital industries, in the form of contract support and planning, should be made. Such industries would include those manufacturing industries associated with machine tools, motor vehicles, aircraft, munitions, electronics, and shipbuilding. Other industries, upon which defence has only limited reliance in peacetime, but would be crucial in conflict, (such as the repair facilities of civil airline companies), should be the subject of special defence provisions and contractual obligations.

.31 **Energy.** Oil will remain a vital energy source for propulsion and mobility in the ADF for the foreseeable future. The supply of liquid fuels and refined products must be managed at the national level to cope with competing demands from the ADF and the civil sector in time of defence emergency. Moreover, Australia's oil and gas production facilities, on- and off-shore, must be protected. Security must also be guaranteed for Australia's major power-generating plants and electricity grids, hydro-electric dams and on-shore pipelines.

.32 **Manpower.** Manpower is an essential element of infrastructure, as its availability and reliability affects the operational capability of the ADF. The nation must be able to provide the necessary manpower support for its armed
forces, increased local production and allies. In time of
defence emergency, national manpower would be required to
protect vital assets, including: dams, pipelines, oil tanks
and refineries, electricity generators, communications
facilities, airfields, rail and road nodes, and information
centres.

**SUMMARY**

.33 RAAF bases must be provided with physical security and
active and passive ground defence. Physical security may
involve civilian police and security agencies, while active
ground defence may involve the Army. Forces charged with the
defence of air bases should be thoroughly familiar with those
air bases, and security measures must be directed towards
deterrence, detection, reaction to threats, concealment, and
post-attack recovery.

.34 Ground defence must concentrate on VAP and the perimeter
of the base. In time of conflict, Army forces are responsible
for off-base protection, while RAAF forces are responsible
for inner zone protection. Static defence will be carried out
by all available personnel, but a QRF must be available to
defend the inner zone. All available personnel should have
war roles that are allocated in peacetime and regularly
practised to ensure currency. As well as regular, realistic
training, ground defence forces need modern equipment.

.35 Because the ADF does not possess sufficient
infrastructure to meet all its requirements, it depends
heavily on the civil sector. In particular, the national
transportation network, which also includes ADF airfields and
facilities, the communications network, and certain elements
of production and supply, underpin the ADF's ability to
prosecute military operations.

.36 ADF and national infrastructure planning are inextricably
linked. The ADF must make the greatest use of civil
infrastructure possible, to minimise duplication and maximise
national economy of effort. This interrelationship is not
limited to the ability of civil infrastructure in meeting RAAF
and ADF requirements. For example, it also encompasses the
contribution that the RAAF's presence has on local
communities, especially in terms of advancing regional
development plans.
CHAPTER 12

PERSONNEL AND TRAINING

An Outline

For the RAAF to function effectively and efficiently in both peacetime and in conflict, its personnel management practices must be attuned to the particular requirements of the time. It is prudent for peacetime activities, as far as possible, to reflect those that would occur in time of conflict.

In a similar vein, it is only through adequate training and education that all members of the RAAF will be provided with the necessary knowledge, skills and attitudes to enable them to contribute effectively to the RAAF's performance as an integrated operational force in time of conflict. The training and education of RAAF personnel provide another dimension to maintaining a qualitative edge.
PERSONNEL AND TRAINING

.1 The organisation of the RAAF should be directly related to the successful performance of the RAAF's function to conduct air campaigns in the defence of Australia. The 'friction' of war is likely to magnify the effects of any organisational, personnel or training weaknesses when the RAAF is operating under stress or when fighting in adverse circumstances.

.2 In times of conflict, tasks such as the regular delivery of mail, prompt evacuation of casualties and their immediate replacement with trained people, provision of recreational facilities and amenities which assist in the well-being of personnel and their fighting fitness, represent signs of good management. Similar signs of good personnel administration in peacetime will have a positive influence on morale, because here the human focus is more on conditions of service. Above all, in both peace and war, a sense of fulfilment and recognition of a service member's worth are significant aspects.

PERSONNEL

.3 Trained personnel are required for the acquisition and operation of new equipment and facilities, and for the maintenance of essential combat skills. The RAAF recruits, trains and educates personnel within a fast-changing environment. Specifically, family lifestyle patterns, social attitudes, values, educational perspectives and technologies continually change. Moreover, in crisis situations, personnel of every speciality represent a manpower resource which can be employed in different ways. Reliable, quality people represent an investment in the future capability of the RAAF.

.4 The peacetime employment of RAAF personnel should include a definition of combat requirements and postings should reflect this need. In war, the employment of support personnel in other than their speciality warrants special consideration. The 'Green Exposure' exercises carried out by Operational Support Group are an example. The history of war shows that support personnel have been called upon frequently to defend their immediate base areas from armed attack, often at night.
The RAAF will determine the employment, rank structure, specific skills training and broader air power education it requires as it strives for internal integration, cohesion and good morale within its personnel. Personnel evaluation systems, training courses, postings selection, administration of personnel records, salary recommendations, retirement and death benefits, housing and family support must be such that they contribute positively to morale and the well-being of RAAF personnel.

The composition of the RAAF's personnel force will change in terms of demography, culture, ethnic background and education. Furthermore, expectations of RAAF personnel will differ from those in the past; job challenge and intellectual interests are likely to receive more emphasis. Service and government legislation requirements will always remain paramount, but the career aspirations of individuals should be given full consideration. Emphasising the wartime role in peacetime will enhance personal challenge and interest, especially if wartime roles are allocated and regularly practised.

Australian society has a right to expect a return for its investment in defence personnel. The RAAF, as part of the ADF, is held accountable, not only for its financial expenditures, but for its policies and practices. The RAAF competes for limited financial and manpower resources against the social and economic needs of the nation as a whole; hence, its personnel must be attuned to maximising benefits and minimising risks, while maintaining operational effectiveness. In this respect, wide use should be made of RAAF Active Reserve personnel and Total Quality Management (TQM) practices.

Medical Support

The medical support structure must be tailored to meet the needs of deployed units, based on the number of personnel in the theatre and the estimates of casualties for various combat operations. Medical units from all Services will be deployed, and additional requirements for extensive health services for all military members and their dependants may be made. A plan to handle casualties evacuated from a theatre to safer areas will involve other government departments, such as Veteran's Affairs and civil authorities, under emergency provisions. National disaster plans may be initiated to augment ADF capacity.
The medical support structure aims to minimise the effects of disease, injuries and wounds on unit readiness, effectiveness and morale. Medical care must be planned, arranged and delivered through the optimum use and integration of all health service support capabilities, including the national health-care system. Evacuation from the Area of Operations (AO) will be carried out when necessary. The system's effectiveness is measured by its ability to return patients to duty quickly and as far forward in-theatre as possible, while minimising morbidity and mortality. The level of care must minimise requirements for replacement personnel, patient evacuation and logistic support. Provision of health services by the ADF, including aeromedical evacuation, is addressed in ADFP 53.

Progression of patients through the health care system will be dictated by the nature of the disability. Movement of patients must be done within hours, using whatever means are quickest. Levels of care at different locations may be required to cope with large numbers. More comprehensive care is provided as movement back from the AO is undertaken. A flexible Aeromedical Evacuation system must be in place to evacuate litter and ambulatory patients. Specialist services which may have to be deployed are: surgical, X-ray and laboratory including blood storage, medical and dental outpatients services, and additional hospital beds. If a Nuclear, Chemical or Biological (NBC) threat is likely, then appropriate specialist measures will be necessary.

The supply of drugs and medical equipment is handled by the specialist pharmaceutical staffs. Because of the short shelf-life of certain drugs and their specialist application, options for ensuring their availability must be carefully managed, while minimising recurring costs of maintaining them in inventory. The automation of systems support and the reporting of casualties must be used extensively.

Clear command relationships must be established and medical support concepts of operation prepared in advance of hostilities, to meet the operational needs of the RAAF and comply with ADF doctrine. Essential training in the handling of crises, under realistic conditions, with evaluation of performance, is an essential part of medical preparedness.
.13 Training (of the individual or group to perform a particular military task effectively) is separate from that of education (of the military professional). Generally, while training focuses on the acquisition of skills, education emphasises the understanding of, and appreciation for, the importance of air power to the defence of Australia.

.14 In essence, the aim of RAAF training and education is to provide every member of the RAAF with the necessary knowledge, skills and attitudes to allow a more effective contribution to the RAAF's performance, in both peace and war. Accordingly, RAAF training and education must have its primary responsibility aligned with the operational effectiveness of the RAAF. In so doing, it must foster a sense of commitment in its personnel as they aspire to the high standards of performance expected of them.

.15 Training must be realistic and education must be tailored to the contemporary needs of the RAAF. To this end, adventurous training has an important utility in melding leadership skills, morale, teamwork and communication in peacetime, in preparation for wartime challenges. Training and education must be fully integrated across the spectrum of courses, to graduate personnel at various levels in the RAAF who have:

a. a sound knowledge and understanding of air power and its importance to the defence of Australia;

b. an appreciation of the many different environments influencing the development and employment of air power in Australia's areas of primary strategic and direct military interest;

c. an appreciation for the doctrinal process involved;

d. an appreciation for, and an understanding of, the role that theory and doctrine play in combat operations;

e. an understanding of the operations of the RAAF; and

f. the skills which will enable them to apply effectively their acquired knowledge in future appointments.

The Profession of Arms
.16 Many professions are able to rely on theoretical learning and practical application as the method of applying their skills and knowledge. While certain components of military training and education may be studied and applied, there are other critical elements, such as leadership experience and decision-making practice, which must be developed in other ways in preparation for the challenge of combat.

.17 The profession of arms is one of increasing complexity, and the effects of defence policies, including budget allocations, recruiting practices and equipment purchases, are likely to be felt at most levels of a technologically advanced society such as Australia's. The ADF is involved in many fundamental issues involving social, political, economic and environmental matters of all kinds, and these influence policy. Therefore, ADF standards of performance, commitment, and intellectual and analytical capability must keep pace with its increased responsibilities.

.18 Paradoxically, a military person is a member of the profession of arms, which sets that person apart from civilian colleagues. This paradox poses great difficulties in the design of educational and training programs which are appropriate to the tasks that must be performed. A consequence for the RAAF is that its training and education system must promote the collective knowledge and attitudinal aspects, as well as the individual skills needed. The RAAF must train in skills required for war, but must comply fully with government peacetime policy directives. Civilian organisations do not have this dual emphasis.

.19 Air power doctrine provides direction to RAAF training and education. It is the authoritative statement that guides the coordinated effort to prepare forces in the diverse areas that contribute to the RAAF's mission. Doctrine must be understood, valid and translated into action. RAAF doctrine creates commitment to an ideal. This commitment will, in turn, provide the foundation for a cohesive, dedicated, disciplined and well-trained force. RAAF training and education must emphasise an operational commitment; such commitment will only be forthcoming if trainees are aware of the extent to which their individual knowledge and skills contribute to the effective application of air power.

**Realistic Training**

.20 Training should build the required war skills and simulate the combat environment as much as possible. This
means that operational realities should be imposed; for example, degraded command and control, ineffective communications, inadequate logistics support, adverse environmental conditions, and enemy and self-induced 'friction'. Such realistic training promotes leadership initiative which in turn enhances the value of air power by preparing people for combat. This training should be carried out not only in national or major exercises, but as a regular aspect of normal operations. At the same time, realistic evaluation of performance should be inherent in all training.

.21 Through realistic training, the following important functions will receive due attention:

a. providing sufficient, appropriately trained and prepared personnel for the duration of operations;

b. maintaining a deployable capability of trained, shadow-posted personnel who have war roles; and

c. providing sufficient personnel trained to handle essential security and ground defence tasks.

Physical Fitness in the RAAF

.22 The RAAF requires its personnel to achieve and maintain a high standard of physical fitness - irrespective of age, rank, category or mustering - to facilitate the discharge of the RAAF's role in the defence of Australia. The primary responsibility for maintaining the required level of physical fitness belongs to the individual; the RAAF is responsible for assisting each member to reach and maintain the prescribed standards.

.23 The level of physical fitness required of RAAF personnel to perform their military duties will vary. Individuals deployed operationally may be required to perform physical duties in excess of that normally required in peacetime. While the method of testing physical fitness is identical for all RAAF members, the standard to be achieved and maintained by each member varies with age, gender and the activity level required to perform allocated duties.

SUMMARY
The effect of coupling the right people with the right training is one of synergy. The right people will require appropriate organisational and management practices that will elicit the best responses and commitment. Personal challenge and interest must be provided within a framework of high morale and fair conditions of service. Fundamental to morale, especially in times of conflict, will be the quality of medical support.

While training is essential to improve basic skills, so too is education to develop an appreciation of the military ethos. The training and education system must provide the requisite knowledge, skills and attitudes to meet the challenges of combat. In peacetime, adventurous training helps meld leadership and teamwork with existing skills and morale.

The profession of arms is complex and unique, requiring a depth of understanding across a broad spectrum of issues. Therefore, military standards will always be high, especially in terms of the intellectual and analytical capabilities of its people. An understanding of RAAF doctrine underpins these capabilities; hence, it forms an essential cornerstone of the RAAF training and education syllabus.

Training must be realistic if it is to be effective, and it must form part of normal operations. Accompanying the need for realistic training is the need for realistic evaluation of performance. Additionally, the rigours of RAAF training and operations require high levels of physical fitness.
Air power doctrine does not exist in isolation and while doctrine itself was addressed in Chapter 2, there are other contextual aspects which need to be examined. For example, air power roles are often conducted in conjunction with surface force operations. Similarly, doctrine does not materialise from thin air, but is a product of a clearly-defined process.

Accordingly, this Part sets the doctrine in context in both an operational and organisational sense. First, by examining the concept of cooperation, in particular its impact on air operations, the overall operational context is established. Second, doctrine is set within an organisational context, through an examination of the RAAF’s doctrine process and its constituent elements.
An Outline

Within the ADF, the concept of cooperation forms part of the foundation of joint warfare. The different roles that the RAAF may need to conduct in the defence of Australia were discussed in Part 2. Several of those roles must be coordinated with surface forces to derive the best effect. Thus, the likely combination of roles that the RAAF would conduct in cooperating with naval and land forces needs to be pursued in more detail.

The traditional environments in which cooperation is rendered provide a convenient way of collectively describing the principle of cooperation in the defence of Australia. That is, cooperation can be viewed in terms of the air, sea and land environments. Since this is an Air Power Manual, the focus is on how the surface forces can assist in the air environment and how air power can contribute in the sea and land environments.
COOPERATION

.1 Cooperation is the long practised and well recognised art of aligning disparate forces in the pursuit of a common objective. The forces may have a common background such as different units of the same army or, as is more often the modern case, they may be dissimilar forces from different Services and environments. The idea of cooperation is so pervasive that it is acknowledged as a principle of war – one recognised by the ADF. Thus for Australia, cooperation means all three Services working together in a complementary way to achieve the overall objective of the ADF. But it is more than that. Cooperation in the ADF exploits the synergy gained when the positive attributes of individual force elements coalesce in a coordinated operation, compensating for their individual limitations and maximising their combined effectiveness. Cooperation is the essence of joint warfare. It assumes singular importance in the ADF because it produces the maximum effect from limited assets.

.2 In the past, cooperation has been considered predominantly from the perspectives of the two surface environments of the land and the sea. Traditionally, one of the surface forces has been perceived as the major force with the other forces being cast in supporting roles. For example, amphibious operations have been perceived as land force operations supported by naval forces. Similarly, air forces have been seen generally as supporting forces for either naval or land forces in the air-sea or air-land battles.

.3 These perceptions were reinforced when certain RAAF squadrons were dedicated entirely to a supporting role for surface forces. Before the outbreak of World War II, for instance, No 5 Squadron was established to provide direct support to the army and was designated No 5 (Army Cooperation) Squadron. Likewise, in 1939, No 9 Squadron was designated No 9 (Fleet Support) Squadron. However, despite the important cooperative role played by air forces in the land and sea environments in the past, cooperation in the air environment has not received the same emphasis. While there are historical examples of the surface forces cooperating with air forces in the air battle, they are few and remain largely unrecognised and unreported. These traditional views now need revision in the light of the increasing influence and capabilities of air power in all environments. If the ADF is to operate to its full effect, a complete three-dimensional view of cooperation must be taken.
.4 In the ADF context, support for another force does not imply a subsidiary role - that misses the essence of cooperation. It is a complementary use of specialist capabilities in which sea, land or air forces have the leading role depending on circumstances. For example, support by naval and land forces might be their primary effort in cooperation with the air force when it has the predominant role. This situation could quickly change to a predominant naval role with air and land forces in support or to a land role with air and naval forces in support. Hence, the essence of a successful defence of Australia is flexible cooperation within a three-dimensional environment.

AIR ENVIRONMENT

.5 Support for the air battle by surface forces does not have a long history. There is little evidence of it in World War II; although two notable examples include the actions of the Long Range Desert Group against Axis airfields in North Africa and the Bruneval commando raid to capture a German radar. Since then, surface support has developed in a number of ways. Perhaps the acme of land support for the air battle was the Israeli army effort in countering the Egyptian air defence capability at the start of the Yom Kippur War. Ground action enabled the Israeli Air Force to regain control of the air. There have been other, but more isolated examples since. The use of Special Forces to identify and designate targets for strike or OCA tasks has particular utility. Similarly, naval assets have been used to enhance aircraft capabilities in avoiding defences and acquiring targets with precision.

ADF Responsibility

.6 The responsibility of the ADF is to defend Australia and its interests in accordance with the defence policy and the directions of the Australian government. In particular, this policy emphasises the strategic importance of Northern Australia and the surrounding approaches to the continent. Therefore, steps have been taken to develop the defence infrastructure in the north, to relocate forces to the area, and to focus exercises on controlling the air-sea gap.

.7 To execute its responsibilities proficiently, the ADF has two broad roles. One, which predominates, is defensive in its thrust and is designed to repel hostile acts
against Australia or its interests. The other is offensive and, essentially, provides the ability to exert control over the escalation of hostilities by taking the initiative.

.8 Air power provides the ADF with the ability to react - either defensively or offensively - with speed and flexibility while presenting the opportunity for strategic reach. The ADF's surface forces have complementary attributes which add depth and flexibility to its armoury, permitting the application of combat power in three dimensions. Indeed, in view of the geostrategic realities of Australia and its interests, the ADF's response to hostile acts would almost certainly include land and sea forces. For example, a resolute aggressor could seek to undermine the strength of ADF air power by a bold air attack on the northern bases. Alternatively, the aggressor could infiltrate a number of small groups by sea and then over land to attack the northern bases. In both cases, sea and land force cooperation with air power would be required to counter the threat and allow the ADF to control further developments.

**Command and Control**

.9 When RAN and Australian Army elements are used to support a primary air effort, the joint responsibility for command and control must be appropriately structured, acknowledging the significance of the primary effort. While this requires coordination in planning and cooperation between respective staffs, the necessary command and control must be exercised through the appropriate joint headquarters. This may mean transfer of operational control of some surface assets to the Air Commander Australia (ACAUST).

.10 Accordingly, degrees of operational authority over the surface support assets may be exercised at the lowest practical level (such as SADC). The practical advantage of this arrangement is the rapid and most direct response by surface elements to a volatile air situation. These arrangements would apply equally in the maritime and land environments, depending on the nature of the primary effort.

**Maritime Support for RAAF**

.11 Surface elements of the RAN can support the air effort in three broad areas of activity, namely offensive, defensive and counter-force. The sub-surface element can also support the
air effort but not to the same degree as surface ships. Specifically, the support functions within these areas are:

a. Offensive Support:
   (1) strike coordination and targeting assistance,
   (2) positive radar control for interception, and
   (3) air defence.

b. Defensive Support:
   (1) early warning, and
   (2) defence of coastal airfields.

c. Search and Rescue (SAR).

d. Counter-Force Support.

.12 Offensive Support. RAN surface elements can actively assist in offensive operations through their ability to keep station in the air-sea gap in nearly all conditions. By providing assistance, in the form of strike and target coordination, the RAN can enhance the precision of air assets in striking high value targets. Similarly, major surface combatants can provide air defence for strike aircraft. It is axiomatic that only naval combatant elements of the ADF can provide such support to the RAAF in the air-sea gap.

.13 Defensive Support. The ability to maintain station for extended periods can be used to good effect in the defensive counter-air role. With their radar fit, RAN combatants can provide early warning of airborne raids - assuming they have been placed on likely lines of enemy approach. This support can be extended through a capability to control DCA missions and a capacity to counter air threats through surface-to-air weapons. As an example, a naval ship could be used for air defence of coastal airfields.

.14 Search and Rescue. The value of combat SAR cannot be overstated; however, the RAAF lacks any specialised capability for combat SAR in the air-sea gap. The implication that SAR may have to be conducted under threat of attack reduces the options of using civilian resources. Surface and sub-surface naval assets may provide the only viable capability. Because
a limiting factor of air power in Australia may be trained crews, the recovery of downed airmen at sea may be a high-priority responsibility for naval assets.

.15 **Counter-Force Support.** The overt use of surface assets as radar and air defence pickets on likely lines of approach to airfields or vital areas in the north, could be sufficient to deter an air threat posed by aircraft operating at the limit of their unrefuelled radius of action. There is an obvious risk in using naval assets in this way. Firstly, the asset is vulnerable and may become a substitute for other high value targets. Secondly, the use of such a valuable asset restricts its flexibility for other naval tasks. However, the counter-force value of one such asset may represent a significant deterrent. For the ADF, with limited resources, this form of support may be the most appropriate use of assets in certain circumstances.

**Land Support for RAAF**

.16 Land forces can provide considerable support for offensive air operations. Normally, the main contribution of land forces to the air effort is in defensive activities, to ensure the security and integrity of air bases. Specifically, the support functions of the land force are:

a. Low Level Air Defence (LLAD),
b. ground defence of airfields, and
c. indirect support (encompassing logistic support and SAR).

.17 **Low Level Air Defence.** Point defence by land forces using SAMs can augment the RAAF capability for defensive counter air. However, such cooperation requires close control by one central commander. For the ADF, with limited SAM assets and responsibility for control of the air vested in the RAAF, this control is best exercised by a RAAF commander. The isolated use of SAMs for mobile defence of ground forces is outside the scope of this manual. Where SAMs are used for Vital Asset Protection (VAP), of ports or airfields for example, there is likely to be a concurrent RAAF commitment, reinforcing the need for centralised control to ensure the safety of friendly aircraft as well as the effective engagement of enemy aircraft.
.18 **Ground Defence.** Ground defence of airfields is one of the more difficult tasks for any defence force. The nature of an airfield and the large area make static defence difficult. While passive defence can be used to some extent to minimise the risk of damage, ultimately, active defence is the only way to ensure the integrity of an airfield. Active defence can be achieved through large numbers of static forces or fewer highly mobile, quick reaction forces. In each case, there is a special need for a large land force capability, either in numbers or in technical assets. As the ADF will always have the disadvantage of small numbers of forces, the highly mobile force may be the only answer for the defence of airfields. This does attract a penalty of suitable force structure and equipment. For example, heliborne forces could react in sufficient time to ground threats to airfields, provided there is some form of technical detection capability. Motorised ground forces may not be able to move quickly enough over the large areas surrounding airfields to prevent incursions into the inner perimeter of the airfield. Further, ground forces would also be required beyond the outer perimeter to protect civilian infrastructure that is integral to the base operations and the civilian community. The number of land forces required therefore becomes significant, bringing with it the usual force maintenance requirements that must be allowed for – otherwise the support forces may impose a penalty on local resources inversely proportional to their contribution.

.19 **Indirect Support.** The permanent relocation of land forces to the north provides the opportunity for the ADF to establish a logistic infrastructure to function effectively during times of tension. The first priority of land forces would be counter offensive; however, the defence of vital assets and ADF offensive assets may assume a higher priority. In these circumstances, land forces may have to allocate more support to the air effort during the early stages of tension. The concept requires close coordination to ensure that the supportive nature of the land force contribution is unambiguously defined. Indirect support also covers the provision of a SAR capability over land.

**MARITIME ENVIRONMENT**

.20 Air power extends the surface capability of sea power beyond its traditional horizon. That is, cooperation in the maritime environment provides a capability to 'see' further, to strike further out, and to defend earlier. Maritime
cooperation has developed to such an extent that specialised aircraft have evolved for particular roles. However, with the flexibility peculiar to air power, these assets have developed still further to exploit other capabilities. A prime example in the Australian maritime environment is the Maritime Patrol Aircraft (MPA) which, in the past, emphasised a specialist Anti-Submarine Warfare (ASW) role but now devotes increasing attention to Anti-Surface Warfare (ASuW), reconnaissance and surveillance.

**ADF Cooperation Objectives**

.21 Up to the outbreak of World War II, sea power had been exercised almost exclusively by navies, although during World War I, there was some use of aircraft in operations at sea that indicated the trend for future developments. In World War II however, air forces became a major factor in the exercise of sea power. Approximately 50 percent of German submarines sunk by known allied action at sea were accounted for by shore-based aircraft. Also, in the great sea battles of Midway and the Coral Sea, aircraft destroyed 29 of the major units and shared in the destruction of another 10 of the 71 elements of the Japanese Fleet.

.22 For Australia, the objective in the maritime environment is no different from that of past wars: it is to control the sea lines of communication so that Australia can use them for its own purposes while denying them to the enemy. The security of coastal waters and the control of sea lines of communication, both for trade and defence, is the primary function of the RAN and is an important cooperation task for the RAAF. Maritime warfare therefore is the joint responsibility of the RAN and the RAAF.

.23 The explicit responsibility of the RAAF is to provide capabilities in three broad functions: as a ready-mobile force to undertake reconnaissance and maritime surveillance; for offensive operations such as maritime strike, attacks against submarines, and aerial mine-laying; and for defensive support of naval and amphibious forces. In order to meet the objectives of these broad functions, the RAAF must exercise a capability in the following roles:

a. Offensive and Defensive Counter Air (Chapter 5),

b. Maritime Strike and Interdiction (Chapter 6),
c. Anti-Submarine Warfare and Anti-Surface Warfare (Chapter 7), and
d. Reconnaissance, Surveillance and Electronic Combat (Chapter 8).

Some of these roles can be employed both directly and indirectly in support of the surface force. For example, several roles such as Reconnaissance, ASW and Electronic Combat, together with DCA, provide close (direct) support to fleet assets. Other combinations, such as OCA and maritime strike, may be used to provide distant (indirect) support.

The roles are described in detail in the respective chapters indicated above and will not be discussed any further. However, maritime aspects of surveillance and reconnaissance and the tasks of aerial mine laying, intelligence collection and SAR require further consideration. These will be examined against a background of ADF responsibility and command and control arrangements. Most of the cooperation in the maritime environment requires a joint organisation which can provide coherent command and control. This will allow the combat power of the RAAF to be fully exploited in cooperation with the RAN.

**ADF Responsibility**

Australia, separated from its allies by vast sea areas and subject to the geostrategic issues discussed in Chapter 1, has responsibility for the surveillance of, and operations within, its area of direct military interest. Defence policy places added importance on the protection of coastal shipping routes, focal points and harbour entrances. As the need for surveillance and operations extends further from its shores, Australia must be prepared to operate in conjunction with allied maritime forces.

Within this framework of cooperation, the ADF has a responsibility to observe three important principles:

a. There should be common systems within the ADF and between allies for operations and intelligence procedures, communications and codes.

b. There must be a clear understanding on common operations policy, and an effective system of day-to-day liaison at all levels of war.
c. The RAAF's maritime air element must be administratively flexible so that its squadrons can be re-deployed quickly, either independently or with those of any allied nation, and can be supported logistically from other than home airfields.

Command and Control

.27 While the RAN is responsible for the defence of sea lines of communication, the RAN and RAAF are jointly responsible for the development of procedures for the conduct of joint maritime operations. In this respect, the RAAF is responsible for providing specialised, land-based aircraft, trained crews, and the logistic support for maritime air operations. As maritime operations are primarily the concern of the RAN, the appropriate naval commander is usually the senior partner in the planning of joint maritime operations. However, successful conduct of joint maritime operations can be assured only by the closest coordination of the appropriate air and naval staffs at all levels. Operational coordination is achieved through Maritime Headquarters Australia.

.28 Vesting responsibility for operational coordination in the Maritime Commander Australia does not alter the requirement for the Air Commander Australia to have overall command of RAAF maritime air assets. It remains the responsibility of the Air Commander Australia to allocate air assets in accordance with the directives and priorities of CDF. On certain occasions, these priorities may dictate that control of some RAAF assets be retained by the Air Commander for an air campaign which has been afforded higher priority than the maritime one. However, in most situations, where Australian forces are involved in maritime warfare, operational control of appropriate RAAF assets would be assigned to the Maritime Commander.

Attrition

.29 RAAF MPA can operate successfully only in a benign environment. Both aircraft and crews are difficult to replace; and while aircraft may be obtainable in the short-term, although at significant cost, crews cannot be so easily replaced. Operational crews therefore are the critical factor in attrition of maritime patrol aircraft. In conflict, RAAF maritime patrol aircraft should not be used if the air environment is hostile, unless they are supported by fighter
Combat Air Patrol (CAP) aircraft or SAM cover from destroyers or frigates.

**Maritime Surveillance**

.30 Australian defence policy demands a manifest capability to conduct maritime surveillance of the nation's considerable air and sea approaches. Apart from obvious defence implications, such a policy demonstrates the national will of Australia to control its own maritime areas. Farther afield, RAAF maritime surveillance must also act in support of Australia's commitment to its region and to the Western Alliance.

.31 The capability of RAAF MPA affords them priority as 'first order' surveillance platforms; that is, they can gather intelligence, classify it, and use it for follow-on targeting purposes. These aircraft offer a high degree of flexibility through their long range, relatively high transit speeds and ease of re-tasking.

.32 MPA offer an important contribution to the maritime 'surface picture'. The problem of maintaining a continuous plot of enemy surface activities is considerable, and the contribution by RAAF airborne sensors may be of little advantage if the data is not coordinated and disseminated appropriately. The end result of surveillance activity is to target a weapon system against the enemy. Thus, concise and sensible command and control arrangements for joint operations must be in place.

.33 It is essential that a single joint commander coordinates all ADF surveillance platforms, collates and substantiates their reports, and distributes positional data to interested parties. It is also important that all surveillance information be coordinated with other national agencies such as the Australian Customs Service. In the ADF, the Air Commander has the responsibility for early warning information in the Control of the Air and Air Strike campaigns. Because of the rapid response times needed to wage these campaigns, Air Headquarters will also need immediate access to other forms of national surveillance, including maritime and space-based surveillance. Responsibility for the coordination of maritime surveillance air activities rests with the Air Commander Australia (on behalf of the Maritime Commander Australia who has overall responsibility for maritime operations).
Maritime surveillance is conducted by the RAAF's MPA; however, in time of conflict, these aircraft will often be required to carry out higher priority tasks, such as ASW. AEW&C aircraft could be used to detect and track naval forces or merchant shipping in the event that MPA are not available, and could also perform SAR tasks by locating vessels in distress and by controlling and coordinating rescue activities.

**Reconnaissance**

To reiterate the difference between surveillance and reconnaissance: surveillance is systematic, repetitive observation of expansive areas, while reconnaissance is directed toward specific targets and may not require repetitive coverage. A primary role for RAAF assets in wartime is likely to be reconnaissance for enemy submarines and surface warships. RAAF maritime air forces would also be tasked with locating, and offering limited protection to allied shipping at sea, until that shipping could be diverted to safer waters.

The RAAF's history of conducting maritime reconnaissance and surveillance missions goes back to 1 July 1939, when Number 10 Squadron was formed as a General Reconnaissance squadron, using Short Sunderland flying-boats. Hansard (1938) carried the following announcement, in respect of maritime reconnaissance and surveillance: 'This entails reconnaissance for a distance to sea for the detection of raiders, against either shipping or territory, and the direct attack of such raiders when found'. In the Battle of the Coral Sea in May 1942, Japan suffered its first serious set-back. RAAF Hudsons and Catalinas made reconnaissance flights over the seas where the Japanese ships were located, and supplied valuable information to the American aircraft carriers. More recently, the RAAF was involved in tracking and recording Soviet naval activity in the Indian Ocean, continuing a long tradition of maritime surveillance and reconnaissance.

**Aerial Mine-Laying**

One of the RAAF's most valuable contributions to the Pacific War was in its mine-laying operations, carried out by Numbers 11, 20 and 43 Catalina Squadrons, from April 1943 to July 1945. These squadrons operated their aircraft closer to Japan than any other RAAF aircraft, and cost the enemy thousands of tonnes of shipping and helped in dislocating its
vital sea lines of communication. Furthermore, the mine-laying campaign was undertaken entirely on the initiative of RAAF Command, which had formed in September 1942.

.38 RAAF aircraft provide a capability for air dropping anti-shipping mines for offensive or defensive purposes. In mine-laying, surface ships provide greater carrying capacity and suitable navigational accuracy and thus offer a preferred option for mine-laying by the ADF. Yet, in mine-laying operations, where speed and distance are of paramount importance, RAAF air assets could be considered for the task. An example of this would be the laying of a defensive minefield, with little warning time, in order to prevent an amphibious landing on a remote beach.

Intelligence Collection

.39 Intelligence collection tasks are undertaken by RAAF maritime aircraft in peacetime as well as in time of conflict. In particular, photographic and visual intelligence can be collected, especially in remote areas which are only accessible after long sea crossings. Depending on the fitment of appropriate equipment, maritime aircraft should also be able to provide limited Signals Intelligence. SIGINT is described in more detail in Chapter 9.

Search and Rescue

.40 An efficient SAR organisation is essential to meet the needs of the ADF, civil aviation and the Australian community in general. The SAR task is performed, in the main, by RAAF maritime and transport aircraft, and helicopters; although, some SAR tasks may be contracted out to commercial operators. Principally, the RAAF is responsible for providing SAR facilities for all ADF and visiting military aircraft, using RAAF or commercial aircraft.

.41 RAAF aircraft provide assistance as requested by outside agencies, including the Civil Aviation Authority (CAA), the Police Departments, and the State Governments. CAA has the responsibility for providing SAR facilities for all civil aircraft operating in the Australian area.

.42 RAAF aircraft provide an excellent search capability, but are severely limited in terms of rescue capability. Survival kits are carried and can be deployed; however, survivors must still be rescued by other means. Having an MPA on SAR
standby may be appropriate use of that asset in peacetime, but is wasteful of a scarce, valuable and specialised resource in wartime. In conflict, the use of MPA for SAR should be on an opportunity basis only, with aircraft diverted from other less important missions.

LAND ENVIRONMENT

.43 Air power and land power are linked in the land environment, in a similar fashion to the cooperative links between air and sea power in the maritime environment. Air-land cooperation had its genesis in 1912 when aircraft were first introduced into regular military service with the primary role of carrying out simple reconnaissance missions on behalf of the Army. Since that early beginning, aircraft have played an increasingly important part in the tactical land battle.

.44 The modern concept of a tactical air force evolved in the Western Desert between 1940 and 1943. The first and most significant step was the close association of the headquarters of the 8th Army and the Desert Air Force in 1941, after which both forces fought to one combined plan and to which all individual operations were subordinate. The knowledge gained during this campaign resulted in the evolution of certain principles which formed the basis for army air support, by both British and United States forces, for the remainder of the war.

.45 The advent of tactical nuclear weapons and changes in defence philosophy have, to a degree, changed the concept of the classic tactical air force which was organised and equipped as a singular entity during World War II. Australia has too few resources to form a tactical air force; rather, aircraft are assigned to support the tactical land battle in numbers and by roles as required. (The capabilities of modern multi-role aircraft enable them to be employed against both 'tactical' and 'strategic' targets, and have caused the differences to become less distinct).

Principles for the Conduct of Tactical Air Operations

.46 Regardless of the size or structure of the composite air force involved in tactical air operations, the principles that applied to tactical air forces during World War II, for the conduct of Air-Land Warfare, still apply today. They are
concerned with the essentially joint nature of this form of warfare; that is, the interdependence of land and air operations. The principles are:

a. The air component commander and his staff must work as a team with the land component commander and his staff. Every plan must be a joint army/air force plan, from its formulation to its execution. Land and air operations must be designed to exploit their combined potential. For example, it may be necessary to adapt both the timing and the location of land operations to assist and take full advantage of operations in the air and vice versa.

b. Command of air forces must be retained at the highest practical level. Decentralisation of command to a lower level would inhibit exploitation of the inherent flexibility of air power; that is the ability to accomplish a variety of roles and tasks and to be switched rapidly from one task to another. The centralisation of command does not preclude the decentralisation of control of the air effort to meet the needs of particular army formations. Indeed, special arrangements are required so that these needs can be met, but without compromising the flexibility of air power.

c. The Joint Force Commander (JFC) should deal with one air commander only. In a theatre of war, in which naval and army air arms as well as the air force are providing combat air support, this principle will result in the air component commander exercising operational control of all air assets, irrespective of the parent Service.
Command and Control

.47 From these long-established principles for the conduct of tactical air operations, which were espoused by Field Marshal Montgomery as principles of war, the doctrine for command and control of tactical air operations has evolved. The fundamental precepts of command and control presented here are pertinent to any joint force operations conducted by Australian military forces.

.48 The basic doctrine for ADF joint force operations proclaims that functional military forces act as a unified force under a JFC. This unified force permits the maximum utilisation of capabilities assigned from each of the Services and inhibits the aspirations of one Service to limit the full potential of the whole. By exercising centralised direction of assigned forces, the JFC can select the most appropriate element to attain a specific operational or tactical objective. Centralised direction of all tactical air elements is part of the basic command and control doctrine of the RAAF. However, control of assigned, allotted or attached assets should be decentralised to any level where the most effective use of these assets can be made.

.49 Command. Command of tactical air operations in the ADF will normally be exercised through an established or designated joint command. A joint command is a command established and designated by the authority of the CDF with a specified military objective, under a single commander, and composed of assigned components of two or more Services for the 'component system' of joint command. In the 'direct' system, a tactical formation or unit commander will perform the function of component commander. CDF determines the force structure, designates a commander, assigns him his objective and his forces, and defines his geographic area of responsibility or functions.

.50 Allocation. Management of all resources within an area of operations will be vested in a JFC, with all forces responding to his direction. The JFC will establish, and assign to component commanders, missions which will best accomplish the overall objective. Based on this broad plan of action and the enemy threat, the JFC will establish mission priorities, or direct force apportionment, which will determine where and how the weight of effort of his forces will be applied. Within this direction, the component commanders allocate their resources to accomplish specific tasks in furtherance of the JFC's plan.
Control. Control of assigned resources is exercised through arrangements in accordance with each component commander's directives. Control of the elements of the air component is exercised by the Air Component Commander through an appropriate Tactical Air Control System, and is based on the principle of centralised direction, decentralised execution and coordination of effort. As such, the tactical air control system ensures optimum employment of the air component elements in all aspects of tactical air operations.

Tactical Air Control System. A Tactical Air Control System provides the Air Component Commander with the organisation and equipment necessary to plan, direct and control tactical air operations, either independently or coordinated with the land and naval components. The system is flexible and highly mobile, and is composed of control agencies and communications, including electronics facilities. At the pinnacle is the Tactical Air Control Centre (TACC), from which air operations are conducted in three distinct, yet interlocking, fields of activity, namely:

a. offensive air support,
b. tactical air transport, and
c. air defence and airspace control.

Tactical Air Control Centre. Within the headquarters of the Air Component Commander is the main control and coordination centre for tactical air operations, the TACC. As the operations centre for the Air Component Commander, it contains jointly manned agencies which deal with the three broad activities of a Tactical Air Control System detailed earlier. These agencies are:

a. Air Support Operations Centre (ASOC). The ASOC controls and coordinates all offensive air support - Offensive Counter Air operations, Air Interdiction, Close Air Support and Tactical Air Reconnaissance - within the Joint Force Area of Operations (JFAO).

b. Air Transport Operations Centre (ATOC). The ATOC controls and coordinates all air transport requirements within the JFAO.

c. Air Defence Operations Centre (ADOC). The ADOC controls and coordinates all assigned air defence resources and airspace control elements within the JFAO. An ADOC may not be specifically established
for a joint operation if an existing Sector Air
Defence Operations Centre (SADOC), of the National
Air Defence and Airspace Control System (NADACS) can
provide the necessary air defence/airspace control.
This would generally be the case in the defence of
Australia; a specified ADOC may, however, be
established in an out-of-area JFAO.

Common to all of these activities is the need for airspace
control to permeate through all levels of coordination.
The Application of Tactical Air Operations

.54 Tactical air operations can contribute to the destruction of enemy land forces in two broad ways; namely by direct and indirect support of friendly land forces.

.55 **Direct Support.** As the term implies, direct support consists of direct intervention in the land battle, and may take several forms, such as close air support, tactical air reconnaissance or battlefield air interdiction. It may be used offensively to support an advance, or defensively to counter an enemy attack. Direct support, however, is only likely to be available to any degree after some measure of control of the air has been established.

.56 **Indirect Support.** Indirect support is designed to influence land operations indirectly by the air attack of targets outside the immediate battle area. It includes strike and interdiction operations and the gaining and maintaining of control of the air through counter air operations. A wide range of objectives may be attacked, but the majority of operations will be aimed at paralysing movement or harassing the enemy.

.57 Within the broad categories of air support just outlined, tactical air operations include the following five roles:

a. Offensive and Defensive Counter Air,
b. Interdiction/Battlefield Air Interdiction,
c. Close Air Support,
d. Air Reconnaissance, and
e. Airlift.

The first four of these tactical air roles are normally grouped together as Offensive Air Support. Airlift is considered separately.

**Counter Air Operations**

.58 Air operations in the ADF will not always be directly related to specific land operations. An overall air plan will, in the first instance, normally concentrate the appropriate air forces in counter air operations against the enemy. This overall air plan may influence the course of land
operations because, once control of the air is gained, land operations can be conducted without hindrance from enemy air power. This was certainly the experience of both the German and Allied Forces during World War II. Without a favourable air situation, air, land and sea operations are unlikely to be carried to a successful conclusion. Thus, counter air operations still retain primacy as a role for air forces in air-land warfare, and are explained more fully in Chapter 5.

**Interdiction**

.59 Normally, air interdiction roles will be conducted beyond the range of organic army weapons because the characteristics of air forces permit them to penetrate enemy rear areas and attack enemy lines of communication throughout an area of operations. The difference between Interdiction and Battlefield Air Interdiction (BAI) is essentially in the distance from the immediate land battle that each is conducted, and the planning, command and control of each. The deeper air interdiction operations would normally be planned and controlled by the Air Commander Australia, whereas the planning and control of BAI would be under the auspices of an appropriate JFC. Interdiction is described in Chapter 6 and BAI in Chapter 7.

.60 Interdiction targets include communication centres, bridges, marshalling yards, and fuel and ammunition dumps. Successful interdiction operations against any form of transport will increase the load on others; thus, all elements of the transportation system should be regarded as targets. For Australia, interdiction targets will also include embarkation points, maritime sea lanes or established beach-heads. From a RAAF point of view, it is more economical, and generally easier, to locate and attack targets such as armour and fuel, either at their source or when travelling along the lines of communication, than to be forced to seek and destroy such targets once they have been deployed in the battle area. Effective interdiction requires careful planning. Since attacks by day will inevitably force the enemy to restrict his movement to the hours of darkness, an interdiction plan should be pursued on a 24-hour basis.

.61 Even under pressure of interdiction operations, a resourceful enemy may continue to sustain deployed forces. Continuous pressure should be maintained by friendly land forces to entice the enemy to exhaust supplies that do get through, and diversion of effort from the interdiction plan to other roles should not be undertaken lightly.
The connection between continued pressure by friendly land forces on the enemy and the success of the air interdiction plan cannot be overstated. The failure of the air interdiction campaigns in Korea and Vietnam showed conclusively that air interdiction will not work against an enemy who holds the initiative in the ground battle - if an enemy dictates the terms of the land battle, he can withdraw or attack at his choosing, depending on his supply state. Of course, there were other reasons for the failure of these campaigns, such as an overestimation of the logistics needs of Asian-style massed armies and the underestimation of the resilience of their unstructured and unsophisticated logistic systems. Both wars demonstrated that interdiction operations are successful only when friendly land forces can compel the enemy to maintain contact.

Close Air Support

Close Air Support (CAIRS) is a classical role of tactical air forces in cooperation with land forces. The inherent flexibility of multi-role aircraft means CAIRS was often considered the primary and most effective form of cooperation. However, the modern battlefield can wreak diminishing returns on the use of multi-role aircraft in the CAIRS role. The particular considerations for the RAAF in conducting CAIRS are discussed fully in Chapter 7.

The conclusion that can be drawn from this form of cooperation is that roles other than CAIRS may produce more effective results. Notwithstanding this conclusion, the JFC will aim for mission success while ensuring that the best use of assets is always a high priority. Where circumstances warrant, this may mean the use of air assets in the CAIRS role, despite the significant risk of attrition.

Tactical Air Reconnaissance

Tactical air reconnaissance provides up-to-date intelligence information for the planning and execution of joint operations. It can be a prime source of information for the JFC in conducting the land battle. Tactical air reconnaissance aircraft are used to conduct systematic and random observation of ground battle areas, targets and sectors of airspace. They may also be used for armed reconnaissance missions to locate and attack targets of opportunity in assigned areas or along land lines of communication.
The intelligence provided by tactical air reconnaissance includes information on terrain, weather, and the disposition, composition, movement, installation, lines of communication, electronic and communications systems of enemy forces. Information is obtained through visual, photographic, electronic or thermal sensors. Tactical air reconnaissance can also provide information for adjustments to artillery and naval gunfire. Remotely Piloted Vehicles (RPVs) and Unmanned Aerial Vehicles (UAVs) can have considerable utility in the tactical air reconnaissance role. The broader context of surveillance and reconnaissance and RPV/UAVs is discussed in Chapter 8.

Command and Control. In all ADF operations, tactical air reconnaissance provides information for the particular needs of the three Services, but tactical air reconnaissance forces are employed to meet the requirements of the joint force rather than any single Service component. Tactical air reconnaissance forces may be assigned to a Joint Force Commander, and placed under control of the Air Component Commander, or they may be tasked for discrete missions within the JFAO, but remain under the control of their Force Element Group Commander. In the latter case, these forces would not be based within the JFAO. Priorities for the employment of reconnaissance forces are established by the Joint Force Commander. To ensure rapid response to priority requirements, the Air Component Commander exercises centralised control of all air reconnaissance forces assigned, using the appropriate control agencies. He may also be given operational control of reconnaissance assets which enter the JFAO, but which are not assigned.

Control Agency. In ADF Tactical Air Operations doctrine, the control agency for tactical air reconnaissance forces is the Surveillance and Reconnaissance Centre (SRC) within the Joint Intelligence Centre (JIC) of a joint headquarters. The SRC maintains a data base of up-to-date reconnaissance imagery, allocates priorities for approved reconnaissance tasks, and coordinates all joint reconnaissance operations. Without centralised control of reconnaissance forces in joint operations, there is potential for their misuse, because demand for the provision of tactical information in the heat of battle will be at a premium, and ADF tactical air reconnaissance resources will always be limited.

**Tactical Airlift**
.69 Tactical airlift includes all forms of movement by air and is the use of air transport in support of land forces. Airlift is discussed more fully in Chapter 8; here it is sufficient to reiterate the importance of airlift tasks to the success of air-land warfare in Australia, and to address command and control responsibilities.

.70 Tactical airlift tasks encompass Airborne Missions, Air Logistic Support, Special Operations, Scheduled Services, SAR and Aeromedical Evacuation. Within the ADF, tactical airlift is conducted by utility helicopters of the Army and by fixed-wing aircraft of the RAAF Air Lift Group. These fixed and rotary wing aircraft are used to convey troops when other methods of movement are impracticable, or when time is an overriding consideration. Airborne forces may be dropped by parachute or landed by helicopter, or ground forces with their equipment may be landed close to the area where they are required, if there is a suitable airfield or landing zone. Thereafter, tactical airlift forces may need to provide logistic support to the land forces within the JFAO, provide them with a capability for certain special missions of a clandestine or specialised nature, and if necessary evacuate casualties.

.71 No one task of tactical airlift operations is considered to have an overall priority, because priorities will change as the tactical 'ground' situation changes. Tactical airlift forces therefore, must maintain the capability to accomplish any one, or combinations, of the basic tasks and must always be prepared for the rapid shifting of emphasis from one to the other.

.72 **Command and Control.** In accordance with the principles of command and control of tactical air operations, tactical airlift forces should be controlled by the Air Component Commander of a joint force, who establishes subordinate command channels through joint agencies and specialist teams, assigns tasks, and delegates the required control authority. Tactical airlift forces are maintained as organisational and operational entities which are centrally controlled for maximum utilisation and are not normally re-assigned for specialised or individual Service use. As an entity, the tactical airlift force accomplishes the needs of all Services in accordance with priorities established by the Joint Force Commander.

.73 During conflict, in remote areas throughout Northern Australia, for example, tactical airlift may be the key to victory for the ADF, as it may be the only means of moving
personnel and supplies directly to where they are needed. Helicopters provide the best means to air-land personnel and supplies, and to evacuate casualties in forward areas where suitable airfields are not available for fixed-wing aircraft.

.74 In the absence of high load-carrying Vertical Take-Off and Landing (VTOL) aircraft, airdrop is an essential back-up to air-landed forces. Airdrop enables delivery of large quantities of heavy stores which cannot be lifted efficiently by helicopter, and at much greater distances from base than can be achieved by helicopter. However, air-dropping equipment is costly and availability of suitable assets is normally limited.

.75 One means of reducing the need for airdrop within Australia's area of direct military interest, and also of overcoming some of the other limitations of tactical airlift forces, is for the ADF, and particularly the RAAF, to acquire and maintain an integral capability for airfield construction. The hundreds of old airstrips, dry-weather strips, or airfields in the north of Australia, which are suitable only for light aircraft, could be improved in a contingency to permit use by most airlift aircraft in the RAAF inventory.

.76 **Attrition.** Airlift, more than any other tactical air operation, is dependent on a favourable air situation. If control of the air has been gained, it must be retained, as its loss would be critical for all operations relying on airlift. Attrition of tactical airlift aircraft can be minimised through accurate and timely intelligence and superior tactics. In a contested situation, tactical airlift should operate where possible at night and at low-level, while at the same time employing Electronic Warfare measures.

**SUMMARY**

.77 The principle of cooperation is fundamental to the effective conduct of joint operations by the ADF. Cooperation should be viewed in a three-dimensional setting, where each force complements the others, producing maximum combat effect from limited assets. In the air environment, naval forces can provide offensive and defensive support, SAR and counter force support; while land forces can provide LLAD, ground defence and indirect support.

.78 In the maritime environment, air power can provide OCA, DCA, maritime strike, interdiction, ASW, ASuW, aerial mine-
laying, surveillance, reconnaissance and SAR. In the land environment, tactical air power operates through a Tactical Air Control System, which coordinates Offensive Air Support (OAS), tactical air transport and air defence and airspace control. OAS includes OCA, DCA, interdiction, CAIRS, BAI and tactical air reconnaissance.

.79 Thus, at the very heart of joint warfare in the ADF is cooperation. Since most operations will be joint, they will involve a degree of cooperation. That is what the ADF provides - three Services proficient in their own environments but fundamentally committed to cooperation in all environments, in order to fight as an integrated force.
Promulgation of doctrine is an important step in an air force's development, but so too is the process of doctrinal revision, to ensure that doctrine remains complete, balanced and valid in changing circumstances. The authority for this process is contained in Defence Instruction (Air Force) Operations 10-1.
THE DOCTRINE PROCESS

.1 Doctrine must be formally recorded so that a body of central beliefs can be accurately explained in a single strategic document, that also ensures correct and consistent understanding. This understanding is an integral part of the revision and refinement that makes doctrine a dynamic process. Recording and refining the collective memory of central beliefs enforces a discipline and clarity of thought that help sustain the dynamic process of doctrine.

Elements of the Process

.2 The RAAF approach is a systematic, continuing process based on five elements and involving several sequential stages within the process of reviewing, refining and endorsing doctrine. The five elements are:

a. the Air Power Doctrine Board which recommends doctrine for approval by CAS;

b. the Air Power Doctrine Working Party which coordinates, monitors and finalises the staff work for proposed doctrinal changes;

c. the hierarchical command chain of the RAAF which allows the two way transmission of the initiation, review, refinement and staffing of proposed doctrinal changes;

d. the Air Power Studies Centre which has responsibility for the process of doctrine revision; and

e. the AAP 1000, The Air Power Manual which records RAAF doctrine.

.3 The Air Power Doctrine Board. CAS is advised by an Air Power Doctrine Board. This Board is effectively an augmented Chief of the Air Staff Advisory Committee (CASAC). The permanent composition of the Board should be, after appropriate consultation, CAS and CASAC, two members from HQADF and one member each from Navy and Army Offices. Further, membership may be increased at the discretion of CAS, on advice from DCAS, to include invited members for a specific Board meeting. The invited member would exercise the
responsibilities of a permanent Board member. The recommended membership is:

a. **Chairman.** CAS or DCAS will be the Chairman of the Board.

b. **RAAF Members.** The RAAF members of the Board are:

Deputy Chief of the Air Staff (DCAS),
Assistant Chief of the Air Staff - Personnel and Resource Management (ACPRM-AF),
Assistant Chief of the Air Staff - Materiel (ACMAT-AF),
Air Commander Australia (ACAUST),
Air Officer Commanding Logistics Command (AOCLC),
Air Officer Commanding Training Command (AOCTC),
Director General Force Development - Air (DGFD-Air).

c. **HQADF and Service Offices members.**

Assistant Chief of the Defence Force - Operations (ACOPS)
Director General Military Strategy and Concepts (DGMSC)
Deputy Chief of Naval Staff (DCNS)
Director General Land Warfare Policy (DGLWP)
Commandant ADF Warfare Centre (COMDT ADFWC)

d. **Invited Members.** Other senior level officers who represent scientific or academic institutions which may have a significant contribution to air power doctrine may be invited.

e. **Secretary.** DAPSC is the secretary.

.4 **Air Power Doctrine Working Party.** The Air Power Doctrine Working Party is the central RAAF agency for coordinating and staffing doctrinal review and refinement proposals. It provides a permanent secretariat function through the RAAF APSC. The Doctrine Working Party is an intermediate as well as a final staffing level during the processing of proposed doctrinal changes. This may necessitate additional informal meetings to prepare submissions for DCAS.

.5 **Membership of Working Party.** The composition of the Doctrine Working Party is based on the RAAF Air Power Studies Centre. The Director and staff are permanent members of the
Working Party. The selection of members for the Working Party is aimed at obtaining the widest possible representation of experience and expertise, consistent with remaining small enough to be functional. The Working Party should be at the Wing Commander (E) level. The recommended membership is:

a. **Chairman.** DAPSC will be Chairman of the Working Party.

b. **RAAF Members.** APSC will provide three members together with one representative at the Wing Commander level from each of the following agencies; DGPP-AF, DGLP-AF, Air Headquarters, Logistics Command, and Training Command.
c. **HQADF and Service Offices.** Three HQADF representatives and one each from Navy and Army are recommended. They are a Doctrine Section representative from ADFWC (DDAir), DDAC from DGMSC and DSA-Air representing DGFD (Air). The Navy representation should be DDNW (Air) from the Directorate of Naval Warfare and the SO1 PUBS Army should represent Army.

d. **Invited Members.** DAPSC may invite additional representation on the Working Party. The extra members will be invited for their contribution of specialist skills and knowledge. DAPSC will request RAAF specialist assistance through DCAS and negotiate with non-RAAF agencies for assistance.

e. **Secretary.** The appointment APS3, within the RAAF APSC, will fulfil the permanent duties of Secretary for the Doctrine Working Party.

.6 **Air Power Studies Centre.** The role of the RAAF Air Power Studies Centre is to maintain a centre of expertise for the analysis of air power and to provide advice to the CAS and the RAAF generally on air power issues, doctrine and policy.

.7 **RAAF Air Power Manual.** The central document for the promulgation of RAAF air power doctrine is the AAP 1000, *The Air Power Manual*. Subordinate documents, particularly in the AAP 1000 and 8000 series, may describe doctrine for operational and support activities. However, the AAP 1000, *The Air Power Manual* remains the central document. It is a widely-available source for the information, education and guidance of all persons involved in the application and development of air power in Australia. It is valuable for all members of the RAAF as an authoritative reference and for specific professional instruction on air power. Its appeal will also extend to the broader defence community and academic institutions interested in strategic concerns. Consequently, the contents of the AAP 1000, *The Air Power Manual* are unclassified. The validity, accuracy and currency of the AAP 1000, *The Air Power Manual* must be assured by an ordered and firm process. That process, and hence the quality of RAAF doctrine, depends on the timeliness and effectiveness of each stage of the doctrinal review process.

**Stages of the Process**
The several stages of the process use the mechanism of the formal chain of command. Management of the process is as follows:

a. produce written doctrine, manage changes and disseminate it through the AAP 1000, The Air Power Manual;

b. circulate the proposed changes to appropriate elements and agencies within the RAAF for review, refinement and staffing;

c. review and prepare submissions for Doctrine Board approval; and

d. modify doctrine and disseminate this for refinement of understanding and education.

Authority

The following define the specific authority for the stages of the RAAF doctrinal process:

a. CAS is the authority for approval of RAAF air power doctrine published in the AAP 1000, The Air Power Manual;

b. the Air Power Doctrine Board is the authority for recommending doctrinal change to CAS;

c. DCAS is the authority for submission of doctrinal changes to the Board;

d. DAPSC is the coordinating authority for the preparation of doctrinal change submissions;

e. DAPSC is the authority for tasking agencies within the RAAF for assistance in preparing doctrinal change submissions; and

f. the RAAF command chain constitutes the authority for direction in staffing proposed doctrinal changes.

Responsibility

Each element of the process has specific responsibilities for maintaining doctrine. The responsibilities range from
broad undertakings applicable to all personnel, to individually defined actions. Each major responsibility is described and defined separately in the following paragraphs.

.11 **Air Power Doctrine Board.** The Board has the following responsibilities:

a. to recommend changes to air power doctrine;

b. collectively, to review the status of air power doctrine;

c. individually, to represent the views of their agency at the Board;

d. individually, to make representation on behalf of elements of agencies seeking more adequate consultation on proposed doctrinal changes; and

e. through DCAS, to refer rejected submissions back to the Air Power Doctrine Working Party or the APSC for further action if necessary.

.12 **Deputy Chief of the Air Staff.** DCAS has the responsibility for:

a. submitting doctrinal changes recommended by the Board to CAS for approval;

b. coordinating doctrinal submissions at CASAC level;

c. advocating doctrinal changes to the Board;

d. tasking DAPSC with the coordination of doctrinal submissions;

e. referring submissions to the Working Party or the APSC for further staffing; and

f. referring approved doctrine to DAPSC for promulgation.

.13 **Air Power Doctrine Working Party.** The Working Party is responsible, through DAPSC, to DCAS for the coordination of input from different RAAF, HQADF and other Service areas. Additionally, it has the following responsibilities:

a. to represent the elements and agencies of the RAAF in reviewing doctrinal change;
b. to prepare submissions and appropriate staffing recommendations on proposed doctrinal changes;

c. to determine further action on informal proposals referred to the RAAF APSC; and

d. to act as a consultative group on doctrinal matters for RAAF and other Defence agencies.

.14 **Director Air Power Studies Centre.** In relation to the development and maintenance of doctrine, DAPSC is responsible for:

a. convening the Air Power Doctrine Working Party;

b. coordinating submissions and preparing briefs on proposed doctrinal changes for use by DCAS;

c. coordinating revisions and comments with relevant Departmental, joint and Service headquarters and branches;

d. coordinating informal doctrinal proposals into the formal chain of staffing;

e. monitoring the staffing progress of doctrinal proposals and maintaining a progress schedule for proposals;

f. issuing and maintaining the *AAP 1000, the Air Power Manual*;

g. initiating regular reviews of the content of the *AAP 1000, the Air Power Manual*, including the requirement for review by the Doctrine Board;

h. monitoring and advising on the implementation of doctrine, including the initiation and sponsoring of further studies and analysis;

i. promoting awareness of the content of approved RAAF doctrine;

j. advising the Board and the CAS on relevant developments in air power worldwide; and


k. maintaining liaison with relevant Working Parties and other appropriate doctrinal elements within the RAAF and ADF.

.15 **Commanders/Division Heads.** The major responsibility for Commanders and Division Heads is to ensure the prompt and timely staffing of doctrinal changes. Further responsibilities are:

a. initiating doctrinal changes;

b. reviewing proposed doctrinal changes;

c. encouraging subordinates to review doctrine; and

d. representing subordinate proposals to higher levels.

.16 **RAAF Members.** Each RAAF member has the responsibility to contribute to the doctrinal process. Where appropriate an individual member may:

a. initiate, formally or informally changes to RAAF doctrine;

b. contribute to the assessment and review of doctrine and proposed changes through his appointment or as a specialist; and

c. implement endorsed doctrine.

.17 **RAAF Staff College.** The RAAF Staff College has the responsibility of tasking each course with a project to analyse and assess the *AAP 1000, the Air Power Manual*. This will include:

a. setting the current course the task of analysing and assessing the *AAP 1000, the Air Power Manual* in a format agreed jointly by DAPSC and Commandant RAAFSC;

b. producing annually a consolidated report on the results of the project; and

c. making the report available to DAPSC for inclusion in the review of doctrine.

**Procedures for Review of Doctrine**
.18 Changes affecting air power doctrine can arise for a number of reasons and the process of doctrinal review must manage their consideration and adoption where necessary. Sources of change might include: domestic, foreign or defence policy of the Australian government; technological and scientific developments; intelligence assessments; military decisions and policy reviews; and an individual commander's proposals based on new procedures.

.19 **Initiation of Doctrine Review.** As a result of changes from any of the sources mentioned above, a review of the AAP 1000, the Air Power Manual or any section of RAAF air power doctrine may be suggested by any division, branch, command or unit. In addition, DCAS will ensure that high-level policy changes are provided to DAPSC for review in relation to doctrine. DAPSC is responsible for monitoring and coordinating the review process. From initiation of a review, the process should follow an orderly, controlled set of procedures.

.20 **Outline of Procedures.** The process of doctrinal review of RAAF doctrine is as follows:

a. **Initiation.** A formally raised proposal to change doctrine will be processed through the command chain to CASAC level.

b. **Preparation.** At CASAC level, DCAS will take responsibility for tasking DAPSC to prepare a formal submission for review. The Working Party will convene for the proposal and determine a recommended course of action.

c. **Initial Staffing.** The prepared submission, and recommendations, will be presented to CASAC for consideration.

d. **Informal Proposal.** An informal proposal forwarded to RAAF APSC will be considered on merit by the Working Party. If appropriate, it will be formalised for submission to DCAS for consideration by CASAC.

e. **Monitoring/Deadline.** Once endorsed, a proposal will be staffed. DAPSC will monitor the staffing with 'action by' dates. Failure to meet the deadline will be taken as concurrence.
f. **Completion of Staffing.** Once staffing is completed, the submission will be returned to DCAS for his endorsement and submission to the Board.

g. **Endorsement.** A proposed change to doctrine will be presented to the Air Power Doctrine Board for endorsement. DCAS will act as advocate. If the Board approves the change, it will be referred to CAS for endorsement.

h. **Approval.** CAS approves RAAF doctrine.

i. **Promulgation.** Endorsed doctrine will be notified to DAPSC by DCAS. DAPSC will then promulgate amended doctrine.

.21 To ensure this process achieves a valid, dynamic doctrine, all persons associated with it are encouraged to take an active and imaginative approach to air power doctrine.

**SUMMARY**

.22 Air power doctrine will evolve slowly but there will be a need for continual refinement and reappraisal. The RAAF doctrine process must, therefore, allow for the incorporation and subsequent dissemination of that refinement and any changes. The objective is to keep RAAF air power doctrine as dynamic authoritative guidance. In this way, the doctrine process is a continuing one.
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