



National Défense
Defence nationale

CANADIAN FORCES AEROSPACE DOCTRINE



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ISBN Number: D2-184/2006E-PDF 0-662-44154-0

B-GA-400-000/FP-000

This publication is available online at:

DIN: http://trenton.mil.ca/lodger/CFAWC/CDD/publications_e.asp

Art Direction by Canadian Forces Aerospace Warfare Centre Production Centre

1st Edition 2006





CANADIAN FORCES AEROSPACE DOCTRINE



Foreword

Canada's Air Force is a vital national security institution, an instrument of national policy and an element of national power. As an integral component of the Canadian Forces, Canada's Air Force delivers aerospace power to control and exploit the aerospace environment in order to contribute to Canadian security and national objectives.

Shaped by our country's proud history, geography and culture, the Air Force has developed into today's multi-purpose force that is able to project aerospace power around the globe. The men and women who built Canada's Air Force through peace and war were challenged by a number of revolutionary changes in technology and wholesale shifts in Canada's strategic security environment. Their successful adaptation to these profound changes was guided by a conviction that the distinguishing characteristics of aerospace power offer decision makers a diverse range of options to achieve national objectives. Thus, aerospace power is an invaluable asset employable across the spectrum of conflict for independent operations, when integrated with land and maritime forces in joint and combined operations, or with other government agencies.

The Canadian Forces is transforming to remain relevant in a newly emerging set of strategic realities. Accordingly, the Air Force is becoming the expeditionary, network-enabled, capability-based and results focused aerospace force that will satisfy Canada's 21st century security needs. As in the past, it is important that our present initiatives for change are firmly grounded in a sound understanding of the fundamental and enduring principles that describe and guide the proper application of aerospace power.

The purpose of this handbook is to articulate the aerospace doctrine for the Canadian Forces. It is intended to provide context to our vision of the future and our strategic plans for achieving that vision. More importantly, this handbook is the foundation upon which every Air Force activity is based. It is as instrumental to prioritizing procurement as it is for testing and evaluating new concepts and policies. Our doctrine represents knowledge gained from experience, ensures interoperability with our allies but requires judgment in its application. Each and every member of the Air Force is personally and professionally obligated to read, understand and apply our doctrine.

Per Ardua Ad Astra



J.S. Lucas

Lieutenant General

Chief of the Air Staff / Commander Air Command



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CHAPTER 1



INTRODUCTION TO DOCTRINE

“In short, the importance of doctrine cannot be overstated. We must all understand our doctrine so that we may be ready for the future.”

- Lieutenant-General A.M. DeQuetteville

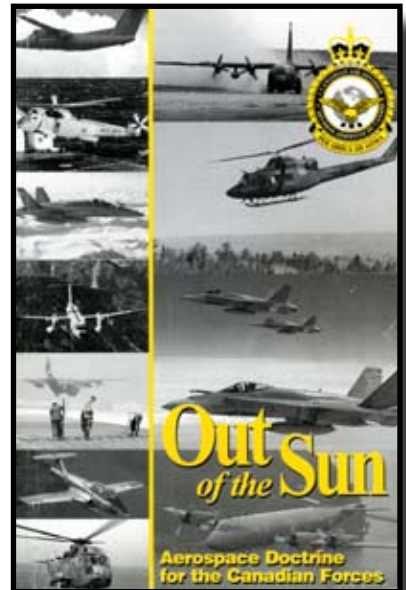
Doctrine Defined

Military doctrine is the foundation upon which every aspect of military activity is based. A sound doctrinal framework provides commanders guidance and allows individuals to think more clearly in the chaos of conflict. The roles, functions, and tasks executed by military forces are derived from doctrine. Doctrine is also instrumental in establishing priorities for procurement and acts as a critical sounding board for testing and evaluating new concepts and policies. For these reasons, doctrine is essential to the effective functioning and evolution of military forces.

Doctrine provides the foundation for all military activity

But what is doctrine? In NATO, doctrine is defined as: “Fundamental principles by which military forces guide their actions in support of objectives.”¹ It represents knowledge gained from experience and, although it is authoritative, it requires judgment in application. As such, doctrine is not rigid and not intended to curtail a commander’s freedom of action.² The CF Doctrine Development manual explains that any departure from the guidance provided by doctrine “...should normally be undertaken only after doctrine has been considered in light of the particular circumstances of an operation, and the doctrine is found to be wanting in some respect.”³ Departures from doctrine may indicate that the doctrine itself requires amendment. Therefore, doctrine is not static; it evolves in response to experience, new technologies and a multitude of other factors. In this way, doctrine must be continuously revalidated and never be considered as dogma.⁴

Doctrine evolves in response to experience



Military Doctrine

CF doctrine is divided into three levels: strategic, operational, and tactical, as depicted in Figure 1.1. Strategic-level doctrine sets out the fundamental and enduring principles that guide military forces in conflict. Operational-level doctrine uses these principles to establish distinct objectives and force capabilities, and to describe the operational environment. Tactical-level doctrine is guided by both higher levels of doctrine in detailing the proper use of specific weapon systems and other resources, in carrying out tasks to achieve a specific aim. Although relatively simple to explain, the boundaries between these levels are not always distinct and sometimes overlap depending on circumstance.

Three
levels of
Doctrine



Figure 1.1 Levels of Doctrine⁵

Military Doctrine is also categorized into three distinct types:⁶

Environmental Doctrine—*doctrine that reflects the three environments in which military operations take place. Sea power, land power and aerospace power have distinct characteristics and varying applications, but they provide complimentary contributions to national and multinational military endeavours.*

Joint Doctrine – doctrine that provides the fundamental principles that guide the employment of forces of two or more environmental commands in coordinated action towards a common objective.

Combined Doctrine – doctrine that describes the best way to integrate and deploy national forces of allies in coalition or alliance warfare.

The relationships between the categories of doctrine are illustrated in Figure 1.2. The CF doctrine publications hierarchy originates with the capstone manual, Canadian Forces Doctrine. There are also capstone manuals for the environments; this document is the capstone for aerospace doctrine. Doctrine publications immediately below the capstone level are referred to as keystone manuals. These operational-level manuals are further amplified through appropriate tactical doctrine publications such as Tactics, Techniques and Procedure (TTP) manuals. To be interoperable, CF military doctrine needs to be compatible with that of our allies.



Figure 1.2 Hierarchy of CF Doctrine

Aerospace Doctrine

Strategic aerospace doctrine in the CF expresses fundamental and enduring principles that describe and guide the proper application of aerospace power. Because of its fundamental and enduring nature, strategic doctrine provides broad and continuing guidance on how aerospace forces are best organized and employed. CF strategic aerospace doctrine, as promulgated in this capstone document, is the foundation for all other levels of aerospace doctrine and establishes the framework for the effective use of aerospace forces.

Operational aerospace doctrine applies the principles of strategic doctrine to aerospace operations to describe the organization of aerospace forces and guide their employment in the context of broad functional areas, distinct objectives, force capabilities, and operational environments. Operational aerospace doctrine is the focus for developing the functions and tasks that must be executed through aerospace operations.

Tactical aerospace doctrine describes the proper employment of specific weapon systems, individually or in concert with other weapon systems, to accomplish specific tasks. Tactical doctrine considers particular tactical objectives and tactical conditions (threats, weather, and terrain), and describes how specific weapon systems are employed to accomplish the task.

CF Aerospace Doctrine Authority

CF aerospace doctrine is developed and promulgated on the authority of the Chief of the Air Staff (CAS). The Director General Air Force Development (DG Air FD) is the designated Aerospace Doctrine Authority (ADA) and thus has authority over all aspects of aerospace doctrine. The ADA is also the designated coordinating authority for CF joint and combined doctrine that encompasses aerospace functions. The ADA is assisted in meeting aerospace doctrine responsibilities with the help of the Aerospace Doctrine Committee (ADC) and the Canadian Forces Aerospace Warfare Centre (CFAWC). The ADC is the designated Air Force body responsible for overseeing aerospace doctrine, while CFAWC is responsible for the development, production, and dissemination of all aerospace doctrine.⁷

DOCTRINE AUTHORITY

Chief of the
Air
Staff



Director
General
Air Force
Development



Aerospace
Doctrine
Committee



CF
Aerospace
Warfare
Centre



DOCTRINE

Fundamental principles by which the military forces guide their actions in support of objectives. It is authoritative but requires judgement in application.

CHAPTER 2

CANADA'S AIR FORCE

“The best basis for sound judgement is a knowledge of what has been done in the past, and with what results.”

- Air Vice Marshal J. C. Slessor




Introduction

A complete understanding of doctrine requires an appreciation of its historical underpinnings. The history of Canada's Air Force is rooted in the earliest days of military aviation. Shaped by the experiences of two world wars and numerous regional conflicts, the Air Force has unique characteristics based on Canadian geography, culture and political heritage. To meet the well-being and security needs of the country, and to keep pace with rapid advances in technology, the Air Force continues to evolve, as does its doctrine, to enable it to operate independently or alongside allies and coalition partners. This chapter provides an overview of the evolution of the Canadian Air Force and its related doctrine. For those who would like to explore Canadian Air Force history in more detail, a list of references is provided in the endnotes.¹

The Early Years

Canadian military air power played a significant role in the First World War when Canadian airmen provided both quantity and quality to the Royal Flying Corps (RFC), the Royal Naval Air Service (RNAS) and the Royal Air Force (RAF). For example, although Canada represented less than 10 percent of the British Empire, approximately 25 percent of all RAF flying personnel were Canadian. In addition, Canadian pilots like Raymond Collishaw and Billy Bishop were among the greatest aces of the war.² Furthermore, Canada became a world leader in aircrew training, producing at least 20 percent of the aircrew reinforcement needs of the British Empire and providing vital assistance to the US just before it entered the war in April 1917.³

While Canadians were prominent in tactical level operations, Canada had few senior officers involved in higher command. In contrast to the Army's Canadian Expeditionary Force, which became a symbol of Canada's growing wartime independence, there were few proponents in the Canadian military or government for an independent Canadian



air arm. Nevertheless, in the last months of the war, the government recognized the large numbers of Canadian airmen employed by the British by forming the Canadian Air Force (CAF) and the Royal Canadian Naval Air Service (RCNAS), formations from which today's forces are descended. After the war these organizations disappeared; but there remained some 13,000 trained aviators in Canada who some believed could form the basis of an "air militia."

In June 1919, an Air Board was created to supervise all air activities in Canada, both military and civilian, and on 18 February 1920, the CAF was formed as a non-permanent force under the Air Board.⁴ On 1 April 1924, the CAF became the Royal Canadian Air Force (RCAF), a permanent force intended to foster commercial applications of the new air technology, a healthy aircraft manufacturing industry, widespread flight training facilities and an active program of technical research. Based on a national concept of a strong civilian base for air activities, RCAF doctrine emphasized peacetime applications of aviation, especially mapping, forestry patrols, and communications. As a result, early Canadian military pilots were described as "bush pilots in uniform," and the RCAF remained a small organization consisting of permanent, non-permanent and reserve elements. By regulation, every licensed pilot in Canada was a member of the Reserve.⁵

While the Department of National Defence was established in 1922 to take over the responsibilities of the Department of Militia, the Department of the Naval Service and the Air Board, the RCAF did not have the status of a fully independent military service because its headquarters was a directorate within Militia Headquarters. This was not to change until 1938 when the first Chief of the Air Staff (CAS) was appointed to be a co-equal with the Chief of the General Staff and the Chief of the Naval Service on Defence Council. This change occurred just in time for the RCAF to become, in a very short period, one of the largest air forces in the world.

During the Second World War, the RCAF expanded to almost 200 times its peacetime strength, from 1,150 all ranks in 1938 to a wartime peak of 206,350 at the end of 1943.⁶ In total, 93,844 RCAF personnel were in direct service with the RAF overseas in both RAF and RCAF formations; the majority were operational aircrew supported by approximately another 35,000 Canadian ground crew.⁷ Once

again Canada excelled in aircrew training; the more than 100 British Commonwealth Air Training Plan schools in Canada⁸ furnished 44 percent of the 340,000 Commonwealth aircrew trained between 1939-45.⁹ Forces were organized functionally into Commands, dedicated to the tasks of training, strategic bombing, air defence, tactical support to land forces and maritime patrol.

The RCAF accumulated considerable experience in all major air power roles during this period. Of the forty-eight RCAF squadrons overseas by 1944, sixteen were in Bomber Command, eighteen (including day fighter, fighter-bomber, fighter-reconnaissance, night fighter, intruder and air observation post) were with the 2nd Tactical Air Force, five were Fighter Command, five were in Coastal Command, and another was supporting the 8th Army in Northern Italy. There were also three RCAF transport squadrons, one operating on the Western Front and two in Burma. Based upon its experience, the RCAF had written doctrine for offensive and defensive air operations to allow for British-Canadian interoperability, and was little different from the RAF's. Offensive doctrine guided those forces engaged in tactical air support, anti-submarine warfare and strategic bombing. Defensive doctrine was written based upon the extensive experience gained by using fighter aircraft in the air defence role.



The Cold War

The North Atlantic Treaty Organization (NATO), created in 1949, was the West's answer to the Soviet economic and military threat to a war-ravaged Europe. In the fall of 1949 the USSR threatened North America directly when it successfully test-detonated its first atomic

bomb and began building a fleet of strategic bombers to carry this strategic weapon. The Cold War had begun.

There were two key developments in the Canadian military during this transition from postwar demobilization to its build-up to meet the Soviet threat. First, the three Services moved from the traditional peacetime force structure of large reserves (to be augmented in times of tension by regular forces), to one that relied on forces-in-being. Although through the early 1950s the RCAF relied heavily upon its reserve and auxiliary components, the RCAF became an increasingly professional service. The RCAF regular force reached an unprecedented peacetime strength of over 3,000 aircraft in 41 squadrons with a personnel strength of 54,000.¹⁰ The second development that affected the Cold War RCAF was the decision of the Canadian government to commit itself to two peacetime alliances: first NATO, and then the North American Air Defence Command (NORAD) in 1958. The RCAF's commitment to NATO's Integrated Forces included 12 fighter squadrons based in eastern France and southwest Germany, and several Maritime Patrol squadrons based in eastern Canada. The RCAF also provided 11 regular force all weather air defence squadrons as well as personnel to man the Canadian Distant Early Warning Line (DEW Line) radar sites in support of NORAD.



To deal with this expansion, the RCAF organized itself into six functional commands, Maritime Air Command, Air Defence Command, Training Command, Air Materiel¹¹ Command, Tactical Air Command and Air Transport Command. At this point, RCAF doctrine began to diverge from its RAF heritage, as the RCAF began to align its operational procedures, tactics and communications with its USAF partner in NORAD and its other Allies in NATO. As practices

in Europe were often markedly different than in North America, given the broad divergence between mission types, there was no overriding RCAF aerospace power doctrine. During this period the Royal Canadian Navy and the Canadian Army had small but effective

aviation branches flying fixed- and rotary-wing aircraft. Some of these units trained regularly with the RCAF at the Joint Air Training Centre (JATC) at RCAF Station Rivers, Manitoba, based on concepts of joint operations that had been practised during the Second World War. The JATC was closed with the unification of the CF.

Unification

The RCAF ceased to exist on 1 February 1968 as stipulated in the Canadian Forces Reorganization Act passed in 1967. Aside from removing the last vestiges of British heritage with new uniforms and rank nomenclature, the Act had a dramatic effect on the Air Force's organization. Its assets were distributed among the functional components or commands of the Canadian Forces (CF): Mobile Command (the army plus ground support aircraft), Maritime Command (the navy plus maritime support aircraft), Air Transport Command, Air Defence Command, and Training Command. Canadian aircraft based in Europe came under Canadian Forces Europe, a geographically based command that included all CF units in Europe. From a doctrinal perspective, the elimination of the RCAF also eliminated the processes and institutions for the development and promulgation of air force doctrine. Air Force Council, previously the authority for approval of air force doctrine, was dissolved. As well, the RCAF Staff College, a key source of air power concepts and doctrine development, and the central repository for air power theory and doctrine publications, was transformed into a unified CF staff college.

What was referred to as “the Air Element” suffered an identity crisis for the next seven years because with unification, unlike the Army and Navy which kept their separate identities and command structures in Mobile Command and Maritime Command, air assets were dispersed throughout the CF. Some of these problems were solved with the formation of Air Command in Winnipeg on 2 September 1975. Air Command was given responsibility for all Canadian military air assets (“everything that flies”), including policy and standards for training and flight safety. However, operational control of tactical aviation and

maritime air units remained with their respective land and naval force commanders. Air resources were organized into functional groups such as Air Transport Group and Air Defence Group. The groups that served the land and maritime components of the CF, 10 Tactical Air Group (10 TAG) and Maritime Air Group (MAG), continued to function as integral operational formations of their respective Commands. At the same time, they responded to Air Command for all other requirements such as administration, professional training, maintenance, career management and flight safety.



The Air Force entered the 1980s with a sense of renewal. New equipment, such as the CF-18 Hornet, the CP-140 Aurora and modernization of the North Warning System, were all seen as an indication of the reinvigoration of Canada's Air Force under Air Command. However, very little had been accomplished to promulgate air force doctrine. Without a coordinating body, by 1981, aerospace doctrine could be found in 58 different documents.¹² To address the problem,

the Commander of Air Command convened an Air Doctrine Symposium in 1984, consisting of senior officers from every part of the Command. Among other things, the Symposium's deliberations led to the formation of the Air Force Doctrine Board, which assumed responsibility for the development of the B-GA-400 series of Aerospace Doctrine Manuals.¹³

But as the Cold War came to an end in 1989, there was a sharp reversal in the Air Force's fortunes and a subsequent reduction in personnel and equipment. During the later stages of the Cold War few people recognized the need for coherent air force doctrine. Many believed that since the Canadian Air Force was committed to specific roles in NATO and NORAD, the doctrine of those organizations would suffice. But lacking the guidance of Air Force doctrine, National Defence Headquarters (NDHQ) staffs found it difficult to prioritize the numerous projects that comprised the air portion of the capital budget.

Post-Cold War

By 1994, the Government decided to reduce the Canadian Forces from 80,000 to 60,000 regular force personnel and to dispose of both equipment and facilities. Along with the other commands, Air Command reduced its level of regular force personnel and equipment so that it could fulfil its major assigned roles within a defence budget that had been reduced by one third. The resulting cuts to staff and equipment saw a major reduction in the number of air force personnel and the aircraft fleet was reduced by over 50 percent. At the same time, the reductions in regular force personnel were offset to a small extent with the increase in the size of the Air Reserve from 1,000 to 3,000 members, or approximately 19 percent of Air Command military strength.

This period also saw the Air Force's command structure realigned. In the summer of 1997 the functionally based Groups (Transport, Fighter, Maritime, Air Reserve and 10 TAG) were dissolved and 14 Training Group was absorbed within Air Command Headquarters. 1 Canadian Air Division was stood up in Winnipeg to exercise operational command of all CF air assets. At the same time the Commander of Air Command also became the Chief of the Air Staff (CAS) and was relocated to NDHQ with a small staff. Concurrent with the stand-up of 1 Canadian Air Division, the publication of *Out of the Sun – Aerospace Doctrine for the Canadian Forces* captured the significant re-structuring and cultural changes of the 1980s and the 1990s. The 1990s also witnessed the birth of joint CF command and control structures. This had a major impact on the Air Force which was assigned an almost exclusively force generation role, except for routine operations. Force employment became the purview of the Deputy Chief of Defence Staff (DCDS) organization for all contingency operations.

After the end of the Cold War many expected that the “peace dividend” represented by the cuts to the CF would be permanent in a relatively benign international climate. But the events of that decade were to change the view of almost all regarding the nature of the post-Cold War world. Instead of a stable and peaceful international community, the loss of the bipolar balance of power brought forth regional and terrorist unrest and conflict on a global

scale. Canada's involvement in the Balkans and in other international operations, especially following the 11 September 2001 terrorist attacks, quickly revealed that the cuts to Canadian military, and years of consistent reduction to the defence budget, had severely constrained the military's ability to maintain the high operational tempo demanded by government commitments.

Cuts notwithstanding, all war-fighting and support communities of Canada's Air Force became heavily engaged in various domestic and overseas crises during the decade and a half following the end of the Cold War. Fighter forces, supported by air-to-air refueling, participated in the First Gulf War and the air campaign to force Serbia out of Kosovo. Air transport forces provided tactical and strategic support to a myriad of deployed and national operations ranging from humanitarian assistance to flood victims in Manitoba and Quebec and earthquake



victims in the Far East, to peace support operations in the Balkans, Iraq, Afghanistan and elsewhere. Maritime patrol squadrons provided support to national security operations, including drug interdiction operations in cooperation with the RCMP, and participated in both UN and NATO operations in the Middle East and the Adriatic. Ship-borne helicopter crews supported deployed naval operations worldwide. Tactical aviation crews supported UN missions in South East Asia, Central America and Haiti and rescued flood victims nationally. This virtually unceasing operational tempo validated Air Force doctrine at

the tactical level, but placed great stress on the Air Force's ability to sustain lengthy operations that require continual personnel rotations. This reality highlighted the need for the Air Force to have strategic and operational level doctrine to match its tactical counterpart.

Although tactical doctrine has been developed effectively, it has been without clear direction or reference to higher-level aerospace doctrine since May 2004 when *Out of the Sun* was rescinded without replacement. To serve as the engine of change for Air Force transformation, the CAS authorized the creation of the Canadian Forces Aerospace Warfare Centre (CFAWC), which was stood up in October 2005. Among other tasks assigned to the Warfare Centre was the publication of a complete series of aerospace doctrine manuals, of which this document is the first.

Conclusion

Throughout its proud history, Canada's Air Force has taken many forms, from a niche air force as "bush pilots in uniform", to the full spectrum multi-purpose air force as one of the largest air forces contributing to the Allied coalition during the Second World War, to the highly professional combat capable multi-purpose air force of today. Canadian Air Force doctrine has always been congruent with that of its principal allies, and this congruence is reflected in this manual. Since a strategic goal of the CF today is to achieve seamless operational integration at short notice with our allies, and particularly with US forces,¹⁴ it is likely that this congruence will continue for the foreseeable future. However, congruent doctrine does not mean identical doctrine. Canada's unique geography, history, and culture have shaped its military into a unique force and, therefore, Canada's Air Force requires doctrine that, while interoperable with our allies, reflects the distinct nature of Canadian aerospace power.

CHAPTER 3

NATIONAL SECURITY AND AEROSPACE POWER

“The most basic role of any national government is to protect its citizens and their vital interests.”

**- Senate Committee on
National Security and Defence**

National Security

In Canada, national security "...is the preservation of a way of life acceptable to the Canadian people and compatible with the needs and legitimate aspirations of others. It includes freedom from military attack or coercion, freedom from internal subversion, and freedom from the erosion of the political, economic, and social values which are essential to the quality of life in Canada."¹ The fundamental aspects of these national interests are largely enduring, although they may be modified in response to internal and external forces such as those resulting from the terrorist attacks on the World Trade Centre and the Pentagon on 11 September 2001. Promoting and protecting national interests is the essence of national security, which is inherently the ultimate responsibility of government and is achieved through the adoption of a coherent National Security Policy.

**Preserving the
Canadian way
of life**

Canadian Defence Policy is shaped by the principles and priorities identified in the National Security Policy. It provides objectives to the Department of National Defence (DND) for the development of a sustainable program and guides the CF in the performance of operations. Since the 1971 White Paper, Canadian Defence Policy has been based on defending Canada, defending North America, and contributing to international peace and security.

National Power

National power is the term that describes a nation's total capability to achieve its national objectives. It encompasses a wide array of interrelated capabilities and includes diplomatic, information, military and economic elements. The successful application of national power lies in determining and employing the most appropriate mix of elements to achieve the desired outcome.

**NATIONAL
POWER**



Diplomatic

Information

Military

Economic

MILITARY
POWER



SEA

LAND

AEROSPACE

Military Power

The military element of national power, often referred to as military power, is the instrument of national strategy normally brought into play by the government when other means have failed or require reinforcement. Military power has three principal forms: sea power, land power and aerospace power. The three forms of military power are interactive, interdependent and complementary in meeting national security objectives. At the same time, each may be effectively employed as an individual entity to project military power as required.

Aerospace Power

Aerospace power is that component of military power applied within or from the aerospace environment to achieve effects above, on and below the surface of the earth. In its broadest context, aerospace power involves the full range of a nation's civilian and military aerospace capability.² In its earliest form, aerospace power was used for observation purposes to gain a perspective over the battlefield that was not achievable using surface-based assets. Over time, aerospace power has evolved from being an element of land and sea power, to becoming an important and inherently flexible form of military power in its own right. History has shown that aerospace power is key to gaining dominance and control over opposing forces thus affording freedom of action to friendly forces while denying the same for adversaries.³ Aerospace power can be used for independent operations across the spectrum of conflict. It can be integrated with land and maritime forces to contribute to joint and combined operations, or it can be integrated with the activities of other government agencies.



Figure 3.1 The Spectrum of Conflict

The 1991 Gulf War provides an example of how aerospace power has become an indispensable element of military power, by demonstrating how control of the air paved the way for the success of follow-on military operations.

“As hostilities heightened and possible war approached, the CF18 squadron included 24 Aircraft and appropriate support personnel. At its peak the Canadian Air Task Group totaled 750 men and women serving in Qatar. War erupted on January 17, 1991 and lasted until early March 1991. By the end of active hostilities the Canadian contingent had 26 CF18s and a CC137 tanker Aircraft stationed in Qatar [as well as five Sea Kings in support naval operations]. In addition Canada provided CC130 Hercules and CC137 airlift for all Canadian Forces operations in the Gulf region. During the conflict Canadian fighters fired their first shots since World War II but did not incur any casualties. The Canadian contingent carried out Combat Air Patrols, Sweep and Escort missions, ground attack roles and Sea King reconnaissance. The air power displayed by coalition forces was decisive and effective, setting the stage for a very brief 100-hour ground war.”⁵





It is customary in the democratic countries to deplore expenditures on armaments as conflicting with the requirements of social services. There is a tendency to forget that the most important social service a government can do for its people is to keep them alive and free.

- Air Chief Marshal J.C. Slessor

CHAPTER 4

FUNDAMENTALS OF AEROSPACE POWER

“If we lose the war in the air, we lose the war and we lose it quickly.”

- Field Marshal B. Montgomery

The Nature of Conflict

A peaceful relationship between nations is always desirable; however, history has shown that conflict is sometimes unavoidable. Nations wage war to achieve political objectives when all other means to achieve them have failed. It is these political objectives that shape military activities and define the boundaries of conflict. Although advances in technology influence how war is conducted, wars are won or lost by people. Success in conflict is largely a matter of judgment, primarily based on knowledge. While common sense and balanced judgment are indispensable qualities for a successful military commander, these qualities alone rarely ensure success under the rigorous conditions of conflict, the nature of which is unpredictable and chaotic, permeated with danger, exertion, uncertainty, fear and chance. Therefore, the commander's decision-making ability must be underpinned by a sound knowledge of certain tried and proven principles, which have marked the success of commanders in the past. These Principles of War are not laws but simply indicators of action that have proven successful in the past. To disregard them involves risk and has often brought about failure.

The Principles of War

The Principles of War are fundamental guidelines for military action and are the most basic form of military doctrine. They are as applicable to the aerospace environment as they are to the land and sea environments. With the exception of the principle of Selection and Maintenance of the Aim, which is regarded as pre-eminent, not all Principles of War apply to all situations at all times. The remaining principles are not listed in any particular order of importance. Although the individual principles may vary between nations, the underlying doctrine is generally similar. It is essential to keep these fundamental principles in mind especially since aerospace power is often exercised jointly with the other forms of military power.

The Principles of War	
Selection and Maintenance of the Aim	Every military operation must have a single, attainable, and clearly defined aim that remains the focus of the operation. The aim defines the operation; deviation from the aim dilutes effort and risks failure.
Maintenance of Morale	Morale is the most important element in ensuring cohesion and the will to win. It is nurtured through good leadership, sound discipline, realistic training, confidence in equipment and a sense of purpose.
Offensive Action	Distinct advantage lies with the offence because it confers the initiative, gives freedom of action and compels the enemy to be reactive rather than proactive.
Security	Security serves to guard vulnerabilities and protects vital interests. It provides freedom to take offensive action and denies this advantage to an opponent.
Surprise	Surprise can produce results out of proportion to the effort expended. An opponent surprised is ill prepared, and unable to mount an effective opposition.
Concentration of Force	It is essential to concentrate superior force at a decisive time and place. Forces should be disposed in a manner which permits them to combine quickly to deliver a decisive blow, or to counter an enemy threat, when and where required.
Economy of Effort	Resources are always limited, so they must not be wasted where they are not needed. To achieve maximum concentration at the main area of interest, prudent risk may have to be accepted in other areas.
Flexibility	No plan can accommodate all factors of chance and opposition. Success requires the ability to alter plans to take advantage of opportunities or to counter difficulties.
Cooperation	Cooperation among elements of a force maximizes its capabilities. It entails a unified aim, team spirit, interoperability, division of responsibility and coordination of effort to achieve maximum effectiveness.
Administration	No plan or operation can succeed without adequate administrative and logistic support. Scarce resources and critical materiel must be controlled at the appropriate level of command. The most economic and effective use of materiel is required at all times.

Table 4.1 The Principles of War

Characteristics of Aerospace Power

Aerospace, meaning air and space, defines the environment that surrounds the earth and extends vertically into space from the earth's surface. The aerospace environment is unique and demands a distinct and considered approach to operations within it. For optimal employment of aerospace power, a fundamental understanding of the following characteristics of aerospace power is essential:

Elevation. The capacity to employ aerospace power above the surface of the earth offers the ability to observe and influence activities on the surface and below the sea.

Fragility. Aerospace vehicles tend to be more fragile than surface vehicles and, therefore, require special handling to keep them in operation.

Impermanence. Typically, aerospace platforms cannot remain aloft indefinitely, and therefore cannot hold a station permanently. This can be offset by committing aerospace platforms in rotation to maintain a posture of relative permanence, or repeating missions as required.

Payload. Some payloads of aerospace vehicles are limited when compared to those carried by maritime and land forces; although, it is possible to compensate for small payloads by using high sortie rates. In addition, a small payload delivered quickly may stabilize a critical situation more effectively than a large payload delivered later.

Precision. Aerospace power can be employed with great accuracy and minimal collateral damage because of inherent capabilities provided by precision guided munitions and surveillance satellites.

CHARACTERISTICS

Elevation

Fragility

Impermanence

Payload

Precision

Reach

Sensitivity
to

Environmental
Conditions

Sensitivity
to
Technology

Speed

Stealth

Support
Dependency

Reach. Aerospace power can be projected globally, unimpeded by surface features such as mountain barriers or water expanses.

Sensitivity to Environmental Conditions. Aerospace power is typically sensitive to environmental conditions. Bad weather, for example, creates difficulties with take-offs and landings, navigation, target acquisition and weapons delivery.

Sensitivity to Technology. Relatively small innovations in technology can have a significant impact on the effectiveness of aerospace power. Technological advances dictate an ongoing requirement for continuous improvement and development of aerospace forces.

Speed. The inherent speed of aerospace vehicles provides a rapid response capability that can be projected over great distances. Speed can also be used to achieve surprise and allows for a reduced time of exposure to hostile action, thus increasing survivability.

Stealth. Stealth (tactics and technology) gives aerospace power the ability to be employed with minimal risk of detection, increasing survivability and allowing for surprise.

Support Dependency. Aerospace power requires a high level of technical and logistical support that must be provided from a support base of operations.

Applications of Aerospace Power

The distinguishing characteristics of aerospace power offer decision makers a diverse range of options to achieve national objectives, making aerospace power as important an instrument for preserving peace and managing crises as it is for waging war. Although not an exhaustive list, aerospace power is ideally suited for the following applications:



Support. With speed and reach, aerospace power can provide physical support, such as humanitarian relief or military assistance, around the world.

Observation. Elevation gives aerospace power the ability to locate, monitor and discern the intentions of enemy activity.

Presence. The presence of aerospace power as a credible counter-threat can serve as a measure of reassurance and is a considerable deterrent to any potential aggressor.

Delay/Denial. Aerospace power can be used effectively to inhibit or prevent aggressors from employing their forces, thus providing friendly forces time to strengthen defences, or launch spoiling attacks.

Diversion. Aerospace power can be used to influence opposing forces by concentrating attacks in key areas, forcing the enemy to divert resources from otherwise intended purposes.

Disruption. Damage inflicted by aerospace power can cause an enemy mental and physical disruption because of resulting confusion, weakened unit cohesion and vulnerability to follow-on attacks.

Destruction. Aerospace power has considerable scope to inflict physical destruction on all types of enemy forces, when and where it is required.

APPLICATIONS

Support
 Observation
 Presence
 Delay/Denial
 Diversion
 Disruption
 Destruction

Tenets of Aerospace Power

The inherent characteristics of aerospace power make it attractive for employment in diverse and multiple tasks, and therefore care must be taken to avoid fragmentation of resources and dissipation of effort. To ensure the optimal employment of aerospace power, certain fundamental tenets must be observed. These are referred to as the Tenets of Aerospace Power. While the Principles of War provide general guidance on how to employ military power, the Tenets of Aerospace Power have been developed from past experience to provide specific considerations for the employment of aerospace power.

TENETS

Centralized
Control and
Decentralized
Execution

Flexibility
and
Versatility

Synergistic
Effects

Persistence

Concentration

Priority

Balance

Centralized Control and Decentralized Execution. Centralized control gives coherence, guidance and organization to the employment of aerospace power. It is achieved through a single commander who has the authority to assign the available assets to best achieve the assigned objectives. Decentralized execution, the delegation of authority to lower-level commanders, is essential for effective span of control and to foster initiative and situational responsiveness.

Flexibility and Versatility. Flexibility is key to the effective employment of aerospace power so that aerospace operations can shift from one objective to another, quickly and decisively. Aerospace power must also remain versatile so that it can be used for a broad spectrum of objectives at the strategic, operational, or tactical levels of conflict.

Synergistic Effects. The coordinated employment of aerospace power with or in support of other forms of military power can produce synergistic effects that exceed contributions of individual forces employed separately.

Persistence. The persistent employment of aerospace power gives a commander influence and presence in an area of interest. Even though aerospace power cannot occupy terrain or remain in constant proximity, its inherent characteristics of speed and reach allow for the continuous revisiting of targets.

Concentration. Effective employment of aerospace power must achieve concentration of purpose to guard against fragmentation of effort in attempts to fulfill the many competing demands of the operation.

Priority. Because of limited aerospace resources, prioritization of the demands for aerospace power is essential for the optimization of its employment and to maintain concentration of purpose. Aerospace power is most cost-effective when employed for tasks that give high-value pay-offs.

Balance. It is essential to balance the employment of aerospace power with due consideration for the Principles of War and the Tenets of Aerospace Power. It is equally important to balance the impact of accomplishing objectives against the associated risk to friendly forces.



OPERATION DESERT STORM

Operation Desert Storm was the air campaign that followed Operation Desert Shield, the six-month buildup of coalition forces in Saudi Arabia that followed the Iraqi invasion of Kuwait in 1990. After the lapse of a deadline set in UN Security Council Resolution 678 for Iraqi forces to leave occupied Kuwait, the coalition launched a massive air campaign. The campaign commenced on the morning of 17 January, 1991 with more than 1,000 sorties per day. The sorties were launched mainly from Saudi Arabia and the six coalition aircraft carrier groups located in the Persian Gulf. The Canadian Air Force provided CH124 maritime patrol helicopters to support the blockading fleet and CF18 fighter aircraft for air cover and bombing missions. The air campaign was conceived in three phases.

Phase 1, the first five weeks of combat, was an air war. While the ground forces positioned themselves coalition air forces mounted air operations consisting of deception operations to focus Iraqi attention on defence and cause them to incorrectly organize their forces. Following this were deep strike operations designed to decapitate Iraqi command and control, and eliminate their ability to reinforce Iraqi ground forces in Kuwait and southern Iraq.

In Phase 2, which overlapped the first phase and continued to the end, the coalition gained undisputed air superiority over Kuwait. This permitted unfettered attack on Iraqi ground forces to reduce their combat power and destroy reinforcing units.

Phase 3 began with the ground invasion of Kuwait and Iraq. Coalition air forces fixed Iraqi forces in place to assist armoured force penetration and exploitation of terrain, to destroy key lines of communication, to interdict re-supply and reinforcement from Iraq, and eliminate Iraqi forces in Kuwait. The ground war lasted only four days, a triumph due largely to the success of the air campaign.

CHARACTERISTICS, APPLICATIONS AND TENETS

Centralized
Control
and
Decentralized
Execution

Desert Storm validated the concept of the Joint Force Air Component Commander (JFACC), solving historical problems of fragmented air operations command. Although this concept had been used as early as the Second World War, this was the first conflict in which the JFACC was established formally. Canadian command and control arrangements further illustrated this tenet as the CF task force command was not co-located with the JFACC but was in fact in a different country.

Flexibility and
Versatility

The master air attack plan (MAAP) reflected a dynamic JFACC process of strategic decision-making. In putting together the MAAP, the best weapon system to achieve the desired effect was selected, regardless of service or country of origin.

Balance

The combinations of stealth aircraft and precision guided munitions (PGMs) allowed nearly simultaneous attack against scores of targets across the theatre. Conventional attack aircraft, supported by specialized countermeasures platforms then exploited the weakened defences.

Persistence

Coalition air forces conducted continuous day and night operations, stealth attacks, and employed PGMs, cruise missiles, drones, attack helicopters, special operations forces, and more to keep constant pressure on the enemy.

Synergistic
Effects

The air campaign was phased to degrade and destroy Iraqi air defences before attacking infrastructure, thus increasing freedom of action. The coalition ground forces were particularly effective as they advanced into Kuwait and Iraq with close air support.

Sensitivity
to Technology

Technology gave the coalition air forces a decisive edge. Stealth, PGMs, electronic suppression of defences, air refueling, reconnaissance and surveillance aircraft, space systems, night-fighting capabilities, tactical ballistic missile defense systems, logistics systems, airlift and sealift, cruise missiles, attack helicopters, remotely piloted vehicles, and flexible-basing aircraft all made major contributions to victory.

CHARACTERISTICS,
APPLICATIONS AND TENETS (Cont'd)

Support

The Canadian Air Force supported the coalition air campaign with air patrols over the fleet in the Gulf, helicopter support to blockading ships, and resupply by air transport.

Observation

Coalition commanders had an unprecedented level of surveillance and reconnaissance of the battlespace, using satellites, UAVs and manned aircraft.

Presence

Coalition air forces continuously covered the entire area of operations: observing Iraqi movements, intercepting communications, disrupting movement, and destroying forces and infrastructure. This continual presence was a critical hindrance to Iraqi ability to conduct an effective campaign.

Delay
and
Denial

The action of coalition air forces played a significant role in preventing the Iraqi forces from effective participation. The Iraqi Air Force was rendered ineffective by the threat of being overwhelmed, in many cases refusing to fly or fleeing to neighbouring Iran. Army units, stunned by aerial bombardment, surrendered in large numbers when the ground war began.

Disruption

Prior to the ground campaign, coalition air forces attacked the Iraqi Air Force, lines of communication, and command and control infrastructure, thus hampering organization of defences. During the ground offensive the Iraqi Air Force was unable to operate effectively, and ground movement by the Iraqis was all but impossible.

Destruction

During the initial air campaign, and during the ground offensive, the Iraqi Air Force suffered the loss of many of its aircraft, its airfields, and its command and control networks. The Iraqi Army lost the majority of its combat capability through air attack, and entire units were annihilated from the air.



CHAPTER 5

FUNCTIONS OF CANADA'S AIR FORCE

**“The beginning of wisdom is calling things
by their right name.”**

- Confucius

Air Force Functions

Air forces exist to exercise aerospace power on behalf of the nation. This is accomplished primarily through the exploitation of the aerospace environment to achieve assigned objectives. Accordingly, air forces are trained, organized and equipped to perform functions that are primarily influenced by the physical possibilities and limitations imposed by that environment.

A century of air warfare has demonstrated that all effective air forces, whether they are large or small, are capable of performing a number of specific functions. In Canada, these functions are:

- Sense
- Shape
- Move
- Sustain
- Command



Sense

From an elevated position, an observer has an excellent vantage point from which to see what is taking place on the surface of the earth and under the seas below. Armies have learned that by occupying the ‘high ground’ and extending their visual range, they have an improved ability to gain reliable information from which to make better decisions in battle. This explains why, beginning with the use of tethered balloons during the Napoleonic Wars,¹ to the use of the first aeroplanes for observation during the First World War,² to the sophisticated remote sensing satellites of today,³ new aerospace technologies have often been first used to gather information.

Sensing is much more than the mere gathering of information. It is the developing of awareness or understanding of the environment, or the engagement space, in which an air force may be conducting operations.

Sensing happens as raw data is collected and then transformed into useable information from which sound decisions can be made. Through an integration of sensors, systems and people, air forces accomplish this by:

- Collecting information through surveillance and reconnaissance⁴
- Fusing it with information from other sources
- Analysing the information to produce knowledge
- Communicating that knowledge to provide usable intelligence⁵

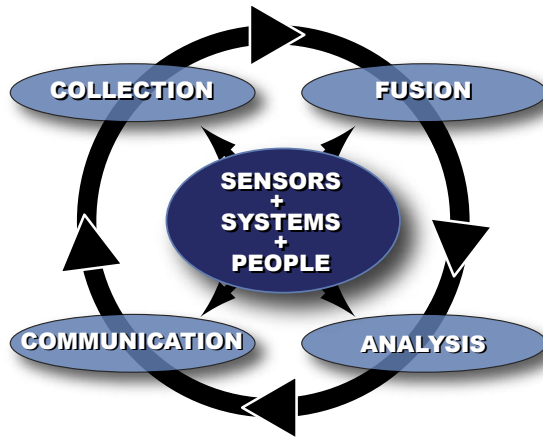


Figure 5.1 The Sensing Cycle

Shape

Shaping is the creation of effects that alter the engagement space in a desired manner. Shaping by air forces is typically accomplished through the use, or the threatened use, of force to create effects in both the physical and the moral domains. In the physical domain, actions are directed toward an adversary's physical capabilities. The objective of these actions is to shape the engagement space and thus:

- Deny an opponent or peace breaker their choice of strategy
- Create favourable circumstances to employ our chosen strategy
- Reduce the requirement for friendly surface forces
- Reduce risks, casualties and cost⁶

In contrast, actions in the moral domain are aimed at will and cohesion. They involve the use of force or the threatened use of force, as well as incentives or rewards, to cause a party to either maintain a desired behaviour or alter it in a desired manner.


Air force actions taken to shape the engagement space can be either offensive or defensive in nature and are grouped into two main categories: Independent Air Operations and Integrated Air Operations.

Independent Air Operations

Independent Air Operations are those in which aerospace forces are the primary and predominant means employed to accomplish assigned objectives. Independent Air Operations are executed to achieve control of the air or to accomplish a strategic effect.

Control of the Air

Gaining sufficient control of the air is an essential requirement across the spectrum of conflict. Having control of the air safeguards sovereignty in peacetime, controls access to it in times of tension, and provides safety from enemy air attack in war. Moreover, control of the air provides friendly forces with the freedom to conduct operations at the time and place of their choosing without prohibitive interference



from an adversary. Consequently, gaining control of the air is normally afforded the highest priority in any military operation.

Depending on the situation and the capabilities of an adversary, control of the air may be established rapidly and maintained at little cost. However, against a capable and resilient opponent, gaining absolute control of the air may be a task of such magnitude that it requires a prohibitive allocation of resources. In such cases, an important consideration for commanders is to balance the cost of absolute air control against the risks created by insufficient control. Therefore, the commander must determine the necessary degree of control of the air required to achieve mission success.⁷ Depending on the situation, actions to secure control of the air may be temporary and localized or they may involve ongoing operations throughout the entire engagement space.

Air Operations for Strategic Effect

Air Operations for Strategic Effect seek to threaten, disrupt or destroy an adversary's strategic centre of gravity.⁸ These operations could involve destructive actions, non-destructive actions or a combination of both to create effects that directly or indirectly result in shattering an adversary's cohesion, will or ability to wage war. By simply possessing the ability to conduct such operations, an air force can deter aggression and reassure allies. When the willingness to conduct strategic air operations is demonstrated through presence or a show of force, these deterrent and reassurance effects are multiplied. For example, in limited conflict air forces can apply force in a controlled and graduated manner to convince an aggressor to cease their undesired behaviour. On the other hand, as a final resort air forces can conduct near-simultaneous attacks on a multitude of targets aimed at overwhelming an adversary's ability to cope with the scope and pace of attacks, inducing a form of strategic decision-making paralysis.⁹

Integrated Air Operations

Air forces also shape the engagement space by conducting operations that are integrated with those of surface forces. When integrated into a joint force, air and surface forces combine their characteristics in a complementary and synergistic manner. By their very nature, integrated air operations shape the engagement space in support of the attainment of military objectives, and are normally associated with the operational and tactical levels of war. Typically, these operations are aimed at:

- Curtailing interference from hostile land and naval forces
- Inhibiting the enemy's ability to manoeuvre
- Denying the enemy an ability to concentrate their forces
- Disrupting the enemy's command, control and communications capabilities.¹⁰

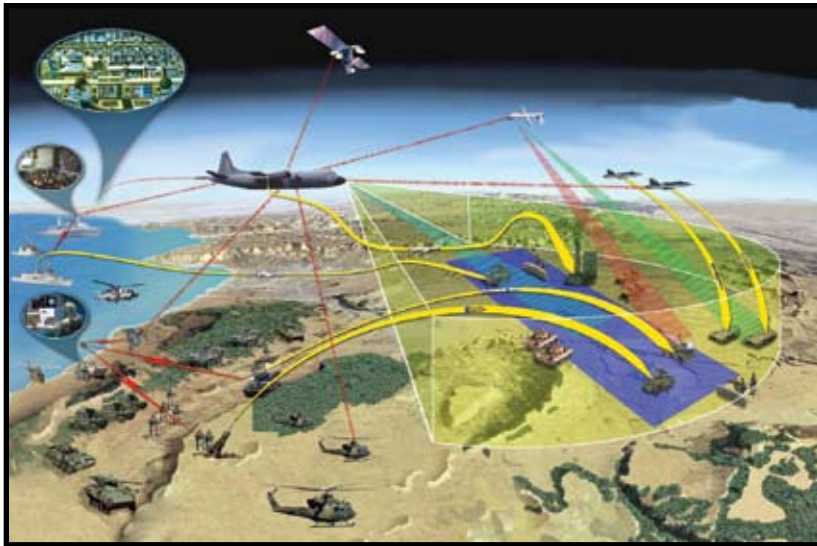


Figure 5.2 Integrated Air Operations

Move

Any military posture relevant for defence and security must have the ability to rapidly deploy and manoeuvre forces, equipment and supplies across the spectrum of conflict. Without hindrance from natural or man-made obstructions, air forces can perform this function to provide humanitarian assistance at home or abroad, or in direct support of engagement with an adversary's forces. There are two components to this function: Air Mobility and Force Projection.

Air Mobility

Air Mobility involves the movement by air of personnel, equipment and cargo within and between theatres of operations. It provides a military commander with the capability to deploy, employ and re-deploy forces and equipment quickly and over considerable distances, to sustain those forces, and support effective application of their military effort. Air Mobility operations can be strategic or tactical, based on missions assigned and the context in which the operations are conducted. These operations include:



Strategic Air Mobility Operations

Strategic Air Mobility Operations are those conducted to deploy, distribute and recover personnel, equipment, and supplies between theatres of operation. Additionally, they include the extraction of non-combatants, aeromedical evacuation for the movement of patients to and between medical treatment facilities and scheduled services for the programmed movement of personnel and supplies.

Battlefield Air Mobility Operations

Battlefield Air Mobility Operations provide tactical commanders the ability to manoeuvre their forces and equipment about the operational engagement space, while providing them with all required logistical support.

Force Projection

Force Projection is the rapid deployment of air forces in order to provide presence or influence for a specific operation, wherever and whenever it is needed. Through Force Projection, the range and reach of aerospace power can be extended beyond fixed bases and installations. Thus Canada's influence can be projected to its remotest regions and outside its own territorial frontiers in a global, expeditionary capacity.



Force Projection is achieved through the ability to rapidly deploy air forces over long distances. It can be further enhanced through air-to-air refuelling that increases the range, loiter time and ultimately the flexibility and versatility of aerospace power. Force Projection is also achieved through the quick establishment of new bases of operation utilizing high readiness deployable units, by pre-established but unmanned air bases ready for activation on short notice, or by negotiating the use of other nation's existing civil and military infrastructure.

Sustain

To apply aerospace power, air forces must be raised, trained and equipped to meet current and potential tasks. The sustain function is an ongoing function of every air force and has two distinct categories: Force Generation and Support Operations.

Force Generation

Generating forces to produce aerospace power is a complex activity, involving both personnel and materiel. Force Generation is founded on doctrine, which leads to the creation of the force structure and the policies

and procedures that govern the employment of a military force. Air force Force Generation includes the following activities:

Recruitment, Education and Training

A prime component of Force Generation is the recruiting, education and training of personnel. This must be done on an ongoing basis to ensure that the Air Force is continually supplied with an adequate number of educated and well-trained people. Individuals selected for the Air Force must be educated in the fundamentals that allow a military organization to operate smoothly, while instilling an underlying sense of duty and responsibility. Training then provides them with the necessary knowledge and skills applicable to specific activities in a continuous and ongoing process. It involves first stage training that leads to qualification status, second stage training that includes upgrading and continuation training as new equipment, tactics, techniques and procedures are introduced, and third stage training which incorporates all additional aspects to maintain the high readiness level required to deploy air forces.

Equipping

Equipping is an activity that ensures air forces have the right tools at the right time to accomplish their assigned tasks. It includes employing new technologies and concepts to maximum advantage by integrating research and development, test and evaluation, and the procurement of new systems to meet air force equipment requirements. Research and development ensures the advance of new concepts through the continuous exploration of emerging technologies. Test and evaluation complements the research and development by ensuring that new equipment, and the associated development of tactics, techniques and procedures, meet the needs of aerospace forces. The equipping process is completed through procurement and then cycles back into the stages of training discussed above.

Support Operations

Once generated, all air forces must be supported to continue to operate, both at home and abroad. This is accomplished through the ongoing provision of a variety of operational, administrative, logistical, and

safeguarding activities. Support operations have two components: Force Support and Force Preservation.

Force Support

Force Support includes Operational, Administrative and Logistical Support services and activities.

Operational Support describes the provision of services that directly support air operations including environmental services (weather), aircraft maintenance, air traffic services, specialized aerospace medicine support, and airfield damage repair involving explosive ordnance disposal, rapid repair of damaged aircraft operating surfaces and crash fire rescue.¹¹



Administrative Support encompasses administrative, financial, as well as health and welfare activities that are required to enable air forces to operate effectively. Its primary purpose is to ensure the provision of the required

numbers of correctly qualified personnel, in the right place, at the right time, and supported by appropriate infrastructure.

Logistical Support includes all aspects of planning and execution of the movement and maintenance of materiel and personnel. It includes four primary activities: Construction Engineering, Materiel Support and Distribution Services (Electrical and Mechanical Engineering, Supply, and Transport), Telecommunications and Information Services, and Food Services.

Force Preservation

Force Preservation is conducted to protect air forces against unnecessary loss and wastage. It consists of Force Protection, Search and Rescue, and Loss Prevention Programmes.



Force Protection encompasses the protection from attack of vital resources located on air bases, and the minimizing of operational losses by developing systems and equipment that seek to thwart known threats and hazards. Among other activities, Force Protection comprises both airfield defence and security. Airfield defence involves forces to repel attack by air and land, while security is concerned with safeguarding personnel and preventing espionage, sabotage, damage and theft, including the security measures that protect documents and communications.



Search and Rescue (SAR) has applications across the spectrum of conflict. In peacetime, SAR units have the mandate to search for and rescue persons in distress in the air, on land or at sea. In times of conflict or war, air forces may also conduct Personnel Recovery (PR) missions, which encompass all military, diplomatic and civil efforts to recover isolated personnel. PR applies to missions in a non-threatening environment as well as Combat SAR (CSAR), which involves finding and recovering personnel trained and equipped to receive CSAR support in hostile territory.

Loss Prevention Programmes are designed to minimize unnecessary risk and prevent accidental loss. Airworthiness and Flight Safety are but two examples of these types of programmes. The Airworthiness programme ensures an acceptable level of safety for all military aviation through a stringent system of clearances and regulations. The Flight Safety programme aims to prevent accidental loss of aviation resources by continuous monitoring of hazards and the investigation and analysis of all aviation safety occurrences.

Command

Overlying and permeating all Air Force functions is that of Command. Command is the foundation of all military organizations and is defined as “the authority vested in an individual of the armed forces for the direction, coordination, and control of military forces.”¹² Command and Control (C2) is an expression used to describe



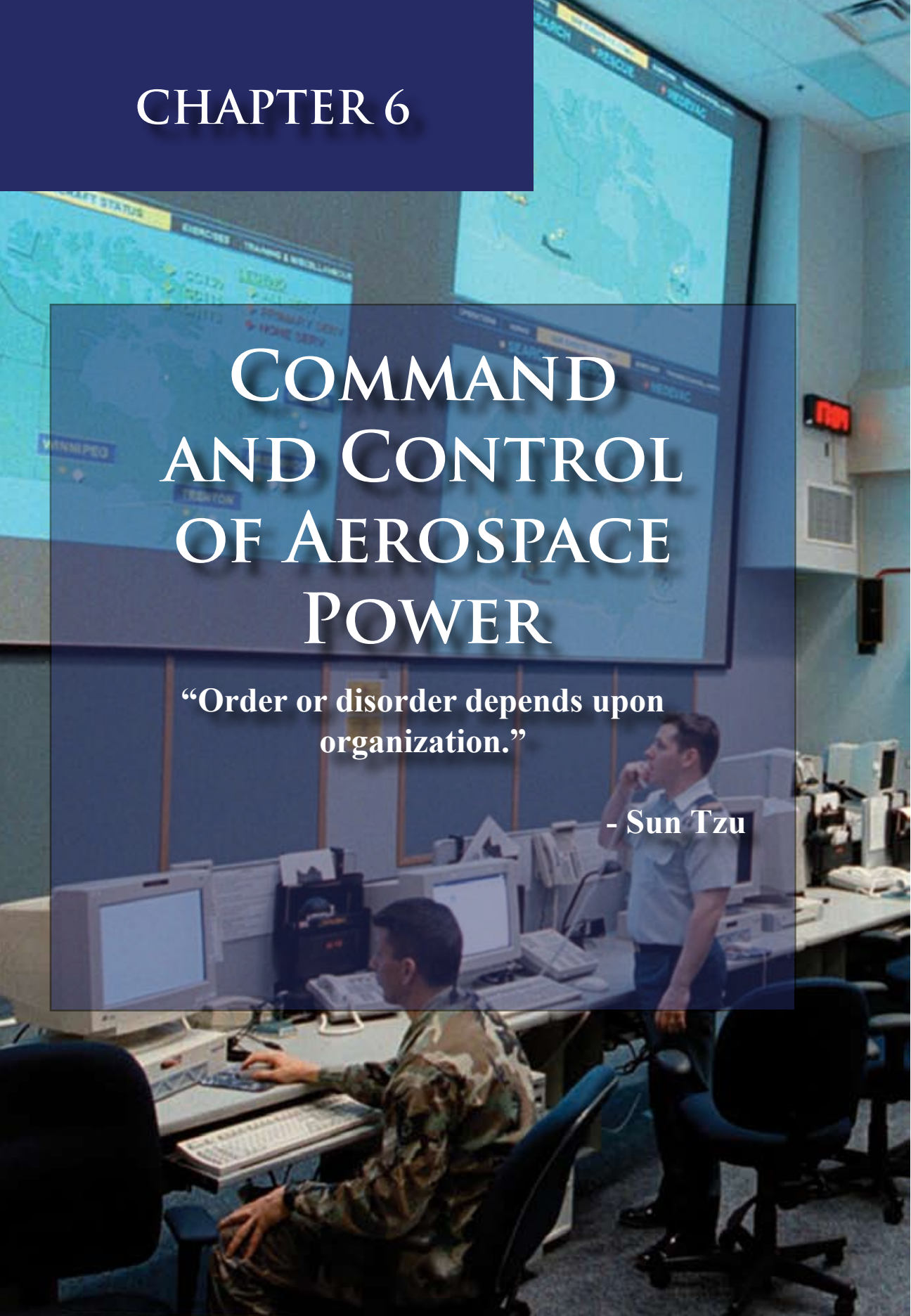
the exercise of authority and direction by a designated commander over assigned forces in the accomplishment of the force’s mission.¹³ Effective C2 is fundamental to the efficient employment of aerospace power. C2 activities include the analysis of information, the development of plans, the preparation of orders, the organization and deployment of forces in preparation for conflict, and once operations begin, the coordination and adjustment of the plan’s execution. Further discussion on the Command and Control of the Air Force is detailed at Chapter 6.

CHAPTER 6

COMMAND AND CONTROL OF AEROSPACE POWER

“Order or disorder depends upon
organization.”

- Sun Tzu



Command and Control

Canada's Air Force, like the Army and the Navy, is a vital instrument of national power with inherent responsibilities to protect Canada, Canadians, and the nation's interests and values, at home and abroad. The Air Force fulfills its obligations through the effective and efficient projection of aerospace power. Fundamental to these activities is a command and control framework that is flexible and responsive and allows resources drawn from different organizations to operate together toward a common goal.¹ In keeping with this principle, the terms and definitions used in this chapter, unless otherwise noted, are drawn from CF joint doctrine.



Command is the foundation of all military organizations and has been defined as “the authority vested in an individual of the armed forces for the direction, coordination, and control of military forces”². However, command is more than an expression of authority. “Command is the act of creatively expressing will to accomplish the mission.”³ This definition includes two factors: creativity and will. The Commander requires creativity to address and solve any unanticipated situations that would impede mission accomplishment. Will is also paramount to the commander as it is the decisive factor required to arrive at a decision, to have the determination to act upon it, in spite of opposition. Thus there are two aspects to effective command authority: one is bestowed by law and is a function of rank; and the other is personal authority, which is a blend of leadership and experience.⁴ All or part of this authority may be transferred or delegated.

Control is that authority exercised by a commander over part of the activities of subordinate organizations, or other organizations not normally under their command. Control encompasses the structures (personnel, facilities,

and procedures) and processes (planning, directing and coordinating) devised by command to enable it to accomplish the mission while managing the intrinsic risk.⁵ Accordingly, inherent in the concept of C2 is the responsibility for implementing orders or directions. All or part of this authority may be transferred or delegated.

Principles of Command

Experience has revealed that there exists certain fundamental principles in the Command and Control of forces which are formally articulated as the Principles of Command:

Principle	Application
Unity of Command	A single, clearly identified commander must be appointed for each operation. The commander has the authority to plan and direct operations and will be held responsible for an operation's success or failure.
Span of Control	Every person has a limited capacity and therefore the assigned resources and activities must be such that one person can exercise effective command or control of the formation or unit.
Chain of Command	The structure of the C2 process is hierarchical and must be respected. Bypassing the chain of command is justified only in the most exceptional circumstances.
Delegation of Authority	Commanders must be clear when delegating all or part of their authority.
Freedom of Action	Once the task or mission has been established and the necessary orders have been given, subordinate commanders must be permitted maximum freedom of action to take initiative and exercise their skills and knowledge of the local situation in the planning and conduct of the operation.
Continuity of Command	A clear and well understood succession of command is essential.

Table 6.1 The Principles of Command

Command and Control Relationship

Command and Control can be exercised at three different levels: full, operational and tactical.

Full Command is the military authority and responsibility of a superior officer to issue orders to subordinates. It covers every aspect of military operations and administration. It is applicable only within national services and, therefore, alliance or coalition commanders cannot have full command over forces of other nations.

Operational Command (OPCOM) is the authority granted to a commander to assign missions or tasks to subordinate commanders, to deploy units, to reassign forces and to retain or delegate operational control (OPCON) and/or tactical control (TACON) as necessary. It does not include responsibility for logistics or administration.

A commander assigned OPCOM may delegate that authority. While OPCOM allows a commander to assign separate employment to components of assigned units, it cannot be used to disrupt the basic organization of a unit to the extent that the unit cannot readily be given a new task or be redeployed. A commander will normally exercise OPCOM through commanders of subordinate components of a task force.

Tactical Command (TACOM) is the authority delegated to a commander to assign tasks to forces under their command for the accomplishment of the mission assigned by higher authority. It is narrower in scope than OPCOM but includes the authority to delegate or retain TACON.

Operational Control (OPCON) is the authority delegated to a commander to direct assigned forces to accomplish specific missions or tasks, which are usually limited by function, time, or location; to deploy units concerned; and to retain or assign TACON of those units. It does not include authority to assign separate employment of components of the units concerned. Units are placed under commanders' OPCON so that commanders may benefit from the immediate employment of these units in their support, without further reference to a senior authority.

Tactical Control (TACON) is detailed and usually restricted to local direction and control of movements or manoeuvres necessary to accomplish missions or tasks assigned. In general, TACON is delegated only when two or more units not under the same OPCON are combined to form a cohesive tactical unit.

	FULL COMMAND	COMMAND		CONTROL	
		OPCOM	TACOM	OPCON	TACON
Provide administrative and logistic support	X				
Assign separate employment of components of units/formations	X	X			
Assign missions	X	X		X	
Assign tasks	X	X	X	X	
Delegate equal or lower command status	X	X	X	X	X
Coordinate local movement or action	X	X	X	X	X
Plan and coordinate	X	X	X	X	X

Table 6.2 Command and Control Relationships

Command in the Canadian Forces

The Governor General is the Commander-in-Chief of the CF and provides the link from the Crown to the armed forces. The Government of Canada provides direction to the CF through the Minister of National Defence. The Chief of Defence Staff (CDS) is responsible to the Minister for the conduct of military operations. By virtue of appointment, the CDS commands the CF and provides strategic direction. The CDS issues orders and instructions through the chain of command, delegates command authority and assigns missions and tasks to subordinate commanders.

Air Force Command and Control

From a C2 perspective, aerospace forces need to be organized in keeping with the Principles of Command and with the purpose of achieving operational effectiveness across the spectrum of conflict. At the same time, while aerospace power is extremely potent, it is also inherently complex and costly, and therefore it is essential that it be centrally controlled by a single air commander to ensure the optimal and effective use of its unique characteristics. Decentralized execution of aerospace power is equally important since it provides subordinate commanders the authority and flexibility to make decisions critical to the success of assigned missions.⁶

Air Component Commander⁷

Military operations are referred to as Joint or Combined, as described in Chapter 1. Domestic operations, involving the air, land and maritime forces are Joint, while deployed operations, in allied or coalition organizations, are Combined. When integrating aerospace power into joint or combined operations, the Joint Force Commander (JFC) or Combined Force Commander (CFC) centralizes the control of assigned aerospace forces by appointing a senior air force officer as the Air Component Commander (ACC). The Force Commander will normally delegate OPCON of all assigned and attached air assets to the ACC who becomes responsible for the planning, coordination, allocation, and tasking of all joint/combined air operations.



Figure 6.1 Command and Control Construct for Joint Operations

Embracing the tenet of centralized control and decentralized execution, the ACC leads the Air Operations Center (AOC), which is the centralized directing organization that produces Air Tasking Orders (ATOs) through which the ACC tasks subordinate commanders. The ATO enables the centralized control of air force assets by providing critical details for the employment of air assets. To enhance the effectiveness of tactical level decision-making, the ACC also provides subordinate commanders with objectives and guidance through the Air Operations Directive (AOD), which is the tool used to guide decentralized execution in the accomplishment of objectives.

POSTSCRIPT

Canadian Forces Aerospace Doctrine lays out the fundamental principles behind the employment of aerospace power in support of Canadian security and national objectives. It provides the framework for the application of aerospace power and is the capstone document for aerospace doctrine serving as the guide for the development of operational and tactical doctrine. While it is authoritative, it is not prescriptive. Based on lessons learned from air operations of the past, it provides a solid foundation for dealing with the aerospace challenges of the future. As such, it is not static but will evolve as new lessons are learned and new concepts are developed and proven. As a result, the successful application of this doctrine can only be achieved through the continued engagement of Air Force personnel in the ongoing process of doctrine renewal and study. In this regard, it is every Air Force member's responsibility to be fully engaged in the process of discussion and development of doctrine, whether at the strategic, operational or tactical level.

Sic Itur Ad Astra

Endnotes

Chapter 1

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- 2 I.B. Holley Jr., "A Modest Proposal: Making Doctrine More Memorable," *Airpower Journal*, Vol 9, No 4 (Winter 1995) 14–20.
- 3 Canada, Department of National Defence, A-AE-025-000/FP-001 Canadian Forces Doctrine Development Manual (Ottawa: Department of National Defence, 2003) i.
- 4 The Concise Oxford English Dictionary (11th Ed) defines dogma as a set of principles laid down by an authority as incontrovertible.
- 5 Canadian Forces Doctrine Development Manual, 2.
- 6 Canadian Forces Doctrine Development Manual, 3.
- 7 For a more comprehensive discussion, refer to Air Command Order (ACO) 8000-0 Aerospace Doctrine.

Chapter 2

- 1 The following books are also recommended for those who would like to explore Canadian Air Force history more deeply: W.A.B. Douglas, *The Official History of the Royal Canadian Air Force Vol. 2: The Creation of a National Air Force* (Toronto: Univ. of Toronto Press, 1986); Brereton Greenhous, et al. *The Official History of the Royal Canadian Air Force Vol. 3: The Crucible of War 1939-1945* (Toronto: Univ. of Toronto Press, 1994).
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- 8 Douglas, Vol. 2, 226-7.
- 9 John Terraine, *The Right of the Line* (London: Hodder and Stoughton, 1985) 258; and Douglas, Vol 2, 247.
- 10 J.A. Foster, *For Love and Glory* (Toronto: McClelland and Stewart, 1989) 124; Brett Cairns, "Canadian Military Aerospace Power," Vol. 1, (Toronto: Canadian Forces College, nd) 21.
- 11 Materiel is a military term used to cover all supplies and equipment used in operations. See glossary for official definitions.
- 12 Cairns, Vol. 2, 59-60.
- 13 Cairns, Vol. 2, 60.
- 14 "Shaping the Future of the Canadian Forces: A Strategy for 2020," (June 1999), accessed at http://www.cds.forces.gc.ca/pubs/strategy2k/intro_e.asp, 4, 8, 10.

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- 1 JWR Taylor, *A History of Aerial Warfare*, (London: Hamlyn, 1974) 9-13.
- 2 See Basil Collier, *A History of Air Power*, (London: Weidenfeld & Nicolson, 1974); also Lee Kennett, *The First Air War 1914-1918*, (Toronto: The Free Press, 1991); Ernst Wilhelm von Hoepfner, *Germany's War In the Air*, (Leipzig: AF Koehler, 1921); and S.F. Wise, *Canadian Airmen and the First World War: The Official History of the Royal Canadian Air Force Volume I*, (University of Toronto

- Press, 1980). In fact, military observation by aircraft pre-dated WWI as the Italian army employed aircraft in this role during the Libyan campaign of 1911-12. See Robin Higham, *Air Power: A Concise History*, (Manhattan, KS: Sunflower University Press, 1988).
- 3 R. Cargill Hall, "The Air Force Agenda: A Case Study in Early Spacecraft Technology", from Jacob Neufeld, George M. Watson, Jr, and David Chernoweth, "Technology and The Air Force: A Retrospective Assessment", Air Force History and Museums Project, (Washington, DC: United States Air Force, 1997).
 - 4 AAP-6 (2006) NATO Glossary of Terms and Definitions (Brussels: NATO Standardization Agency, 2006).
 - 5 Ibid.
 - 6 Air Vice Marshal Tony Mason; "The Future of Air Power: Concepts of Operations", *Royal Air Force Air Power Review*. Vol 1, No. 1, (1998) 36.
 - 7 Achieving control of the air environment prevents the enemy from using air power effectively against friendly forces while allowing friendly use of air power against the enemy. Delaying, disrupting or destroying the enemy air forces achieves control of the air, which is usually expressed as air superiority or air supremacy. See glossary for definitions of these two terms.
 8. The concept of the Center of Gravity (CoG) originates from the writings of Clausewitz who expressed the concept as meaning 'the hub of all power and movement, on which everything depends. That is the point at which all of our energies should be directed.' See Carl von Clausewitz; *On War*, edited and translated by Michael Howard and Peter Paret, (Princeton, New Jersey: Princeton University Press, 1984) 595-6. Even today, there remains some debate over how Clausewitz's concept should be translated and interpreted. For example, see Antulio J. Echivarria; *Clausewitz's Center of Gravity: Changing Our Warfighting Doctrine – Again!* (Carlyle, Pa: Strategic Studies Institute, September 2002).
 - 9 While this idea was expressed as early as 1954 (see United States; AFM 1-8 Strategic Air Operations, (Department of the Air Force 1 May 1954) 5, the modern understanding of parallel attack is based on the writings of Col John Warden. See for example John A. Warden III, "The Enemy as a System," *Airpower Journal*, Vol 9, No 2, (Spring 1995).
 - 10 Air Vice Marshal Tony Mason; "The Future of Air Power: Concepts of Operations", *Royal Air Force Air Power Review* Vol 1, No. 1 (1998) 37.
 - 11 CFR – Crash Fire Rescue. This is a role of Military Fire Protection Services, provided at military airfields for response to aircraft crashes or incidents. Canada, Department of National Defence, C-08-005-120/A6-000 Realty Asset Management Manual, (Ottawa: Department of National Defence, 2002) Ch 10.
 - 12 Canada, Department of National Defence, B-GJ-005-300/FP-000, *Canadian Forces Operations*, (Ottawa : Department of National Defence, 2005) 2-1.
 - 13 Defence Terminology Bank.

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- 1 Canada, Department of National Defence, "B-GJ-005-300/FP-000, *Canadian Forces Operations*" (Ottawa: Department of National Defence, 2005) 2-1.
- 2 Ibid, p. 2-1.
- 3 Ross Pigeau and Carol McCann, "Re-Conceptualizing Command and Control," *Canadian Military Journal* 3, no. 1 (Spring 2002), 56.
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- 5 Ross Pigeau and Carol McCann, "Re-Conceptualizing Command and Control," 54.
- 6 David K. Gerber, "Adaptive Command and Control of Theater Airpower," Air University Press, Maxwell Air Force Base, Alabama, March 1999, 8.
- 7 North Atlantic Treaty Organization/Partners for Peace, "AJP-3.3: Joint Air and Space Operations Doctrine," (Brussels: North Atlantic Treaty Organization/Partners for Peace, 2002), Section 305, 3-4.

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Glossary

Note: The definitions contained in this glossary are derived from a number of sources. Where this publication is the source of a definition, no source is indicated. Definitions taken from other sources are indicated in parentheses at the end of each term, utilizing the following abbreviations:

- a. AFDD 1-2 - *Air Force Glossary (USAF)*
- b. AJP 3.3.4 - *Air Operations Support*
- c. AJP-01 - *Allied Joint Doctrine*
- d. B-GJ-005 - *CF Operations (B-GJ-005-300/FP-000)*
- e. COD - *The Concise Oxford Dictionary*
- f. DPN - *Defence Policies of Nations: A Comparative Study - Glossary*
(Edited by Douglas J. Murray and Paul R. Viotti)
- g. DTB - *DND Defence Terminology Bank*, found online at <http://terminology.mil.ca/>
- h. JP 1-02 - *US Joint Pub 1-02, Dictionary of Military Terms*
- i. JWP 0-01 - *British Defence Doctrine*

aerospace (aerospace environment)

Meaning air and space, the environment that surrounds the earth and extends vertically into space from the earth's surface.

Aerospace Doctrine Authority (ADA)

The designated Air Force staff position with authority over all aspects of the development, production and dissemination of CF aerospace doctrine. The ADA is the chairman of the Aerospace Doctrine Committee (ADC), and coordinating authority for CF joint and combined doctrine that encompasses aerospace functions. The DG Air FD is the designated ADA.

Aerospace Doctrine Committee (ADC)

The designated Air Force body responsible for overseeing the development, control and advocacy of aerospace doctrine. The ADC is established under the authority of the CAS/Comd AIRCOM.

aerospace function

The broad, fundamental and continuing activities of aerospace forces. Aerospace functions can most effectively or solely be performed within or from the aerospace environment. They represent the primary operational capabilities of the Air Force by which it accomplishes the assigned Defence Tasks.

aerospace medicine

The specialty of medicine concerning the determination and maintenance of the health, safety, and performance of those who fly in air or space. The military applications of this specialty directly support the full spectrum of aerospace operations. Aeromedical operations deliver four basic effects in support of military air operations: ensuring fit and healthy forces; preventing casualties; restoring health; and optimizing human performance. (AJP 3.3.4)

aerospace operation

Activity related to the planning and application of aerospace power organized in time and space to achieve specific objectives. Operations normally involve more than one mission or type of mission.

aerospace platform

The vehicles through which aerospace power achieves effect. Aerospace platforms have inherent advantages of speed, reach and manoeuvrability in comparison with platforms that operate in the maritime or land environments.

aerospace power

That component of military power that is applied within or from the aerospace environment to achieve effects above, on and below the surface of the earth.

air component commander

A commander, designated by the JFC/CFC or higher authority, responsible for making recommendations to the JFC/CFC on the proper employment of assigned, attached, and/or made available forces; for tasking air forces; planning and coordinating air operations; or accomplishing such operational missions as may be assigned. The joint force air component commander or the combined force air component commander is given the authority necessary to accomplish missions and tasks assigned by the establishing commander. Also called JFACC/CFACC. (AJP-01)

air force

The branch of the armed forces charged with generating and projecting aerospace power in defence of the nation and its national interests and institutions. Although the Canadian Forces is a unified force comprising a single service, it has become common practice to refer to the three Environmental Commands (ECs) as the Navy, Army and Air Force.

airlift

Operations to transport and deliver forces and materiel through the air in support of strategic, operational, or tactical objectives. Also referred to as air transport. (AFDD 1-2)

air refuelling

The capability to refuel aircraft in flight, which extends presence, increases range, and serves as a force multiplier. Also called AR. Also referred to as air-to-air refuelling (AAR). (JP 1-02)

air superiority

That degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force. (DTB)

air supremacy

That degree of air superiority wherein the opposing air force is incapable of effective interference. (DTB)

campaign

A set of military operations planned and conducted to achieve a strategic objective within a given time and geographical area, which normally involves maritime, land and air forces. (DTB)

capstone manual

A manual of overarching importance within a hierarchy of manuals that deals with the fundamental aspects of a broad subject matter, and having precedence over all other manuals within that subject regardless of sub-domain. (DTB)

centre of gravity

Characteristics, capabilities, or localities from which a nation, an alliance, a military force or other grouping derives its freedom of action, physical strength or will to fight. (DTB)

coalition

1. An ad hoc agreement between two or more nations for a common action. (DTB) 2. A grouping of nations or forces, usually on a temporary basis, for the accomplishment of a stated goal. (JWP 0-01)

combat operation

A military operation where the use or threatened use of force, including lethal force, is essential to impose will on an armed opponent or to accomplish a mission. The actual level of force used will be in accordance with specified rules of engagement. (DTB)

combat search and rescue

The detection, location, identification and rescue of downed aircrew in hostile territory in time of crisis or war and, when appropriate, isolated military personnel in distress, who are trained and equipped to receive combat search and rescue support. (DTB)

combined

Adjective used to describe activities, operations and organizations, in which elements of more than one nation participate. (DTB)

command

1. The authority vested in an individual of the armed forces for the direction, coordination, and control of military forces. (DTB) 2. An order given by a commander; that is, the will of the commander expressed for the purpose of bringing about a particular action. (DTB) 3. A unit, or group of units, organization, or area under the authority of a single individual. (DTB) 4. To exercise command. (DTB)

command and control

The exercise of authority and direction by a designated commander over assigned forces in the accomplishment of the force's mission. The functions of command and control are performed through an arrangement of personnel, equipment, communications, facilities, and procedures which are employed by a commander in planning, directing, coordinating and controlling forces in the accomplishment of [their] mission. (DTB)

contingency operations

Contingency operations can be conducted in either a domestic or international theatre. If an operation does not fall into the routine category, then it is a contingency operation, and a grouping tailored to the operation is generated. Any grouping created for a contingency operation, regardless of size, is designated a task force.

control

That authority exercised by a commander over part of the activities of subordinate organizations, or other organizations not normally under [their] command, which encompasses the responsibility for implementing orders or directives. All or part of this authority may be transferred or delegated. (DTB)

crash fire rescue (CFR)

The pursuit of rescue and fire fighting at the scene of an aircraft accident. (DTB)

doctrine

Fundamental principles by which the military forces guide their actions in support of objectives. It is authoritative but requires judgment in application. (DTB)

dogma

A principle or set of principles laid down by an authority as incontrovertible. (COD)

force

1. An aggregation of military personnel, weapon systems, vehicles and necessary support, or combination thereof. (JP 1-02) 2. A major subdivision of a fleet. (JP 1-02)

force development (FD)

A system of integrated and interdependent processes that identifies necessary changes to existing capability and articulates new capability requirements for the CF. It is driven by changes in policy, actual or projected changes in the security environment and lessons learned from operations. Force development comprises capability based planning, capability management and capability production. (DTB)

force employment (FE)

The command, control and sustainment of generated forces on operations. (DTB)

force generation

1. The process of bringing forces, or part of them, to a state of readiness for operations, by assembling, and organizing personnel, supplies, and materiel. This task includes the training and equipping of forces and the provision of their means of deployment, sustainment and recovery to meet all current and potential threats. Account must be taken of the need to cater for concurrent operations and timely recuperations. It also embraces the mobilisation,

regeneration and reconstitution necessary to meet a major conflict, such as general war, and the long-term development of capability to meet changing circumstances. (DTB) 2. The process by which military resources are assembled, trained and deployed to meet a requirement. (DTB)

force protection

All measures taken to contribute to mission success by preserving freedom of action and operational effectiveness through managing risks and minimizing vulnerabilities to personnel, materiel, facilities, information, and activities from all threats. (DTB)

intelligence

The product resulting from the processing of information, concerning foreign nations, hostile or potentially hostile forces or elements, or areas of actual or potential operations. The term is also applied to the activity which results in the product, and to the organization engaged in such activity. (DTB)

intelligence, surveillance, and reconnaissance

Integrated capabilities to collect, process, exploit and disseminate accurate and timely information that provides the battlespace awareness necessary to successfully plan and conduct operations. (AFDD 1-2)

interoperability

The ability of the forces of two or more nations to train, exercise and operate effectively together in the execution of assigned missions and tasks. Also known as Force Interoperability.

joint

Adjective used to describe activities, operations and organizations in which elements of at least two services participate. (DTB)

keystone manual

A manual of seminal importance under an overarching capstone manual within a hierarchy of publications that deals with the fundamental aspects of a specific subject matter, and on which are based related supporting manuals published in the same field. (DTB)

leadership

1. The art of influencing human behaviour so that subordinates willingly carry out orders to effectively accomplish military missions. 2. Influencing people to achieve a mission. (DTB)

logistics

The science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with:

- a. design and development, acquisition, storage, transport, distribution, maintenance, evacuation, and disposition of materiel;
- b. transport of personnel;
- c. acquisition, construction, maintenance, operation, and disposition of facilities;
- d. acquisition or furnishing of services; and
- e. medical and health service support. (DTB)

materiel

Military materials and equipment. The stores and equipment used in warfare; includes ships, land vehicles, aircraft, weapons, munitions, clothing, etc. (DTB)

military power

The total of a nation's military capabilities or potential derived from available naval, land and aerospace forces.

mission

The essential activities assigned to an individual, unit, or force. It contains the elements of who, what, when, where, and the why (reasons therefore), but seldom specifies how. (DTB)

national interests

A generalized concept of elements that constitute a nation's compelling needs, including self-preservation, independence, national integrity, military security and economic well-being. (DPN)

national objectives

The aims, derived from national goals and interests, toward which a national policy or strategy is directed and efforts and resources of the nation are applied. These may be short-, mid-, or long-range in nature. (JP 1-02)

national power

The sum total of a nation's capabilities or potential derived from available political, economic, military, geographic, social, scientific and technological resources. Leadership and national will are the unifying factors. (DPN)

national security

1. A collective term encompassing both national defence and foreign relations. Specifically, the condition provided by:

- a) a military or defence advantage over any foreign nation or group of nations, or
- b) a favourable foreign relations position, or
- c) a defence posture capable of successfully resisting hostile or destructive action from within or without, overt or covert. (JP 1-02 - mod)

2. The protection of a nation from all types of external aggression, espionage, hostile reconnaissance, sabotage, subversion, annoyance, and other inimical influences. (DPN)

national strategy

The art and science of developing and using the political, economic, and psychological powers of a nation, together with its armed forces, during peace and war, to secure national objectives. (JP 1-02)

operation

1. A military action or the carrying out of a strategic, [operational], tactical, service, training, or administrative military mission. (DTB) 2. The process of carrying on combat, including movement, supply, attack, defence and manoeuvres needed to gain the objectives of any battle or campaign. (DTB)

principles of war

Broad precepts distilled from experience which influences the conduct of armed conflict and which should inform all strategic and operational decisions. There is some variation between the principles accepted by different nations. (JWP 0-01)

readiness

The capability of a unit/formation, ship, weapon system or equipment to perform the missions or functions for which it is organized or designed. May be used in a general sense or to express a level or degree of readiness.

reconnaissance

A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. (DTB)

role

The fundamental and most demanding role for air forces is to generate, apply and sustain aerospace power in combat operations: domestically, in defence of the nation; or abroad, alongside allies or coalition partners.

rules of engagement

Directives issued by competent military authority which specify the circumstances and limitations under which forces will initiate and/or continue combat engagement with other forces encountered. (DTB)

search and rescue

The use of aircraft, surface craft submarines, specialized rescue teams, and equipment to search for and rescue personnel in distress on land or at sea. (DTB)

security

1. The condition achieved when designated information, materiel, personnel, activities and installations are protected against espionage, sabotage, subversion and terrorism, as well as against loss or unauthorized disclosure. (DTB) 2. The measures necessary to achieve protection against espionage, sabotage, subversion and terrorism, as well as against loss or unauthorized disclosure. (DTB) 3. The organizations responsible for protecting against espionage, sabotage, subversion and terrorism, as well as against loss or unauthorized disclosure. (DTB)

sortie

In air operations, an operational flight by one aircraft. (DTB)

spectrum of conflict

The spectrum of conflict describes the varying states of relations between nations or groups, and the continuum of operations relates to the range of military responses to peace and conflict (including war). (B-GJ-005)

surveillance

The systematic observation of aerospace, surface, or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means. (DTB)

sustainment

The requirement for a military force to maintain its operational capability for the duration required to achieve its objectives. Sustainment consists of the continued supply of consumables, and the replacement of combat losses and non-combat attrition of equipment and personnel. (B-GJ-005)

task

An activity which contributes to the achievement of a mission. (DTB)

task force

1. A temporary grouping of units, under one commander, formed for the purpose of carrying out a specific operation or mission. (DTB) 2. A semi-permanent organization of units, under one commander, formed for the purpose of carrying out a continuing specific task. (DTB)

transformation

A continuous and proactive process of developing and integrating innovative concepts, doctrines and capabilities in order to improve the effectiveness and interoperability of military forces. (DTB)

war

1. The most extreme manifestation of armed conflict, characterized by intensive, extensive and sustained combat, usually between states. (JWP 0-01) 2. Open and often prolonged conflict between nations (or organized groups within nations) to achieve national objectives. (AFDD 1-2)

weapon system

A combination of one or more weapons with all related equipment, materials, services, personnel, and means of delivery and deployment (if applicable) required for self-sufficiency. (DTB)







