ROYAL CANADIAN AIR FORCE
DOCTRINE

CANADIAN
ARMED FORCES

FORCES ARMÉES
CANADIENNES

National Defence   Défense nationale

Canada

FOREWORD

The Royal Canadian Air Force (RCAF) is an instrument of national policy and an element of national power. Canada's Air Force delivers air power to control and exploit the air environment in order to execute assigned missions and tasks that contribute to Canadian security and national objectives.

Our capstone doctrine is essential because it is the overarching guide for the proper application of air power. The primary change to our capstone and keystone doctrine is how we look at RCAF capabilities and roles in order to execute missions. This new way of thinking breaks down capability stovepipes and presents a more integrated, less platform-specific view of air power operations. Each fleet can be expected to operate in many of the capability areas with the common goal of executing the mission.

The new suite of doctrine is presented in a way that is easier to understand and can be converted into practice at the tactical level. Information from lessons learned and international forums will lead to increased interoperability with our Army, Navy, special operations forces, and coalition partners. Refocusing our doctrine will set the conditions that ensure continued mission success. This third edition, *Royal Canadian Air Force Doctrine,* is enduring in nature and flexible in its application.

The six RCAF functions—Command, Sense, Act, Shield, Sustain, and Generate— are still applicable and should always be considered when planning operations; however, they are no longer used to categorize each capability. Operations over the past decade have demonstrated that the RCAF will continue operating within a joint and coalition construct for years to come. RCAF doctrine that aligns with the core capabilities of our principal allies and joint partners will better enable the employment of Canadian air power during multinational operations.

This publication presents the capstone RCAF doctrine, with emphasis on the air power capabilities and roles, and extends to the missions and tasks that the RCAF executes. Correspondingly, RCAF keystone doctrine will be structured on traditional air-force capabilities and roles, albeit related to some extent back to the functions. Most importantly, a more intuitive connection to the activities conducted at the tactical level will be established.

M. J. Hood
Lieutenant-General
Commander RCAF

PREFACE

This manual provides the overarching and fundamental principles that guide the application of air power. This manual has been designed for use by the following:

a. Canadian Armed Forces (CAF) schools and academies that train, indoctrinate, and develop personnel in the sustainment and support of air operations and activities;

b. Royal Canadian Air Force (RCAF) units and headquarters (HQ); and

c. other CAF elements proposing to command or support CAF air forces.

This manual is presented in 6 chapters:

a. **Chapter 1 – Air Power Doctrine.** Sets the stage for RCAF air power, outlines its importance to national security, and provides descriptions of doctrine and air doctrine.

b. **Chapter 2 – Canada's Air Force.** Lays out a brief history of the RCAF and how it affected air power doctrine development.

c. **Chapter 3 – Fundamentals of Air Power.** Discusses the fundamentals and characteristics of air power.

d. **Chapter 4 – The RCAF Functions.** Describes how the RCAF uses the six Air Force functions and their importance in conducting operations.

e. **Chapter 5 – RCAF Capabilities.** Lays out the core and enabling capabilities of the RCAF.

f. **Chapter 6 – Delivery of Canadian Air Power.** Discusses how the RCAF employs air power at home and abroad.

Recommendations for amendments to this publication are welcome and should be forwarded to the Canadian Forces Aerospace Warfare Centre, attention: Doctrine Development Branch.

Commander RCAF, the Air Doctrine Authority, is the approval authority for this doctrine.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

AIR POWER DOCTRINE

INTRODUCTION

Air power is that element of military power applied within or from the air environment to achieve effects above, on, and below the surface of the Earth.[1] In its earliest form, air power was used for observation purposes to gain a perspective over the battlefield that was not achievable using surface-based assets. Air power has evolved from being an element of land and sea power to being an important, inherently flexible, and dominating form of military power in its own right. History has shown that the continued modernization of air weapons, platforms, and delivery systems has heightened the importance of air power in the global balance of power to the point where air power can be employed independently across the spectrum of conflict.[2] It can be integrated with Land and Maritime forces to contribute to joint and multinational operations, or it can be integrated in a whole-of-government or comprehensive approach. The employment of air power along the spectrum of conflict, as depicted in Figure 1-1, requires air power doctrine that is scalable to meet the needs of the operation.

PEACE : CONFLICT : WAR

Figure 1-1. The spectrum of conflict

By extension, Canadian air power is a fundamental component of Canada's military power and contributes to national security by providing air power effects for the Canadian Armed Forces (CAF) and the Government of Canada. As a component of CAF, the Royal Canadian Air Force (RCAF) provides security to Canada, its citizens, and its interests around the world.

NATIONAL SECURITY / NATIONAL INTERESTS

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."[3]

National interests can include: ensuring national sovereignty and the physical security of the country, its people, and territories; safeguarding national institutions and values; and enhancing the economic and social well-being of its people.

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1. *Defence Terminology Bank* (*DTB*) record 43951, accessed June 2, 2015, http://terminology.mil.ca/term-eng.asp. Director General Space coordinates and oversees the fulfillment of the Defence Space Programme, ensuring coherence across the Department of National Defence (DND) and compliance with federal-government objectives in the use of space systems, providing the centre of expertise and advice to the Minister of National Defence on defence space-related matters, and coordinating the human-resources requirements for space.

2. Canada, DND, B-GJ-005-000/FP-001, Canadian Forces Joint Publication (CFJP 01), *Canadian Military Doctrine* (Ottawa: Department of National Defence, 2011), 2-12.

3. W. D. Macnamara and Ann Fitz-Gerald, "A National Security Framework for Canada," *Policy Matters* 3, no. 10 (October 2002): 8, accessed June 2, 2015, http://irpp.org/research-studies/policy-matters-vol3-no10/.

Today, most nations consider that their own interests are increasingly linked to those of their allies and that these, in turn, are progressively influenced by the broader global responsibilities of the international community.

National power is a nation's total capability to achieve its national objectives. It encompasses a wide array of interrelated capabilities and includes diplomatic, informational, military, and economic elements. The military element of national power, often referred to as military power, "is the potential of military capabilities that a nation possesses."[4] It is the instrument of national strategy normally exercised by the government when other means have failed or require reinforcement. Military power consists of three principal forms: sea power, land power, and air power. From an RCAF perspective, projecting military power requires sound, well-defined air doctrine.

WHAT IS DOCTRINE?

Doctrine is defined as the "fundamental principles by which military forces guide their actions in support of objectives."[5] Military doctrine is the foundation for every aspect of military activity.

A sound doctrinal framework provides the basis for operations and training, guides commanders, and permits individuals to think and act more clearly while engaged in conflict.[6] 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.

Although it is authoritative, doctrine requires judgement in application. As such, doctrine is not rigid and should not curtail a commander's freedom of action.[7] Nevertheless, the CAF *Doctrine Development Manual* explains "users will depart from applying established doctrine only after considering the doctrine in light of particular circumstances within an operation and the doctrine is wanting in some respect."[8]

Departures from doctrine may indicate that the doctrine itself requires amendment. Doctrine is, therefore, not static; to be relevant it needs to remain in concert with how forces evolve in response to experience, new technologies, and a multitude of other factors. In this way, doctrine must be revalidated continuously and never be considered as dogma.[9]

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4. CFJP 01, *Canadian Military Doctrine*, 2-3.

5. *DTB* record 1761.

6. CFJP 01, *Canadian Military Doctrine*, 1-2.

7. I. B. Holley Jr., "A Modest Proposal: Making Doctrine More Memorable," *Airpower Journal* 9, no. 4 (Winter 1995): 14–20.

8. Canada, DND, A-GJ-025-0A1/FP-001, CFJP A1, *Doctrine Development Manual* (Ottawa: Department of National Defence, 2013), 1-2.

9. *The Concise Oxford English Dictionary*,12th ed., defines dogma as a set of principles laid down by an authority as incontrovertible.

MILITARY DOCTRINE

CAF doctrine is divided into three levels: strategic, operational, and tactical, as depicted in Figure 1-2. Strategic doctrine sets out the fundamental and enduring principles that guide military forces across the continuum of operations. Operational doctrine applies these principles to describe the use of armed force in the context of distinct objectives, force capabilities, mission types, and operating environments.[10] Tactical doctrine is guided by the higher levels of doctrine in detailing the proper use of specific weapon systems and other resources in order to execute tasks to achieve a specific aim. The boundaries between these levels are not always distinct and can sometimes overlap, depending on circumstances.

STRATEGIC
(Guiding Principles)

OPERATIONAL
(Objectives and Force Capabilities)

TACTICAL
(Use of Weapon Systems)

Figure 1-2. Three levels of doctrine

Military doctrine is also categorized into three distinct types:

a. **Environment-specific doctrine.** Doctrine that reflects the environments in which military operations take place. Sea, land, and air power have distinct characteristics and applications that provide complementary contributions to national and multinational military operations.

b. **Joint doctrine.** Doctrine that provides the fundamental principles that guide the employment of forces from two or more environments in coordinated action toward a common objective.

c. **Multinational doctrine.** Doctrine that describes the best way to integrate and deploy national forces of more than one nation in coalition or alliance operations, such as North Atlantic Treaty Organization (NATO) doctrine.

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10. CFJP 01, *Canadian Military Doctrine,* 1-2–1-3.

The relationships between the categories of doctrine are illustrated in Figure 1-3. The CAF doctrine hierarchy originates with the capstone B-GJ-005-000/FP-001, Canadian Forces Joint Publication (CFJP) 01, *Canadian Military Doctrine* manual, which provides strategic guidance for CAF doctrine, while harmonizing with Government of Canada defence policy and allied doctrine. Accordingly, all doctrine development must be traceable back to the capstone tenets. Each environment has its own capstone manual at the strategic level: this publication, the B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, is the capstone for air doctrine. Operational-doctrine publications immediately below the capstone level are referred to as keystone manuals. The keystone level focuses on specific capability areas, for example, air mobility, control of the air, and air attack. Below the keystone level are the tactics, techniques and procedures (TTP) manuals, which are very detailed and describe the conduct of tactical activities and tasks. To facilitate interoperability, CAF strategic, operational, and tactical doctrine must be consistent with the doctrine of our principal allies and alliances. In this regard, CAF actively participates in the development and ratification of multinational doctrine within NATO. In addition, due to some similarities in force structures and the strong probability that Canada will participate in coalition operations, Canada is an active participant in doctrine development with the armed forces of the United States, the United Kingdom, Australia, and New Zealand. These relationships ensure that CAF doctrine is compatible with the joint and multinational doctrine of NATO and the Five Eyes[11] community.[12]
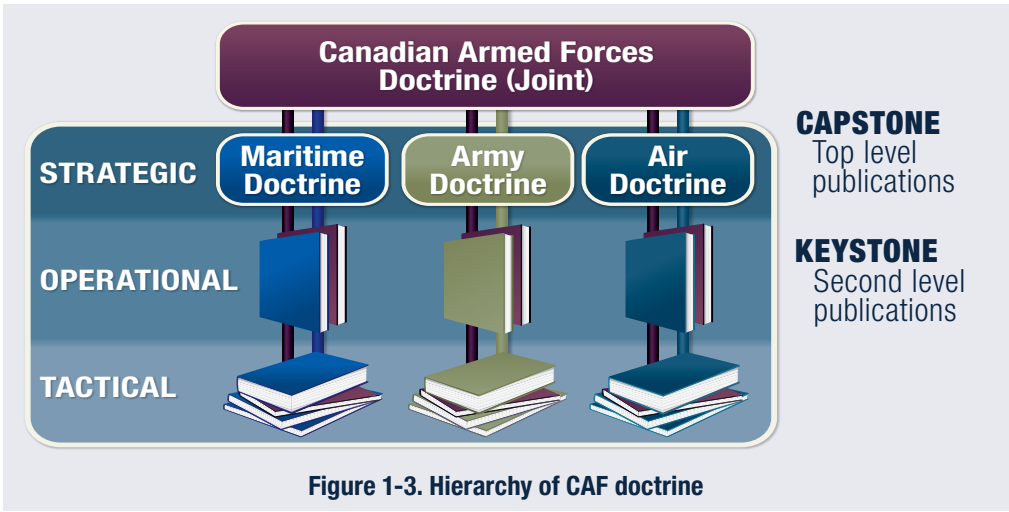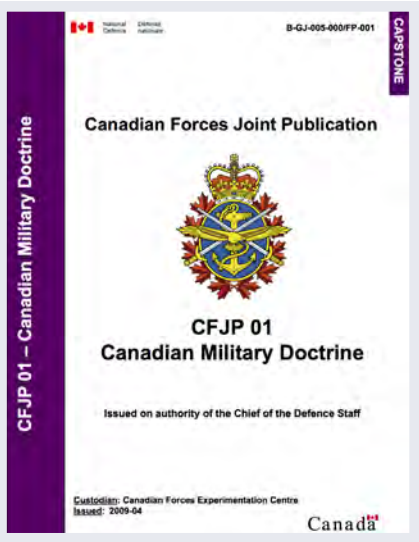

Figure 1-3. Hierarchy of CAF doctrine

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11. See *DTB* record 47288.

12. CFJP 01, *Canadian Military Doctrine*, 1-4.

AIR DOCTRINE

Capstone air doctrine expresses fundamental and enduring principles that describe and guide the proper application of air power. Capstone doctrine draws on strategic and joint guidance to describe the conditions that shape the force and determine the government's options for its employment. It is the foundation for all other levels of air doctrine and establishes the framework for the effective use of air power. CAF strategic air doctrine, as promulgated in this capstone manual, is the foundation for all other levels of air doctrine and establishes the framework for the effective use of air forces.

Keystone air doctrine applies the principles of capstone doctrine to the organization and employment of air forces. It defines air power capabilities within the context of the Air Force functions. Keystone doctrine is the foundation for the development of tactical doctrine. Operational air doctrine, in the RCAF keystone manuals, is the focus for developing the missions and tasks of air operations.

Tactical air doctrine applies the principles of keystone doctrine to explain how to employ air power capabilities to accomplish desired effects. Tactical doctrine is codified in the body of TTP, standard-manoeuvre manuals, and other publications. Tactical doctrine considers particular tactical objectives as well as tactical conditions (e.g., threats, weather, and terrain) and describes how specific capabilities are employed to achieve operational effects.

CANADIAN ARMED FORCES AIR DOCTRINE AUTHORITY

RCAF doctrine is developed and promulgated through Air Force Order 8000-0, Air Doctrine, on the authority of the Commander (Comd) of the RCAF. The Comd RCAF is the Air Doctrine Authority (ADA) with authority over all aspects of the development, production, and dissemination of RCAF doctrine.

The Deputy Commander RCAF is the appointed Air Doctrine Programme Authority (ADPA) with the authority to oversee the Air Doctrine Programme on behalf of the ADA. The ADPA fulfils the responsibilities of the Air Doctrine Committee (ADC) Chair and is the designated coordinating authority for CAF joint and multinational doctrine that encompasses air functions.

The Commanding Officer of the Canadian Forces Aerospace Warfare Centre is the appointed Air Doctrine Technical Authority with the authority to manage the Air-doctrine-development process on behalf of the ADPA.

The ADC is the body responsible for overseeing the development of all air doctrine. Membership on the ADC is structured to represent all RCAF capability advisory groups as well as air doctrine and select joint stakeholders.

CANADA'S AIR FORCE

INTRODUCTION

A complete understanding of air power doctrine requires an appreciation of its historical underpinnings. The history of the Royal Canadian Air Force (RCAF) is rooted in the earliest days of military aviation. Shaped by the experiences of two world wars, numerous regional conflicts, and United Nations (UN) operations, the RCAF has unique characteristics based not only on these experiences but also on Canadian geography, culture, and political heritage. To meet the security needs of the country and to keep pace with rapid advances in technology, the RCAF and its doctrine continue to evolve, enabling the force to operate independently, jointly, or alongside allies and coalition partners. This chapter provides an overview of the evolution of the RCAF and its related doctrine.[1]

CAF Photo

THE EARLY YEARS

Canada played a significant role in the First World War, when Canadian airmen provided both quantity and quality to the Royal Flying Corps, the Royal Naval Air Service, and the Royal Air Force (RAF). Approximately 25 per cent 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] Canada's major contribution to the air war was in aircrew training, producing at least 20 per cent of the aircrew-reinforcement needs of the British Empire and providing

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1. For those who would like to explore Canadian Air Force history in more detail, the following books are recommended: W. A. B. Douglas, *The Creation of a National Air Force: The Official History of the Royal Canadian Air Force*, vol. 2 (Toronto: University of Toronto Press, 1986); and Brereton Greenhous et al., *The Crucible of War, 1939–1945: The Official History of the Royal Canadian Air Force*, vol. 3 (Toronto: University of Toronto Press, 1994).

2. "WWI Aces of Canada," The Aerodrome, accessed June 2, 2015, http://www.theaerodrome.com/aces/canada/index.php.

vital assistance to the United States (US) after it entered the war in April 1917.[3] In the last months of the war, the government felt that the large number of Canadians serving overseas in British units merited the formation of a national organization and established a Canadian air force consisting of two squadrons based in England. At the same time, a desire to enhance national defence against German submarines operating against allied shipping off the East Coast led to the creation of the Royal Canadian Naval Air Service in Canada. It is from all of the formations mentioned above that the RCAF descended, highlighting both a domestic and expeditionary heritage. After the war, these organizations disappeared, but there remained some 13,000 trained aviators in Canada whom some believed could form the basis of an air militia.

In June 1919, the Air Board was created to supervise all air activities in Canada, both military and civilian, and on 18 February 1920, the Canadian Air Force was reformed as a non-permanent force under the Air Board.[4] On 1 April 1924, the Canadian Air Force became the Royal Canadian Air Force, 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 programme 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.[5] As a result, early Canadian military pilots were described as "bush pilots in uniform,"[6] and the RCAF remained a small organization consisting of permanent, non-permanent, and reserve elements.

During the Second World War, the RCAF expanded to a peak strength of 210,000 in March 1944, almost 200 times its peacetime strength.[7] RCAF personnel served overseas in both RAF and RCAF formations. Within Canada, the Home War Establishment engaged German submarines off the East Coast, participated in multinational operations against the Japanese in Alaska, and worked with the US to ensure North American security. Once again, Canada excelled in aircrew training; the more than 100 British Commonwealth Air Training Plan schools in Canada[8] furnished 44 per cent of the 340,000 Commonwealth aircrew trained between 1939 and 1945.[9]

During this period, the RCAF had no written doctrine for offensive and defensive air operations to allow for British–Canadian interoperability; therefore, the RAF's doctrine was used.

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3. Hiram Bingham, *An Explorer in the Air Service* (New Haven: Yale University Press, 1920), 11–22.

4. Leslie Roberts, *There Shall Be Wings* (Toronto: Clarke, Irwin & Co., 1959), 33.

5. Douglas, *Creation of a National Air Force*, 65–75.

6. Allan Douglas English, *The Cream of the Crop: Canadian Aircrew, 1939-1945* (Montreal: McGill-Queen's University Press, 1996), 11.

7. Robin D. S. Higham, *One Hundred Years of Air Power and Aviation* (College Station: Texas A&M University Press, 2003), 212.

8. Douglas, *Creation of a National Air Force*, 226–67.

9. Ibid., 247; and John Terraine, *The Right of the Line* (London: Hodder and Stoughton, 1985), 258.

CAF Photo

THE COLD WAR

The North Atlantic Treaty Organization (NATO), created in 1949, was the West's answer to the economic and military threats posed by the Union of Soviet Socialist Republics (USSR) 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 bombers to carry this strategic weapon. The Cold War had begun.

During the post–Second World War period, there were two key developments in the Canadian military. First, the three environments moved from using small, peacetime permanent forces as a nucleus for mobilization to one that relied on established forces. The RCAF Regular Force reached an unprecedented peacetime strength of over 3,000 aircraft in 41 squadrons, with personnel strength of 54,000.[10] The second development was the decision of the Canadian government to commit itself to three international organizations: the UN in 1945, NATO in 1949, and the North American Air Defence Command (NORAD) in 1958. Although Canada went to war in Korea in 1950 under a UN banner, from an RCAF perspective it was the commitment to NATO's integrated forces of 12 fighter squadrons based in Europe and several maritime-patrol squadrons based in eastern Canada that took the most effort. The RCAF—in support of NORAD—also provided 11 air-defence squadrons and personnel to man the various radar formations.

To deal with this expansion, the RCAF organized itself into six functional commands: Maritime Air Command, Air Defence Command, Training Command, Air Materiel[11] Command, Tactical Air Command, and Air Transport Command. At this point, RCAF doctrine began to diverge from its RAF heritage to that of its United States Air Force partner in NORAD and its allies in NATO. At the same time, RCAF support of UN peacekeeping and nationally directed humanitarian assistance grew. Due to the broad divergence of mission types, practices in Europe were often different from those in North America. Thus, there was no overriding RCAF air power doctrine.

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10. J. A. Foster, *For Love and Glory* (Toronto: McClelland and Stewart, 1989), 124; and Brett Cairns, *Canadian Military Aerospace Power* (Toronto: Canadian Forces College, n.d.) 1: 21.

11. "Materiel" is a military term used to cover all supplies, materials, and equipment used in operations. See Glossary for official definition.

UNIFICATION

On 1 February 1968, as stipulated in the 1967 Canadian Forces Reorganization Act, the RCAF ceased to exist, and its assets, along with former Canadian Army and Royal Canadian Navy aircraft and personnel, were distributed among 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. The elimination of the RCAF also abolished the processes and institutions of Air Force doctrine. The Air Force Council was dissolved, and the RCAF Staff College was transformed into a unified Canadian Armed Forces (CAF) staff college.

What was referred to as the "Air Element" suffered an identity crisis for the next seven years. 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, including policy and standards for training and flight safety. 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 Canadian Forces (CF) were 10 Tactical Air Group (TAG) and Maritime Air Group. In the 1980s, new equipment (e.g., the CF188 Hornet, the CP140 Aurora, and modernization of the North Warning System) was seen as an indication of the Canadian Air Force's reinvigoration. However, due to the absence of a coordinating body, air doctrine was fragmented among 58 documents and had no clear plan for promulgation.[12] To address the problem, an air-doctrine symposium was convened in 1984, leading to the formation of the Air Force Doctrine Board, which assumed responsibility for the development of the B-GA-400 series of air doctrine manuals.[13]

As the Cold War came to an end in 1989, there was a reduction in personnel and equipment. RCAF leadership believed that since the Canadian Air Force was committed to specific roles in NATO and NORAD, the doctrine of those organizations would suffice. However, without the guidance of a coherent Air Force doctrine, Department of National Defence prioritization of the air portion of the capital budget was difficult.

POST–COLD WAR

This period saw a reduction in the defence budget as well as in the numbers of Air Force personnel and equipment. In 1997, the Air Force dissolved its functionally based groups (Transport, Fighter, Maritime, Air Reserve, and 10 TAG), and 1 Canadian Air Division was established to exercise operational command of all CF air assets. Commander of Air Command became the Chief of the Air Staff and moved to National Defence Headquarters with a small staff.

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12. Cairns, *Canadian Military Aerospace Power* 2: 59–60.
13. Ibid., 60.

Concurrently, *Out of the Sun: Aerospace Doctrine for the Canadian Forces* was published, capturing the recent restructuring and cultural changes. CAF command and control structures continued to evolve during the 1990s and 2000s, beginning with the Deputy Chief of the Defence Staff, Canadian Expeditionary Forces Command, and finally, Canadian Joint Operations Command, all the while remaining the primary CAF force employer. For the RCAF, the introduction of the wing organization in the early 1990s also had an impact on doctrine. The intent was for the wing to be the man-oeuvre formation and the base commander to be the landlord, responsible for infrastructure and support services. While this did not materialize as intended, the introduction of 2 Wing and the air expeditionary wing / air task force concept partially redressed this situation.

While a high operational tempo after the Cold War validated RCAF tactical doctrine, the lack of higher-level air doctrine created challenges during employment at the operational level. As a result, the RCAF decided to develop a comprehensive suite of capstone and keystone air doctrine. This was aptly timed, as it coincided with participation in the Afghanistan and Libya campaigns. The acquisition of new capabilities (such as strategic- and tactical-airlift fleets) underlined the need to examine new methods of executing RCAF operations.

Since 2005, RCAF doctrine has been tested on operations and, thus, provided a strong basis of how best to employ air power. Iterative improvements have been made by applying lessons learned from recent operations. In some cases, second editions of doctrine have been published, and the effort to educate RCAF personnel about doctrine continues.

CONCLUSION

Throughout its history, the RCAF has taken many forms, but its doctrine has always been congruent with that of its principal allies. Since a strategic goal of CAF today is to achieve seamless operational integration at short notice with our allies, it is likely that this similarity 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; therefore, the RCAF requires doctrine that, while interoperable with that of our allies, reflects the distinct nature of Canadian air power. The integration and alignment of the RCAF's strategic guidance (*Air Force Vectors*), the "RCAF Campaign Plan," and our doctrine will provide a strong basis for a focused and synchronized approach to RCAF operations around the world.
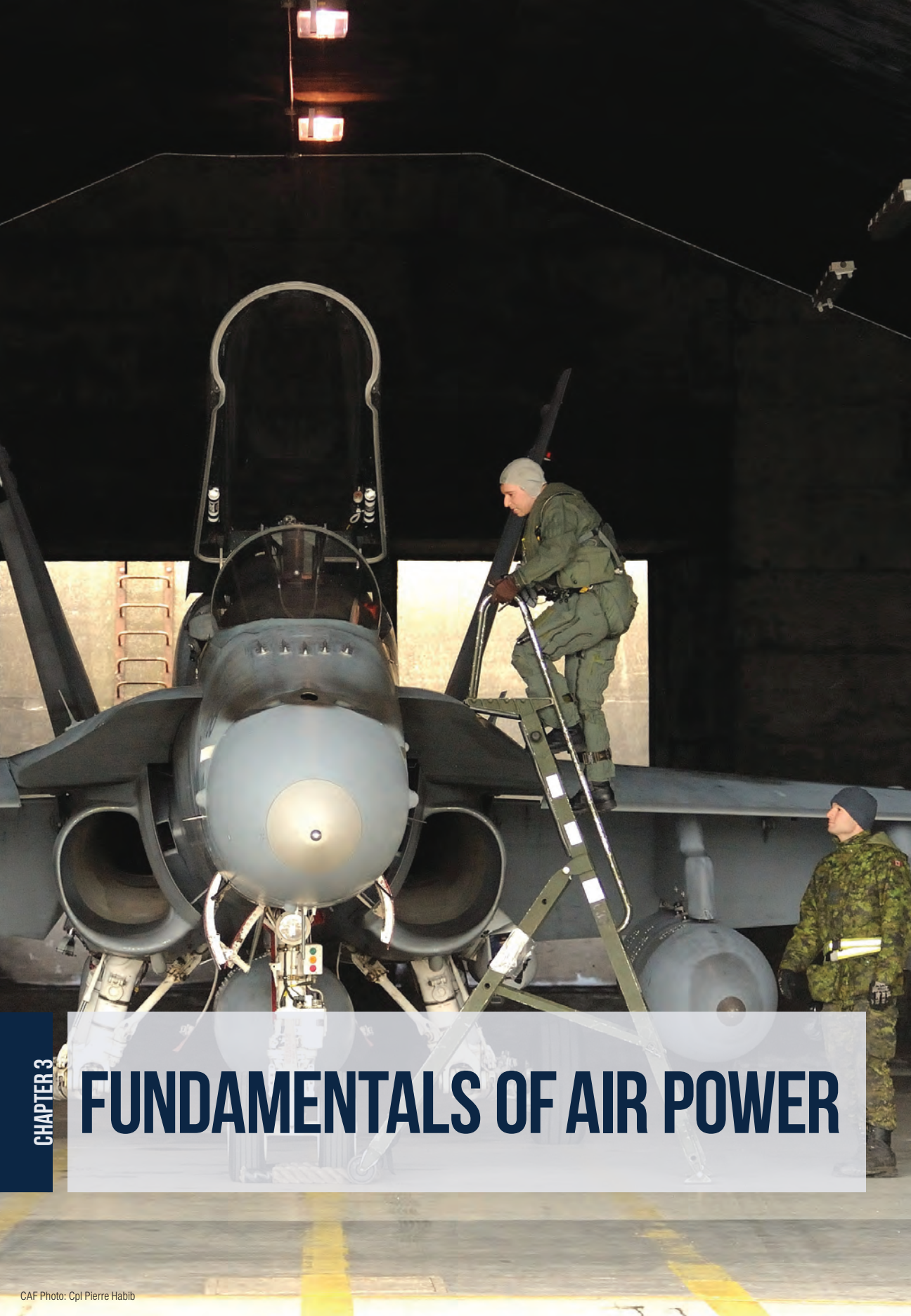
FUNDAMENTALS OF AIR POWER

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. These political objectives 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 judgement, primarily based on knowledge. While common sense and balanced judgement 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 not only unpredictable and chaotic but also permeated with danger, exertion, uncertainty, fear, and chance. Therefore, the commander's decision-making ability must be underpinned by a sound knowledge of certain fundamentals and proven principles.

PRINCIPLES OF WAR

The principles of war[1] as described below are fundamental guidelines for military action and are the most basic form of military doctrine. They are not laws; rather, they are simply indicators of actions that have proven successful in the past. They are as applicable to the air and space environments 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 of the 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 air power is often exercised jointly with the other forms of military power. To disregard the principles of war involves risk and has often brought about failure.

    a. **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.

    b. **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.

    c. **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.

    d. **Security.** Security guards vulnerabilities and protects vital interests. It provides freedom to take offensive action and denies this advantage to an opponent.

    e. **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.

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1. B-GJ-005-000/FP-001, Canadian Forces Joint Publication (CFJP) 01, *Canadian Military Doctrine*, 2-4.

f. **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.

g. **Economy of effort.** Resources are always limited, so they must not be wasted. To achieve maximum concentration at the main area of interest, prudent risk may have to be accepted in other areas.

h. **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.

i. **Cooperation.** Cooperation among elements of a force maximizes the force's capabilities. It entails a unified aim, team spirit, interoperability, division of responsibility, and coordination of effort to achieve maximum effectiveness.

j. **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 economical and effective use of materiel is required at all times.

CHARACTERISTICS OF AIR POWER

Air power is that element of military power applied within or from the air environment to achieve effects above, on, and below the surface of the Earth. The air environment is unique and demands a distinct and considered approach to operations within it. For optimal employment of air power, a fundamental understanding of the following air power characteristics is essential:

a. **Elevation.** The capacity to employ air power above the surface of the Earth offers the ability to observe and influence activities on the surface and below the sea.

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

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

d. **Reach.** Air power can be projected globally, unimpeded by surface features such as mountain barriers or water expanses. The global reach of air power is a distinct characteristic that provides strategic options and contributes to the Canadian Armed Force's power projection.

e. **Speed.** The speed of air 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.

f. **Sensitivity to environmental conditions.** Air power is typically sensitive to environmental conditions. Bad weather, for example, creates difficulties with take-off and landing, navigation, target acquisition, and weapons delivery.

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

h. **Precision.** Air power can be employed with great accuracy and minimal collateral damage because of capabilities provided by precision guided munitions and intelligence, surveillance and reconnaissance systems.

i. **Payload.** The payloads of some air 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 produce a better effect than a large payload delivered later.

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

k. **Support dependency.** Air power requires a high level of technical and logistical support that must be provided from a support base of operations.

CAF Photo: Sgt Donald Clark

APPLICATIONS OF AIR POWER

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

a. **Support.** With speed and reach, air power can provide physical support (e.g., humanitarian relief or military assistance) around the world.

b. **Observe.** Elevation gives air power the ability to locate, monitor, and observe dispositions of enemy activity.

c. **Deter.** The presence of air power as a credible counter-threat can serve as a measure of reassurance and is a considerable deterrent to any potential aggressor.

d. **Deny.** Air power can be used effectively to inhibit or prevent aggressors from employing their forces, thus providing friendly forces with time to strengthen defences or launch spoiling attacks.

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

f. **Defeat.** Air power can be used to diminish the effectiveness of the enemy to the extent that it is unable to participate in combat or at least not fulfil its intention.

g. **Destroy.** Air power has considerable scope to inflict physical destruction on all types of enemy forces, when and where required.

CAF Photo

TENETS OF AIR POWER

The characteristics of air power make it useful for many types of tasks; however, care must be taken to avoid spreading resources and effort too thinly. To ensure the optimal employment of air power, certain fundamental tenets must be observed. These are referred to as the tenets of air power. While the principles of war provide general guidance on how to employ military power, the tenets of air power have been developed from past experience to provide specific considerations for the employment of air power.

a. **Centralized control and decentralized execution.** This is seen as the overarching tenet of air power, as failure to achieve unity of the air effort will marginalize the effects of the other tenets of air power.

(1) Centralized control gives coherence, guidance, and organization to the employment of air power. It is achieved through a single air commander who, informed by a theatre-wide perspective, has the authority to assign the available assets to best achieve the assigned objectives. The air commander is, therefore, responsible for the control (which includes planning, direction, prioritization, allocation, synchronization, integration, and de-confliction) of all air assets. Centralized control ensures the most efficient use of limited air assets and permits one commander to confirm all of the requirements and then assign or reassign resources to specific missions based on changing circumstances and priorities.

(2) Decentralized execution, the delegation of authority to subordinate commanders to execute assigned missions, is subject to the commander's intent, the rules of engagement, and the other parameters established by higher command. Decentralized execution allows commanders at all levels to apply their expertise and understanding of local conditions for mission accomplishment, while also fostering initiative and situational responsiveness in a dynamic environment.

b. **Flexibility and versatility.** These tenets are key to the effective employment of air power. Inherently flexible and uniquely versatile, air resources can be quickly and decisively shifted from one objective to another across a broad spectrum at the strategic, operational, and tactical levels of conflict.

c. **Synergistic effects.** The coordinated employment of air power with or in support of other forms of national power can produce synergistic effects that exceed contributions made by individual forces employed separately.

d. **Persistence.** The persistent employment of air power gives a commander influence and presence in an air environment. Even though air power cannot occupy terrain or remain in constant proximity, its inherent characteristics of speed and reach allow the operational environment to be shaped by revisiting targets persistently over time.

e. **Concentration.** Effective employment of air power must achieve concentration of effort and guard against fragmentation of effort in attempts to fulfil the many competing demands of the operation.

f. **Priority.** Demand for air power will almost always exceed the supply. Because of limited air resources, prioritization of demands is essential for the optimization of air power employment. Air power must be applied where it can make the greatest contribution.

g. **Balance.** It is essential to balance the employment of air power with due consideration for the principles of war and the tenets of air power. It is equally important to balance the impact of accomplishing objectives against the associated risk to friendly forces.

THE RCAF FUNCTIONS

INTRODUCTION

The Royal Canadian Air Force (RCAF) uses the six Air Force functions (Command, Sense, Act, Shield, Sustain, and Generate) as a broad means to develop and employ air power capabilities. The functions should be viewed as factors to consider when employing air power, rather than a series of boxes into which every capability must fit. Every air power capability requires a mix of all of the functions, as illustrated in Figure 4-1. For example, a control-of-the-air operation will have an aspect of Command, an ability to collect information (Sense), an ability to Act, some form of protection (Shield), and some means to Sustain itself.

COMMAND – SENSE – ACT – SHIELD – SUSTAIN – GENERATE

Figure 4-1. The RCAF functions
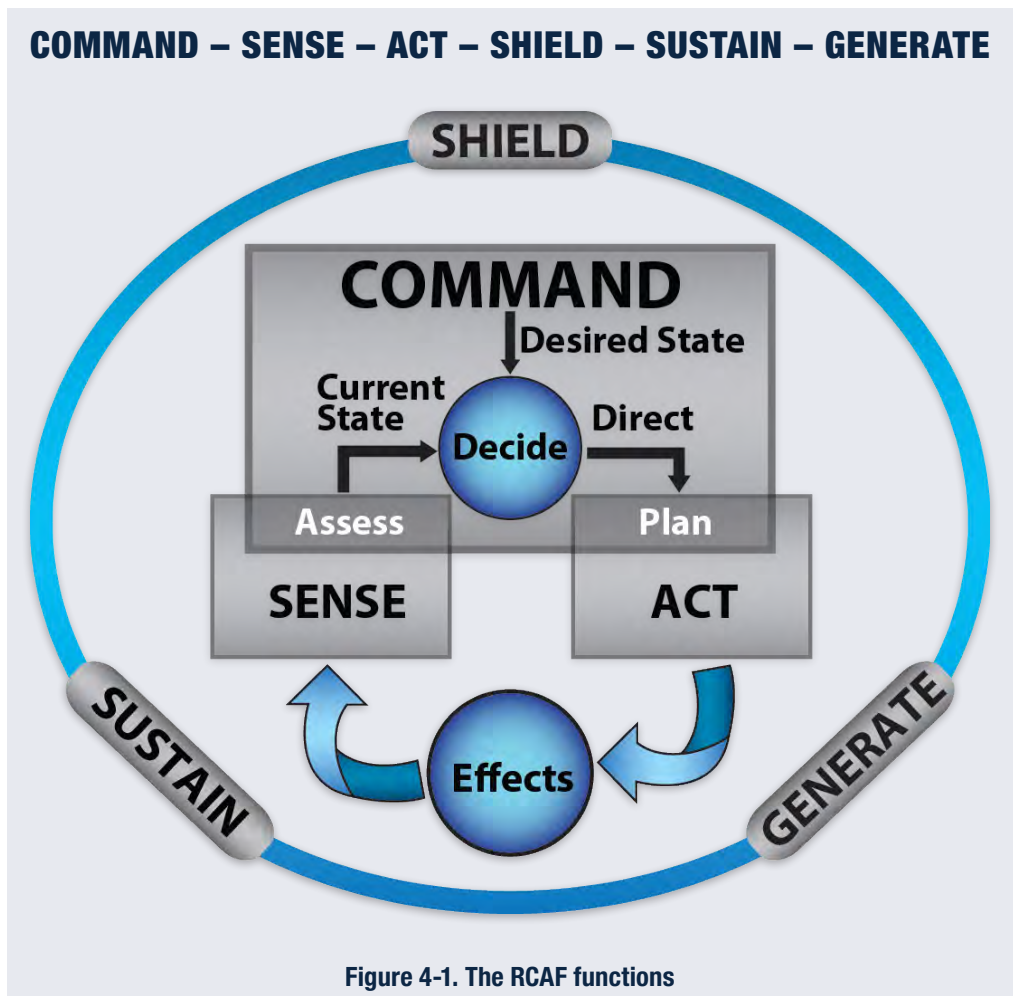
The RCAF functions may also be used as a way to plan and execute operations. Every operation is planned through a consideration of the RCAF functions. How will the operation be commanded? What information is required to support decision making (Sense)? What action will be taken (Act)? How can risks to the force be minimized (Shield)? How will the force be logistically maintained (Sustain) and how will the force be generated (Generate)?

COMMAND

Command is one of the key considerations when planning and executing operations. By virtue of the fact that Command directs resources to achieve effects, it is a critical component of every military activity. Of the six functions, it is recognized that Command is fundamental to and of paramount importance to the military art.[1] Command provides vertical and horizontal integration through the "command" and "control" of military forces and other elements as allocated as well as through the five command and control (C2) activities identified in Table 4-1.

COMMAND	CONTROL
• constitutes formal authority	• derives by delegation from command
• provides oversight, unifying all action	• supports command in detail
• is focused on establishing common intent	• is focused upon the details of execution
Together as "C2" the following five activities are performed:	
MONITORING • ASSESSING • PLANNING • DIRECTING • COORDINATING	

Table 4-1. Command, control, and C2[2]

Command involves the integration of a system of systems, procedures, organizational structures, personnel, materiel, information, and communications, which are designed to enable any commander to exercise authority and direction across the spectrum of conflict. Commanders will typically work with specialist staff such as public affairs officers, political advisors, and legal advisors; they also integrate these specialists into all operations.

COMMAND IN THE CANADIAN ARMED FORCES

The Governor General is the Commander-in-Chief of the Canadian Armed Forces (CAF) and provides the link from the Crown to the armed forces. The Government of Canada provides direction to CAF through the Minister of National Defence. The Chief of the Defence Staff (CDS) is responsible to the Minister for the conduct of military operations. By virtue of appointment, the CDS commands CAF 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.

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1. It is important to note that leadership is essential for the effective application of command (i.e., all commanders must be leaders). Although this doctrine manual will not address leadership per se, it must always be borne in mind that military operations require leadership and that leadership is indispensable to command. Readings on leadership include A-AP-005-000/AP-003, *Leadership in the Canadian Forces* (Ottawa: Department of National Defence, 2005); and *Sic Itur Ad Astra: Canadian Aerospace Power Studies,* ed. W. A. March, vol. 1, *Historical Aspects of Air Force Leadership* (Ottawa: Department of National Defence, 2009).

2. The Royal Canadian Air Force considers command and control an enabling capability. See Chapter 5.

COMMAND IN THE RCAF

The Commander (Comd) of the RCAF commands and provides strategic direction for the RCAF. As the senior Air Force officer in the Canadian military, the Comd RCAF is directly responsible to the CDS and acts as an advisor on strategic Air Force issues. The Comd RCAF is also responsible for generating and sustaining a combat-capable, multipurpose Air Force to meet Canada's defence objectives. Three commanders report directly to the Comd RCAF: Comd 1 Canadian Air Division (Cdn Air Div), Comd 2 Cdn Air Div, and the Commanding Officer of the Canadian Forces Aerospace Warfare Centre.

COMMAND AND CONTROL OF AIR POWER

Centralized control and decentralized execution is the fundamental tenet of air power as it relates to C2. Air forces need to be organized based on sound C2 principles with the purpose of achieving operational effectiveness across the spectrum of conflict. Centralized control ensures the most efficient use of limited air assets to best accomplish overall objectives; therefore, air forces are coordinated and directed at the operational level by a single air commander. Centralized control also allows action to be refocused quickly to exploit fleeting opportunities, to respond to the changing demands of the operational situation, and to be concentrated at the critical place and time to achieve decisive results.

Decentralized execution fosters initiative and situational responsiveness and provides subordinate commanders with the authority to apply their expertise and understanding of local conditions to accomplish the mission within the guidelines and overall intent of the commander. When integrating air power into joint or multinational operations, the joint force air component commander will advise the joint task force (JTF) comd or the multinational JTF comd as to the appropriate air C2 structure. Further discussion on command, control, and C2 of the RCAF is detailed in the keystone-level B-GA-402-001/FP-001, *Royal Canadian Air Force Doctrine: Command and Control* manual (to be promulgated).

SENSE

Sense provides the commander with knowledge of the situation, which is required in order to make decisions about what action to take. This situational awareness (SA) is facilitated by a common operating picture (COP) and information management (IM) as follows:

a. **Situational awareness.** Since what is required from the Sense function is knowledge of the situation that will enable action, SA is critical. SA is the perception of the circumstances and participants, subsequent comprehension of the causal factors and consequences, and the ability to apply this comprehension to determining the desired future circumstances as well as the course of action to get there.[3] Thus, SA contributes to creating understanding in the minds of information users at the pinnacle of the cognitive hierarchy.

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3. Canada, Department of National Defence (DND), Canadian Forces Joint Information and Intelligence Fusion Capability (JIIFC), *Concept of Fusion*, Version 1.0 (15 September 2008), 7.

b. **Common operating picture.** In order to rapidly facilitate SA, most modern operations utilize a COP to provide "an interactive and shared visual representation of operational information gathered from various sources."[4] The aim of a COP is to provide a fused near-real-time picture that coherently answers all of the information requirements as quickly as possible and that can be tailored to meet the tactical, operational, and strategic needs of the user. Consequently, the COP is not limited to simple contact or track data. Instead, it provides that data, information, and knowledge required by commanders to visualize the [operational environment] and support the command decision making necessary to successfully achieve their missions.[5]

c. **Information management.** IM normally refers to the governance structure and tools adopted by an organization to provide quality information to the right person at the right time in a usable form to facilitate understanding and decision making. The goal of IM is to enable the efficient retrieval and display of relevant, precise, complete, and usable information in a timely manner.[6]

CAF Photo: 14 AMS Wing Imaging

Sense incorporates all capabilities that collect and process data. The aim of Sense is to enable the decision makers to achieve decision superiority. Decision superiority is the competitive advantage enabled by ongoing SA that ensures the implementation of more effective and efficient actions than an adversary. In essence, Sense is about providing an understanding of the "state of the world" to commanders in order to enable them to make decisions and to optimize the other functions. Ultimately, Sense provides commanders with the knowledge they need to direct their forces to achieve the most appropriate effects.

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4. *Defence Terminology Bank* (*DTB*) record 41401.
5. Canada, DND, JIIFC, *Concept of Fusion*, 10.
6. Canada, DND, CFCD 128, *Formation and Fleet Information Management Manual* (December 15, 2004).

The raison d'être of Sense is to provide an understanding of the operational environment to decision makers. In order to achieve this, Sense aims to collect and report on the following:

a. elements of the operational environment that the commander does not control, such as actual or potential adversaries, neutral elements, and environmental issues, including weather and terrain; and

b. elements of the operational environment that the commander controls, such as their own or allied forces' dispositions via reports and returns from subordinates; certain dedicated sensor applications including Blue Force Tracker; and from liaison with other forces, other government departments as well as international and non-governmental organizations.

All weapon systems that contribute to the creation of a COP are part of the overarching CAF Sense enterprise. In the Air Force context, ground-, air- and space-based sensors and radars collect data to contribute to the CAF Sense realm. The data collected by a variety of systems is processed by personnel, often assisted by computerized technologies, to create usable knowledge.

CAF Photo: Cpl Pierre Habib

ACT

The RCAF requires core capabilities that deliver a variety of air power effects. Act is the function that integrates mobility, joint fires,[7] and information operations to achieve desired effects. When planning and executing operations, the action taken to achieve the commander's intent lies within the realm of the Act function. Act "shapes" the operational environment with kinetic and non-kinetic effects to create the conditions for success and enable the commander's end state. This is achieved through agility, selective application of fires, and the broad application of information operations. Act includes a force-projection capability, whereby military power can be moved rapidly within and between theatres of operation. Through the range

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7. "Fires delivered during the employment of forces from two or more components in coordinated action to produce desired effects in support of a common objective." (*DTB* record 34148)

and reach of air power, the projection of forces can be extended beyond fixed bases and installations. Thus, Canada's influence can be projected to its remotest regions and outside its own territorial boundaries through its global expeditionary capability.

Force projection is achieved by rapidly deploying high-readiness units using air-mobility assets. The provision of air-to-air refuelling (AAR)[8] further enables capabilities by extending the flight range and loiter time of receiver aircraft, thereby reducing the number of stops en route, maintenance requirements, and, ultimately, the response time.

Air power capabilities can greatly influence the operational environment by establishing control of the air, attacking from the air in support of surface forces, achieving strategic effect, or coordinating information operations.

In the physical domain, actions are directed toward an adversary's physical capabilities. The objectives of these functions are to:

    a. deny the enemy their choice of strategy;

    b. create favourable circumstances to employ the chosen strategy;

    c. reduce the requirement for other friendly forces; and

    d. reduce risks, casualties, and cost.[9]

In contrast, actions in the moral domain are aimed at will and cohesion. They involve the use of force or threatened use of force as well as incentives or rewards to cause an adversary to either maintain a desired behaviour or to alter it in a desired manner. Force application in the physical domain can and often does create effects in the moral domain and vice versa.

Air power capabilities aiming to achieve strategic effect seek to threaten, defeat, or destroy an adversary's strategic centre of gravity.[10] Such operations could involve destructive actions, non-destructive actions, or a combination of both to create effects that result in the defeat or shattering of 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, signal resolve, and reassure allies.

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8. Doctrinally, AAR is a role of air mobility; however, AAR also doubles as a critical enabler of Canada's force-projection capability.

9. Air Vice-Marshal Tony Mason, "The Future of Air Power: Concepts of Operations," *Royal Air Force Air Power Review* 1, no. 1 (1998): 36.

10. The concept of the centre of gravity originates from the writings of Clausewitz, who expressed it 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*, eds. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984), 595–96. Even today, there remains some debate over how Clausewitz's concept should be translated and interpreted. For example, see Antulio J. Echevarria, *Clausewitz's Center of Gravity: Changing Our Warfighting Doctrine – Again!* (Carlyle, PA: Strategic Studies Institute, September 2002).

While possessing the required capabilities to conduct operations on its own, it is common for the RCAF to participate as part of a coalition or allied-force package, especially when certain types of operations are prosecuted (i.e., air attack).

CAF Photo: Cpl Lou Penney

SHIELD

When planning for and conducting operations, the protection of a force, its capabilities, and its freedom of action must be considered. It enables capabilities to fulfil their respective roles during operations. A thorough understanding of Shield (including force protection, security risks, cyber threats, and health concerns) is required by all levels of command to enable the commander to address current and future risks, thereby allowing mitigation of such risks to an acceptable level. In addition to its use during conflict, Shield is also required in conflict prevention, mitigation, and post-conflict operations such as reconstruction and nation building. In many instances the RCAF relies on other CAF resources (Director General Cyberspace, Canadian Army, etc.) and other governmental resources (such as the Canadian Security Intelligence Service) to ensure adequate protection from various threats is achieved.

RCAF Shield activities are focused on protecting vital resources located on air bases from attack and the minimization of operational losses by developing strategies and employing personnel and other resources to thwart known threats. Such threats are not constant, as some continually evolve and adapt. Some of the main threat considerations are asymmetric terrorist threats as well as chemical, biological, radiological and nuclear (CBRN) events such as aerial threats, psychological threats, cyber threats, and kinetic threats.

Shield must also consider non-combatants, local civilians, and dependants, including those located near main operating bases (MOBs) and deployed operating bases (DOBs). If the protection of the local population is not considered, then alienation of that population may occur. Such considerations can be divided into the physical, moral, and informational domains.

The physical domain includes consideration of all the kinetic facets across the spectrum of conflict. The moral domain includes psychological threats, morale and unit cohesion, rules of engagement, mission legitimacy, attacks against Canadian interests, and interactions with the local populace. The informational domain includes controlling access as well as protecting systems and information.

Effective Shield planning and an understanding of all considerations will ensure adequate measures and countermeasures are in place to mitigate the effectiveness of the adversary's efforts and attacks. The operation will also be afforded a considerable measure of safety and an ability to carry out the mission.

CAF Photo: Cpl Dany Veillette

SUSTAIN

Sustain is the "function that regenerates and maintains capabilities in support of operations."[11] Deficiencies in sustainment will have a detrimental impact on the successful execution of operations. Sustain focuses on the maintenance and regeneration of four components—personnel, materiel, infrastructure, and services—which contribute to the ongoing operational effectiveness of air power. Also important to the goal of maintaining capabilities is preserving the force through loss-prevention programmes. The aim is to ensure that the right resources are provided at the right places and times.

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11. *DTB* record 26170.

COMPONENTS OF SUSTAINMENT

The breadth of sustainment includes four main components that are equally relevant for MOB and DOB operations. Personnel, materiel, infrastructure, and services must be provided to and sustained for any fighting force for all types and categories of operations. These four components, illustrated in Figure 4-2, are essential for sustaining a force during every phase of an operation, from warning and preparation through to deployment, employment, and redeployment.

Figure 4-2. The components of sustainment

Personnel

The availability and employment of trained personnel, in the right number and at the right location, are critical to achieving operational success. The highly technical and complex nature of air operations demands that personnel, whether military, civilian, or contractual, be fully competent and current in the knowledge required to carry out their assigned duties.

The RCAF must conduct air operations under military leadership in a disciplined fashion. This places a premium on certain personal qualities, such as fighting spirit, professional competency, and fitness for duty. These qualities are earmarks of the professional service person and facilitate an ability to lead and, thereby, provide sustainment that is agile, reliable, and robust.

Materiel

Materiel includes the systems, vehicles, aircraft, arms, parts, and materials used to support and maintain air operations. Materiel is assigned based on operational requirements which are articulated in documents such as statements of operational requirements, post-operation reports, unsatisfactory condition reports, cases for action, and business cases. A key challenge is ensuring that all required materiel is available, visible, and accounted for.

Infrastructure

Infrastructure applies to all fixed and non-permanent installations for the support and control of military forces. It includes runways, roads, telecommunication networks, relocatable temporary camps, and all types of utilities such as power generation, electrical distribution, telecommunication ducting, natural-gas networks as well as water and sewage systems. The maintenance of existing RCAF infrastructure (including updating and modernization in accordance with operational requirements) is a major ongoing activity. Similar to materiel, the concept of life expectancy is applied to infrastructure. This ensures that demolition plans are developed and that construction and maintenance are properly sequenced.

Services

Sustain provides services in the disciplines of engineering, health and welfare, logistics, comptrollership as well as aircraft maintenance and engineering. In some instances (e.g., construction engineering, electrical and mechanical engineering, and logistics) services bring the other three components of sustainment together at the right place and time. The challenge is to identify the best means to deliver all services on a continuing basis regardless of the operational environment.

LOSS-PREVENTION PROGRAMMES

Generating and employing RCAF assets involves a certain degree of risk, which may result in death, serious injury, loss of equipment, degradation of capability, or damage to the environment. To mitigate these risks, the RCAF uses several loss-prevention measures, including the Flight Safety, General Safety, and Airworthiness programmes.

CAF Photo: MCpl Pierre Thériault

GENERATE

Generate is "the function that develops and prepares an air force to meet force employment requirements."[12] It delivers the capabilities necessary to implement the other five functions. Generating forces to provide air power is an ongoing activity that involves force-development and force-readiness activities, including recruitment, training, and education.

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12. *DTB* record 37251, modified.

FORCE DEVELOPMENT

Force development is the "system of integrated and interdependent processes used to identify, conceptualize, and implement necessary changes to existing capabilities or to develop new capabilities"[13] for CAF. The RCAF has its own force-development process to conceive, design, and build new RCAF capabilities.

FORCE READINESS

Readiness is the "preparedness to respond to government direction."[14] Force readiness requires that its three main elements—materiel, personnel, and processes[15]—are prepared collectively in order to achieve the desired readiness state. The RCAF prepares its forces to achieve the mandated readiness posture directed by the CDS.

RECRUITMENT, EDUCATION, AND TRAINING

A prime component of force generation is the recruitment, education, and training of personnel. This must be done on an ongoing basis to ensure the RCAF is continually supplied with an adequate number of educated and well-trained people. Government policy, fiscal restraint, technological change, and Canadian culture have all, at one time or another, affected the size, shape, and composition of the Air Force. However, one thing has remained constant: the need for professional airmen, airwomen, and civilians to meet current and future challenges.

EQUIPPING

Equipping is an activity that ensures air forces have the right tools at the right time to accomplish their assigned tasks. Since interoperability with defence partners and allies is essential for the RCAF, such acquisition processes require that new materiel takes into account the joint and multinational nature of defence capabilities. Such processes include employing new technologies and concepts to maximum advantage by integrating research and development, modelling and simulation, test and evaluation, and the procurement of new systems to meet RCAF equipment requirements.

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13. *DTB* record 32172.
14. *DTB* record 34053.
15. Processes include the training and procedures to employ a capability.

RCAF CAPABILITIES

CAPABILITIES, ROLES, MISSIONS, AND ACTIVITIES

A capability is "the ability to carry out a military operation to create an effect."[1] It is through air power capabilities that air power effects are delivered for the Canadian Armed Forces (CAF) and Government of Canada. When developing or employing an air power capability, consideration of the Royal Canadian Air Force (RCAF) functions is essential for success. For example, when employing an air-mobility capability with an airlift role, the command and control (C2) arrangement must be determined, information on the enemy situation (Sense) must be available, force-protection measures must be considered (Shield), and the force must have some ability to sustain itself. When they are taken into account, the functions will help ensure mission success.

The RCAF uses the terms "core" and "enabling" to categorize air power capabilities. Core capabilities provide a discrete set of direct air power effects that leverage air power's strengths and advantages. Enabling capabilities play an essential part in accomplishing the mission. As outlined in Table 5-1, RCAF capabilities create air power effects through the assignment of roles, the conduct of air power missions, and the execution of supporting activities.

CAF Photo

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1. *Defence Terminology Bank* (*DTB*) record 36730.

RCAF FUNCTIONS	CAPABILITIES		ROLES, MISSIONS,[2] ACTIVITIES
COMMAND SENSE ACT SHIELD SUSTAIN GENERATE	Core	Control of the Air	Counter Air (OCA, DCA, Air Defence)
			Area of Operations Management[3] (Airspace Control, Nav Systems, Air C2)
		Air Attack	Counter Land (CAS, Interdiction)
			Counter Sea (ASW, ASUW)
		Air Mobility	Airlift (Strategic and Tactical, Aeromedical Evacuation)
			Air-to-Air Refuelling
			Search and Rescue (Personnel Recovery)
		Intelligence, Surveillance and Reconnaissance	Collect, Process, Disseminate[4] (Early Warning, RAP)
	Enabling	Electronic Warfare	Electronic Attack
			Electronic Protection
			EW Support
		Command and Control	Monitor, Assess, Plan, Direct, Coordinate
		Force Protection	Security
			CBRN Defence
			Health Protection
		Force Sustainment	Aircraft Maintenance
			Logistics
			Engineering
			Communications
		Force Generation	Readiness, Education and Training
		Force Development	Capability Development

Table 5-1. RCAF capabilities, roles, missions, and activities

2. The mission types in parentheses are derived from Canada, Department of National Defence (DND), *Air Force Vectors* (Ottawa: Director General Air Force Development, 2014) and are described in keystone doctrine and TTP manuals.

3. "Area of operations management" has replaced "battlespace management" as the DND / Canadian Armed Forces approved term. The latter term is considered obsolete. See *DTB* record 32222.

4. Collection, processing, and dissemination are three of the four phases of the intelligence cycle. More information on the intelligence cycle is detailed in the keystone level B-GA-401-002/FP-001, *Royal Canadian Air Force Doctrine: Intelligence, Surveillance and Reconnaissance* manual (to be promulgated).

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 complete control of the air, or "air supremacy," 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 favourable 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.[5]

Assuring access to the air is important to all military operations. This necessitates operations to guard air assets and associated ground infrastructure. Additionally, operations to prevent an adversary's hostile use of air capabilities through denial, deception, defeat, degradation, or destructive measures, as appropriate, may be required.

Counter-Air Operations

Counter-air operations are categorized as either offensive counter-air (OCA) or defensive counter-air (DCA). In an OCA operation, the intent is "to destroy, disrupt or limit enemy air power as close to its source as possible,"[6] while in a DCA mission the intent is to use "active and passive defensive measures designed to detect, identify, intercept, and destroy or make ineffective forces attempting to attack or to penetrate friendly airspace."[7] DCA and air defence are, by and large, synonymous activities, the outcome of which is protection from enemy air attack.

Area Of Operations Management

During operations, the RCAF must synchronize, prioritize, and de-conflict its activities with joint and multinational partners. A deployed combined air operations centre with its C2 capabilities, processes (air tasking cycle), and products (air tasking order, airspace control plan, and airspace control order) allows the force to manage the area of operations (AO) and, thus, contribute to control of the air operations. These activities ensure the assigned AO within the operational environment is used in accordance with the joint task force commander's intent.

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5. 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, defeating, 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.

6. *DTB* record 4956.

7. *DTB* record 44143.

AIR ATTACK

The air-attack capability includes the air roles of counter-land and counter-sea operations. These operations require support from other air assets including air-to-air refuelling (AAR); C2; electronic warfare (EW); and intelligence, surveillance and reconnaissance (ISR). Air-attack operations are in large measure condition dependent and demand an acceptable level of control of the air. Should an adversary possess a credible counter-air capability, these operations may be curtailed or rendered less effective.

Counter-Land Operations

Air operations in support of land forces are conducted to target fielded enemy surface forces and their supporting infrastructure. Such operations will directly lead to desired effects by denying the adversary's ability to execute a coherent ground campaign. Support to land forces is most frequently associated with the Air Force providing direct support to friendly surface forces. Counter-land operations may also be conducted independently of surface-force objectives or where no friendly forces are present.

Counter-Sea Operations

Air operations in support of naval forces are conducted to attain and maintain a desired degree of maritime superiority through the destruction, delay, diversion, or other neutralization of threats in the maritime environment. These operations utilize air forces to counter adversary air, surface, and subsurface threats in order to enhance the maritime scheme of manoeuvre.

When integrated into a joint force, air, space, and surface forces combine their characteristics in a complementary and synergistic manner. By their very nature, air-attack roles contribute to joint fires, manipulate the operational environment in support of the attainment of military objectives, and are normally associated with the operational and tactical levels of war. As illustrated in Figure 5-1, the Air Force's land and naval support roles are typically applied to:

    a. curtail interference from hostile land and naval forces;

    b. inhibit the enemy's ability to manoeuvre;

    c. deny the enemy an ability to concentrate their forces; and

    d. defeat the enemy's command, control, and communications capabilities.[8]

AIR MOBILITY

In its broadest form, air mobility is the delivery of personnel or materiel by air, independent of platform type. Examples of this are AAR and the movement or recovery of personnel using air assets. These include a CC130J Hercules conducting a sustainment flight, the refuelling of a CF188 Hornet by a CC150 Polaris tanker, the retrieval of domestically stranded personnel by a CH149 Cormorant, a CH147 Chinook moving troops, and the aeromedical evacuation of an injured CAF member. As a core air power capability, air-mobility activities are employed across the spectrum of conflict.

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8. Mason, "The Future of Air Power," 37.
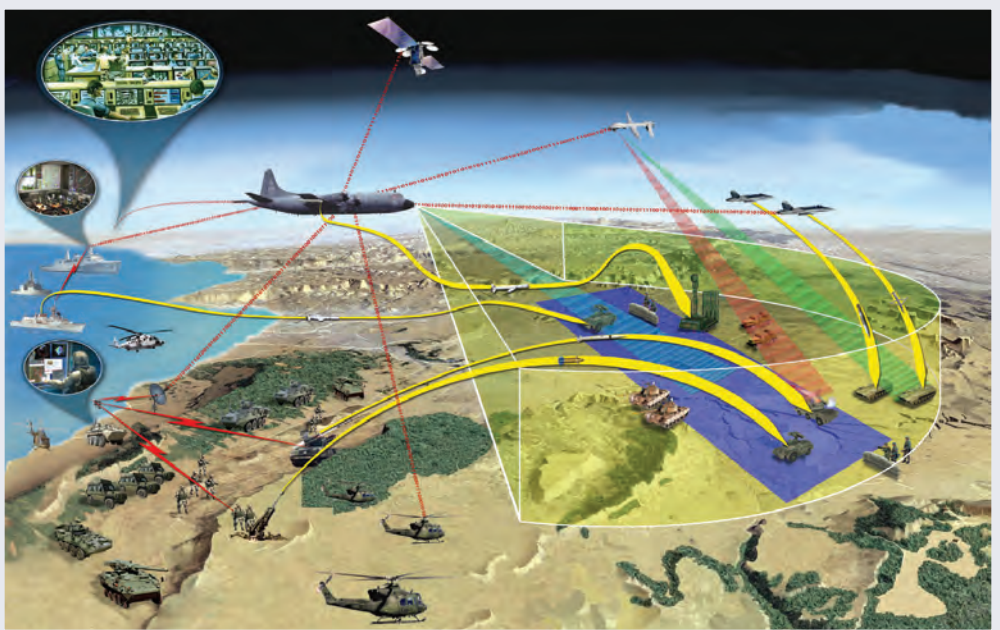
Figure 5-1. Support to land and naval forces

Airlift

Airlift is "the transport and delivery by air of personnel and materiel in support of strategic, operational, or tactical objectives."[9] It provides the military commander with the capability to deploy, employ, and re-deploy forces and equipment quickly over considerable distances and to sustain those forces once deployed from their MOBs.

Able to operate globally, airlift can be strategic, tactical, or both, depending on the nature of the mission. The categorization selected is based on missions assigned and the context in which the missions are conducted. Strategic airlift is used when moving personnel and materiel between theatres, whereas tactical airlift provides commanders with the ability to position their forces and equipment within an AO, while at the same time providing them with the required logistical support.

Finally, a specific mission within the broader airlift role is aeromedical evacuation, which is defined as "the movement of patients under medical supervision to a medical treatment facility by air transportation."[10]

Air-to-Air Refuelling

AAR is the refuelling of an aircraft in flight by an airborne tanker aircraft. It is one of the key enablers to force projection. The provision of AAR extends the flight range of receiver aircraft, thereby reducing the number of stops en route, maintenance requirements, and, ultimately, the response time to reach their AO. Additionally, AAR enables receiver aircraft to carry a greater payload on departure and to conduct multiple missions as required. AAR is thus a force enabler, a force multiplier, or both, depending on the mission being conducted.

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9. *DTB* record 34083.
10. *DTB* record 3308.

CAF Photo: Cpl Pierre Habib

Search and Rescue

Search and rescue (SAR) is 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. In Canada, the National Search and Rescue Secretariat (NSS), under Public Safety Canada, is charged with coordinating the national SAR programme. SAR is an inherently integrated activity because it involves coordination between Public Safety Canada, CAF, Canadian Coast Guard, and local law enforcement organizations. The RCAF supports the national SAR programme by responding to emergent situations with the appropriate equipment and personnel.

Unlike SAR, personnel recovery (PR) is "the sum of military, civil and diplomatic efforts to recover and reintegrate isolated personnel and/or recover persons in distress."[11] PR is the recovery of "personnel," meaning the recovery of personnel employed by the Government of Canada. PR doctrine emphasizes an integrated approach in which CAF provides assistance to other government departments (OGDs) and non-governmental organizations as required. It represents a broad span of different types of activities and operations consolidated into a coherent spectrum.[12] A PR operation is an integrated action in deliberate response to an event involving isolated personnel.[13]

INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE

ISR has come to mean more than its individual components of intelligence, surveillance and reconnaissance. ISR brings these three components into a coherent whole to provide a framework for selecting, tasking, and coordinating collection assets. Furthermore, ISR encompasses the numerous activities and assets related to information collection; the enterprise that designs and generates related capabilities; and the structure around which the various processes of direction, collection, processing, and dissemination reside.

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11. *DTB* record 31303.

12. The personnel recovery spectrum includes combat recovery, combat search and rescue, and hostage rescue.

13. As stated in *DTB* record 37299, isolated personnel are "military or civilian personnel who are separated from their unit or organization in a situation that may require them to survive, evade, resist, and/or escape while awaiting recovery. Note: Applicable civilians are as designated by national authorities responsible for deploying individuals/personnel."

CAF Photo

ISR is the activity that synchronizes and integrates the planning and operation of all collection capabilities with exploitation and processing to disseminate the resulting information to the right person, at the right time, in the right format in direct support of current and future operations.

ISR is a joint and, at times, multinational capability. RCAF ISR is part of multi-environment and multi-agency effort to gain situational awareness (SA) and subsequent decision superiority in support of Canada's national strategy. Therefore, the RCAF conducts ISR not just in support of its own requirements but also those of the entire government. Conversely, the RCAF uses information and intelligence provided by other Department of National Defence (DND) and government ISR agencies to enhance its own ISR operations. As a consequence of this interaction, RCAF ISR systems must be interoperable with those of the entire joint force.

CAF and its allies operate under stringent engagement criteria that dictate the use of weapons that are increasingly precise. Coupled with these criteria is an adversary that has become harder to detect, through either technology or the unconventional nature of its forces and techniques. These criteria require detailed and highly accurate intelligence supported by robust ISR.

While essential in times of conflict, ISR is also critical to peacetime operations. ISR supports SA for sovereignty operations, building intelligence databases, guiding tactics development, assisting capability development, and providing indications and warning.

ELECTRONIC WARFARE

EW is "military action that exploits electromagnetic energy to provide SA and achieve offensive and defensive effects. It exploits the electromagnetic spectrum (EMS), encompassing:

a. the search for, interception and identification of electromagnetic emissions;

b. the employment of electromagnetic energy, including directed energy, to reduce or prevent hostile use of the EMS; and

c. actions to ensure its effective use by friendly forces."[14]

EW capabilities can produce effects across the spectrum of conflict, and operational planners must coordinate their activities to ensure that EW's contribution to air and joint operations is optimized.

As a force enabler, EW creates effects to facilitate EMS dominance, management, and control. The freedom to operate across the operational environment, including the EMS, is essential to successful military operations.

As a force multiplier, EW can enhance mission accomplishment when integrated with other military operations to detect, deny, defeat, deceive, or destroy enemy forces while minimizing losses through platform self-protection. The subcomponents of EW include electronic attack, electronic protection, and electronic warfare support.

COMMAND AND CONTROL

Monitoring, assessing, planning, directing, and coordinating are the five key activities to effective C2 (a critical enabling capability to any military operation) and efficient projection of air power. For the RCAF to perform effectively, all personnel involved in force-generation or force-employment activities must not only have a complete understanding of the definition of various C2 authorities and relationships but also appreciate where they and their commander fit into the overall C2 structure. C2 authorities and relationships have been developed to ensure the effective direction of military forces at the strategic, operational, and tactical levels. At each level, commanders can elect to either retain or delegate C2 authorities in order to effectively accomplish their force-generation activities or force-employment operations. While command authority may be delegated, a commander's responsibility cannot be. Ultimately, responsibility remains with the commander it is originally vested in.

CAF Photo

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14. *DTB* record 4164, modified.

FORCE PROTECTION

> All measures and means to minimize the vulnerability of personnel, facilities, equipment and operations to any threat and in all situations, to preserve freedom of action and the operational effectiveness of the force.[15]

This capability, aligned closely with the Shield function, uses all necessary measures (with the exception of offensive operations) to protect the force from any kind of threat. The force-protection capability is critical in allowing a force the freedom of movement required to conduct operations. The protection of personnel as well as expensive, scarce, and fragile air power assets is paramount to successful air power operations.

Force-protection measures consist of kinetic and non-kinetic security means to protect the force from physical, cyber (including electronic and information), and psychological threats. Means to protect the force consist of kinetic and non-kinetic security measures. These measures also include personnel security, chemical, biological, radiological and nuclear (CBRN) defence, and health protection. The RCAF is dependent on its ability to communicate through voice, networks, and data links to achieve operational success, so it is essential that these be protected from attack.

FORCE SUSTAINMENT

Sustainment is the bridge that connects the nation's support capacity to its combat capability. To be able to sustain an activity requires that the requisite support activities are available when and where they are needed.[16] This includes activities such as aircraft maintenance, logistics, engineering, and communications, which relate to the broad support or overall sustainment of military field forces, both at home and deployed.

The RCAF uses the centralized DND/CAF national support system to sustain air power operations. The enabling capability of force sustainment focuses on ensuring the air task force (ATF) has the necessary personnel, materiel, infrastructure, and services to sustain air operations. Within the RCAF, support is categorized into operations and mission support.

Operations support (ops sp) is the provision of assistance that directly supports air operations. Operations support units, namely operations support elements (OSEs) and aircraft maintenance detachments, primarily provide those personnel and aircraft services essential for the conduct of flying operations. OSE force sustainment includes armament and munitions management as well as airfield damage repair.[17]

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15. *DTB* record 23554.

16. Canada, DND, B-GL-300-004/FP-001, *Land Force Sustainment* (Ottawa: Department of National Defence, 1999).

17. The operations-support element functions of meteorology, oceanography, and intelligence fall within Sense/ISR while aerospace control as well as operations planning and coordination are command and control activities. Operations support to Shield / force-protection activities include airfield defence, policing, airfield security, and aircraft security.

CAF Photo: Sgt Norm McLean

Mission support is "the provision of logistical, technical, and administrative support to air operations."[18] The mission-support capabilities include (but are not necessarily limited to) communications and information systems, construction engineering, supply, transport, electrical and mechanical engineering, health services, food services, comptrollership, and human resources.

FORCE GENERATION

The process of organizing, training and equipping forces for force employment.[19]

Force generation involves an extensive range of activities including recruiting, training, educating, and retaining the right personnel. These activities are essential to the readiness of a competent force with the ability to execute all air power missions.

The RCAF needs an expeditionary structure and proper enabling processes that will facilitate the rapid deployment of air power in support of CAF operations. Furthermore, the RCAF must be able to force generate and maintain high-readiness forces capable of supporting CAF objectives, both domestically and internationally.

FORCE DEVELOPMENT

A system of integrated and interdependent processes used to identify, conceptualize and implement necessary changes to existing capabilities or to develop new capabilities.[20]

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18. *DTB* record 34911, modified.
19. *DTB* record 32171.
20. *DTB* record 32172.

The RCAF requires a force-development capability and process to determine and develop Canada's air power needs of the future. A number of factors (e.g., government policy, changes to doctrine, lessons learned[21] from operations, emerging technologies, and the future security environment) play a part in defining future force-capability requirements. Concepts resulting from the introduction of new weapon systems and changes in their employment will also have to be trialled, and policies and doctrine to govern their employment will need to be developed. Once the necessary capabilities are determined, forces must then be generated; that is, they must be recruited, assembled, trained, equipped, and structured to effectively perform their associated defence tasks.

SUPPORT TO JOINT OPERATIONS AND THE CIVIL POWER

To fully optimize the contribution of CAF air power capabilities to national strategic effects, the RCAF must be fully integrated with the Canadian Army (CA), Royal Canadian Navy (RCN), special operations forces (SOF), and other government departments. CAF air power is critical to the success of those elements. CAF air power is unique from that of many of Canada's allied and coalition partners in that the evolution of Canada's military has established the RCAF as the sole element responsible for all air power capabilities within CAF. Therefore, RCAF support to joint operations and the civil power is fundamental and essential.

CAF Photo: MCpl Louis Brunet

Air power in support of joint operations is provided through both direct support from RCAF core capability assets and from integral air power assets that have been established with joint forces at the tactical level. Integral air assets are established within the RCN, CA, and SOF to fulfill the requirement for continuous and dedicated aerial mobility, reconnaissance, and firepower. Integral air capabilities are a necessity to establish a shared understanding of the following: the operational

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21. Canada, DND, *Air Force Lessons Learned Campaign Plan* (AFLLCP), 3000-1 (Commanding Officer CFAWC), 7 July 2009, accessed June 2, 2015, http://w08-ttn-vmweb01/CFAWC/en/rcaf-llp/documents.asp.

environment, synchronized manoeuvre and fire support, an intimate appreciation of the supported commander's intent, and clear C2 relationships. These requirements are achieved through mutual trust and are maintained through persistent liaison; collaborative planning; standardized tactics, techniques and procedures; and collective training. Integral air assets are physically located and based with their associated joint force. They are structured with logistics and operational support to enable integration with both the joint element and with RCAF systems. When deployed in support of a joint task force, integral air power assets remain under ATF C2 but epitomize decentralized execution, as they are typically grouped under operational command or operational control of their supported joint commander. They must be able to move and operate with the joint forces either from helicopter air detachments on RCN ships or austere land-component forward operating bases. Within the RCAF, these integral capabilities are specifically known as maritime helicopters, tactical aviation, and special operations aviation.

CAF Photo: Cpl Ian Doyle

Joint forces are further enabled through non-integral direct support from core RCAF capabilities through associated subordinate missions and tasks, either domestically from RCAF wings or from detachments to an expeditionary ATF. Direct support is provided to joint commanders and OGDs in the form of air attack, air mobility, and ISR air missions.

RCAF air power in support to the civil power recognizes the fundamental responsibility of CAF to help secure Canadians at home and abroad. The provision of SAR, disaster and crisis response as well as humanitarian assistance are examples of how air power provides the government with this capability.

Both direct support and integral air power assets deliver effects that contribute to objectives at the tactical and operational levels and are also capable of achieving independent strategic objectives. Therefore, the collective contributions of all RCAF efforts support joint operations in some manner.

CHAPTER 6

DELIVERY OF CANADIAN AIR POWER

INTRODUCTION

The Royal Canadian Air Force (RCAF) requires an effective organizational structure so it can effectively plan, coordinate, and deliver air power on behalf of the Canadian Armed Forces (CAF). Given this reality, the air task force (ATF) is the organization the RCAF uses for the delivery of Canadian air power during domestic and expeditionary operations.[1] The ATF can be a large organization when supporting major national or international air power commitments, or it can be as small as an air detachment or a single aircraft.

Regardless of the size of the ATF / air detachment employed, an appropriate command method[2] and force-employment model is necessary in order to deliver air power effects. The organizational construct should be flexible enough to cover different operational scenarios, while providing a high degree of predictability as to what the likely force-employment model will be. Adhering to this basic premise will provide the RCAF with a reliable and effective means of delivering air power.

CAF Photo: WO Randolph Rice

COMMAND AND CONTROL

The command and control (C2) of air power is critical to the effective delivery of air power. C2 is defined as "the exercise of authority and direction by a commander over assigned, allocated, and attached forces in the accomplishment of a mission."[3] C2 activities include the analysis of information, the development of plans, the preparation of orders, the organization and deployment of forces in preparation

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1. Components of an ATF include the air detachment(s), operations-support element, and mission-support element.

2. There are two command methods used in the Canadian Armed Forces (CAF) / Royal Canadian Air Force: direct command and component command.

3. *Defence Terminology Bank* (*DTB*) record 5950.

for conflict, and—once operations begin—the coordination and adjustment of the plan's execution. How forces and entities are grouped (who reports to whom) directly affects how information flows and command decisions are made. The exact nature of this arrangement will depend on the scale/complexity of the air operation, the size of the force, and which organization is the force employer of the operation.[4] Such factors need to be weighed carefully when establishing command arrangements. While not the only consideration, C2 is a key factor when determining the structure of an organization.

CAF Photo: Canadian Forces Combat Camera, DND

AIR TASK FORCE

An ATF "is a temporary grouping of RCAF operational/tactical formations, squadrons, units or detachments formed for the purpose of carrying out a specific operation, mission or task."[5]

The ATF is how the RCAF will organize and present forces to an air component commander (ACC) and/or force employer. The ATF may be used at the operational or tactical level (depending upon the scale and complexity of the operation). This will normally include the baseline components of an ATF commander (comd) / headquarters (HQ), operations-support elements (OSEs), and mission support elements (MSEs).[6] Such a model has advantages; it permits scalable operational requirements, simplicity when aligning support functions, the development

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4. Canada, Department of National Defence (DND), B-GA-401-000/FP-001, *Canadian Forces Aerospace Command Doctrine*, 1st ed. (March 2012), accessed June 2, 2015, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/doctrine/b-ga-401-000-fp-001.page.

5. Canada, DND, "Royal Canadian Air Force Air Task Force Commander Definitions, Roles and Responsibilities," Canadian Forces Air Doctrine Note (ADN) 14/01 (May 28, 2014), accessed June 2, 2015, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/doctrine-adn-14-01.page.

6. In certain circumstances, the ATF structure may include the force protection element as a separate subunit. See B-GA-402-005/FP-001, *Royal Canadian Air Force Doctrine: Expeditionary Air Operations* (to be promulgated).

of a coherent and simple C2 architecture, and relatively common infrastructure demands. Under this tailored model (see Figure 6-1), the ATF comd could (contingent on mission demands) be allocated a range of air detachments, squadrons, or wings (including an air expeditionary wing [AEW]).

Figure 6-1. Typical ATF structure[7]
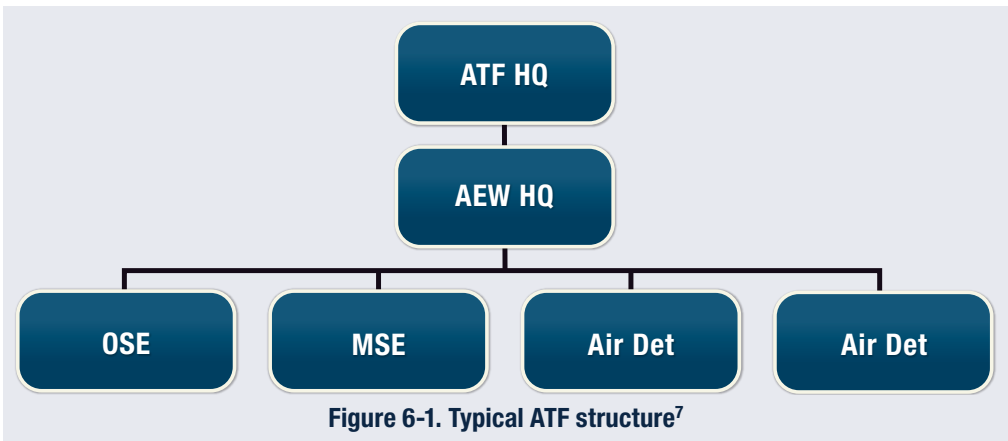
The ATF must meet the force-employment objectives of the force employer, be that a CAF joint force air component commander (JFACC) during domestic and expeditionary operations (where operational command [OPCOM] has been delegated to the CAF JFACC) or the joint task force (JTF) comd during domestic and expeditionary operations (where OPCOM has been delegated to a CAF JTF comd).

During domestic operations, RCAF air power assets are normally OPCOM to Comd 1 Canadian Air Division (Cdn Air Div), who is responsible to the Comd RCAF. As the CAF JFACC, Comd 1 Cdn Air Div exercises C2 of air power on behalf of the supported commander. Comd 1 Cdn Air Div is also accountable to the Commander of the North American Aerospace Defence Command for control over forces allocated for air defence of the Canadian region.

While the ATF must be scalable, modular, and rapidly deployable, it must also be capable of operating under two different C2 methods. The C2 methodology used for a joint operation will depend on the resources allocated to the operation, the degree of authority delegated to the JTF comd, the nature of the operation, and the situation. The two basic C2 methodologies available to the JTF comd are the component command method and the direct command method.

The component command method is employed when a JTF comd exercises authority through component commanders. This is the most commonly used C2 method. The JTF comd issues broad operational directives to each of the component commanders who then translate the directives into detailed plans and orders. Each component command has a separate HQ. The JTF HQ and component HQs may be either collocated or in separate locations. The RCAF does not normally deploy an ACC or air operations centre for domestic or expeditionary operations. An ATF comd and an ATF HQ are deployed to perform air component duties as required.

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7. This is an organization chart only and is not necessarily representative of a C2 structure.

The direct command method is employed when a JTF comd exercises command authority by issuing detailed orders directly to subordinate elements. The direct method is an alternative method of command, normally used when size, complexity, and time span of an operation are limited. In order to exercise direct command, a JTF comd requires the staff and facilities that make possible the managing of all details required for the assumed span of control, including those unique to the efficient and effective integration of air power. An ATF comd normally acts as the key advisor to the JTF comd on the employment of air power.

ATF EMPLOYMENT MODELS

There are five models for the employment of an ATF: the single-environment (RCAF only) operation, RCAF supporting a regional JTF, RCAF supporting a CAF JTF using the component-command method, RCAF supporting a CAF JTF using the direct-command method, and the RCAF within a coalition/allied operation.[8]

AIR DETACHMENT

The air detachment is a "fleet-specific combat force package that generates aerospace power."[9] While an air detachment is a component of the ATF, the RCAF may deploy a single detachment of tactical-level air forces to conduct missions. The scope of such a deployment may still warrant the use of an ATF structure and its support components.

When conducting routine aircraft missions, the detachment model is normally used.[10] Examples of this level of commitment include humanitarian-assistance missions such as experienced in the Saguenay region of Quebec, evacuation from threatened isolated communities, and domestic search and rescue. Other examples include the deployment of maritime helicopter detachments or 1 Wing tactical-support units that are integral to the mission of a deployed ship or Army formation.

In such missions, the detachment(s) will be directly commanded by the 1 Cdn Air Div JFACC in Winnipeg. In some cases, it will still be necessary to deploy separate air component coordination element liaison capabilities, or OSEs/MSEs, in support of the detachment.

Delivering air power is a complex activity with many moving parts working together. To achieve success requires an effective organizational construct, the correct force-employment model, and the most suitable command method for the operation at hand.

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8. The employment options are explained in detail within Air Doctrine Note (ADN) 14/01, "Air Task Force Commander Definitions."

9. *DTB* record 34897.

10. Canada, DND, "RCAF Campaign Plan: RCAF Force Employment Concept," accessed June 2, 2015, http://airforce.mil.ca/caf/dairsp/campaign-plan/page-eng.asp?cid=300.

POSTSCRIPT

Royal Canadian Air Force Doctrine lays out the fundamental principles behind the employment of air power in support of Canadian security and national objectives. It provides the framework for the application of air power and is the capstone document for air 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 air power 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 Royal Canadian Air Force (RCAF) personnel in the ongoing process of doctrinal renewal and study. In this regard, it is every RCAF member's professional obligation 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

GLOSSARY

The definitions contained in this lexicon 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. **B-GJ-005 –** B-GJ-005-300/FP-001, Canadian Forces Joint Publication (CFJP) 3.0, *Operations*;

b. ***DTB –*** *Defence Terminology Bank*, http://terminology.mil.ca/index-eng.asp; and

c. **JP 1-02 –** United States Department of Defense, Joint Publication 1-02, *Dictionary of Military and Associated Terms.*

Act
The operational function that integrates manoeuvre, firepower and information operations to create the desired effects. (*DTB* record 26165, modified)

aeromedical evacuation (AE)
The movement of patients under medical supervision to a medical treatment facility by air transportation. (*DTB* record 3308)

air detachment (air det)
A fleet-specific combat force package that generates aerospace power.

Note: 1. An air det consists of aircrew, aircraft maintenance personnel, other integral support personnel as well as aircraft and equipment.

2. An air det is the core component of an air expeditionary wing. (*DTB* record 34897)

Air Doctrine Authority (ADA)
The Royal Canadian Air Force officer with authority over all aspects of the development, production, and dissemination of Canadian Armed Forces air doctrine.

Note: The Commander RCAF is the ADA. The ADA may delegate this authority. (*DTB* record 34072)

Air Doctrine Committee (ADC)
The designated Air Force body responsible for overseeing the development, control, and advocacy of air doctrine.

Note: The Air Doctrine Committee is established under the authority of the Commander Royal Canadian Air Force. (*DTB* record 34073)

Air Doctrine Programme Authority (ADPA)
The Royal Canadian Air Force officer with the authority to oversee the Air Doctrine Programme on behalf of the Air Doctrine Authority.

Note 1: The ADPA fulfils the responsibilities of the Air Doctrine Committee Chair and is the designated coordinating authority for CAF joint and multinational doctrine that encompasses Air functions.

2. The Deputy Commander RCAF has been appointed as the ADPA. (*DTB* record 694279)

air expeditionary wing (AEW)
A deployable, task-tailored, tactical-level force comprised of a command element, one or more air operations elements, an operations-support element, a mission-support element and a force-protection element. (*DTB* record 34903)

Air Force (AF)

The branch of the armed forces charged with generating and projecting air power in defence of the nation and its national interests and institutions.

Note: Although the Canadian Armed Forces is a unified force comprising a single environment, it has become common practice to refer to the three environmental commands as the Royal Canadian Navy, Canadian Army, and Royal Canadian Air Force. (*DTB* 34080, modified)

air force function

A broad, fundamental and continuing activity of an air force. (*DTB* record 37250)

airlift

The transport and delivery by air of personnel and materiel in support of strategic, operational, or tactical objectives. (*DTB* record 34083)

air mobility

The capability of conducting airlift and air-to-air refuelling roles. (*DTB* record 37284)

air operation

An activity, or series of activities, related to the planning and application of air power to achieve assigned objectives. (*DTB* record 30555)

air power

The element of military power that is applied within or from the air operating environment to create effects above, on or below the surface of the Earth. (*DTB* record 43951, modified)

air superiority (AS)

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* record 3364)

air supremacy

That degree of air superiority wherein the opposing air force is incapable of effective interference. (*DTB* record 3366)

air task force (ATF)

A temporary grouping of Royal Canadian Air Force formations, units or detachments that is formed to conduct a specific operation, mission or task. (*DTB* record 694281)

air-to-air refuelling (AAR)

The refuelling of an aircraft in flight by an airborne tanker aircraft.

Note: Air-to-air refuelling is a subset of air refuelling. (*DTB* record 37283)

area of operations (AO)

A geographical area, within an area of responsibility, assigned to a subordinate commander within which that commander has the authority to plan and conduct tactical operations. (*DTB* record 3528)

area of operations management

The prioritization, coordination and deconfliction of activity across all dimensions within an assigned area of operations.

area of responsibility (AOR)

The geographical area assigned to an operational-level commander within which that commander has the authority to plan and conduct military operations. (*DTB* record 34612)

campaign

A set of military operations planned and conducted to achieve a strategic objective. (*DTB* record 18743)

capability

The ability to carry out a military operation to create an effect. (*DTB* record 36730)

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 the sub-domain. (*DTB* record 32223)

centre of gravity (CG)

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* record 324)

coalition

An ad hoc agreement between two or more nations for a common action. (*DTB* record 21755)

combat recovery (CR)

The recovery by conventional forces of isolated personnel from a situation where hostile interference may be expected.

Note: In combat recovery, either the recovery force, or the isolated personnel, or both, have not been trained in combat search and rescue tactics, techniques, and procedures. (*DTB* record 36629)

combat search and rescue (CSAR)

The application of specific tactics, techniques, and procedures by dedicated forces to recover isolated personnel, the latter being trained and appropriately equipped to receive this support, from a situation where hostile interference may be expected. (*DTB* record 18744)

command

1. The authority vested in an individual of the armed forces for the direction, coordination, and control of military forces. (*DTB* record 27866)

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* record 27867)

3. A unit, group of units, organization or area under the authority of a single individual. (*DTB* record 23382)

4. The operational function that integrates all the operational functions into a single comprehensive strategic, operational or tactical level concept. (*DTB* record 26166)

command and control (C2)

The exercise of authority and direction by a commander over assigned, allocated and attached forces in the accomplishment of a mission. (*DTB* record 5950)

common operating picture (COP)

An interactive and shared visual representation of operational information gathered from various sources. (*DTB* record 41401)

component command (CC)

In joint operations, an organization, subordinate to the joint task force commander, responsible for the planning, integration, and conduct of operations for a specific environment or function.

Note: Typical components are maritime, land, air, special operations and support. (*DTB* record 35704)

comprehensive approach

A philosophy according to which military and non-military actors collaborate to enhance the likelihood of favourable and enduring outcomes within a particular situation.

Note: The actors may include joint or multinational military forces, Canadian government departments and agencies (whole of government), other governments (foreign, provincial and municipal), international organizations (NATO, UN), non-governmental organizations (CARE, OXFAM), private sector entities or individuals. (*DTB* record 34522)

control (con)

1. That authority exercised by commanders 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.

Note: All or part of this authority may be transferred or delegated.

2. The authority exercised by a commander over part of the activities of subordinate organizations, or other organizations not normally under [their] command, that encompasses the responsibility for implementing orders or directives. (*DTB* record 375)

defensive counter-air operation (DCA)

Active and passive defensive measures designed to detect, identify, intercept, and destroy or make ineffective forces attempting to attack or to penetrate friendly airspace. (*DTB* record 44143)

doctrine

Fundamental principles and proven practices by which military forces guide their actions in support of objectives.

Note: Doctrine is authoritative but requires judgement in application. (*DTB* record 1761)

environment

Either the Royal Canadian Navy, Canadian Army, or the Royal Canadian Air Force. (B-GJ-005)

force

1. An aggregation of military personnel, weapon systems, equipment and necessary support, or combination thereof.

2. A major subdivision of a fleet. (JP 1-02)

force development (FD)

A system of integrated and interdependent processes used to identify, conceptualize and implement necessary changes to existing capabilities or to develop new capabilities. (*DTB* record 32172)

force employment (FE)

1. At the strategic level, the application of military means in support of strategic objectives.

2. At the operational level, the command, control and sustainment of allocated forces. (*DTB* record 32173)

force enabler

A capability provided to a force that is essential to mission accomplishment. (*DTB* record 37304)

force generation (FG)
The process of organizing, training and equipping forces for force employment. (*DTB* record 32171)

force multiplier
A capability provided to a force that enhances the probability of success in mission accomplishment. (*DTB* record 37306)

force protection (FP)
All measures and means to minimize the vulnerability of personnel, facilities, equipment and operations to any threat and in all situations, to preserve freedom of action and the operational effectiveness of the force. (*DTB* record 23554)

Generate
The function that develops and prepares an aerospace force to meet force employment requirements. (*DTB* record 37251)

information operations (info ops)
Coordinated actions to create desired effects on the will, understanding and capability of individuals and groups, in support of overall objectives by affecting their information, information-based processes and systems, while exploiting and protecting one's own. (*DTB* record 31721)

informational domain
The sphere in which information and data reside. (*DTB* record 41414)

integration
The combination of military and non-military elements to achieve a common goal through coordinated and complementary efforts. (*DTB* record 34192)

intelligence (int)
The product resulting from the collection, processing, analysis, integration and interpretation of available information concerning foreign states, hostile or potentially hostile forces or elements, geography and social and cultural factors that contributes to the understanding of an actual or potential operating environment.

Note: The term "intelligence" also applies to the activities that result in the product and to the organizations engaged in such activities. (*DTB* record 738)

interoperability
The ability to act together coherently, effectively and efficiently to achieve common objectives.

Note: Interoperability may be achieved through the compatibility of doctrine, processes and materiel. (*DTB* record 32228)

isolated personnel
Military or civilian personnel who are separated from their unit or organization in a situation that may require them to survive, evade, resist, and/or escape while awaiting recovery.

Note: Applicable civilians are as designated by national authorities responsible for deploying individuals/personnel. (*DTB* record 37299)

joint
Said of activities, operations and organizations in which elements of at least two components participate.

Note: The components are maritime, land, air and special operations. (*DTB* record 35248)

joint fires

Fires delivered during the employment of forces from two or more components in coordinated action to produce desired effects in support of a common objective. (*DTB* record 34148)

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* record 32229)

leadership (ldrsp)

1. The art of influencing human behaviour so that subordinates willingly carry out orders to effectively accomplish military missions.

2. The art of influencing people to achieve a mission. (*DTB* record 34085)

logistics (log)

The science of planning and carrying out the movement and maintenance of forces.

Note: In its most comprehensive sense, logistics is the aspects of military operations that 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; and

d. acquisition or furnishing of services. (*DTB* record 815)

materiel (mat)

All public property, other than real property, immovables and money, provided for the Canadian Forces or for any other purpose under this Act, and includes any vessel, vehicle, aircraft, animal, missile, arms, clothing, stores, provisions or equipment so provided. (*DTB* record 864)

military power

An instrument of national power that uses force, threat of force or other inherent capabilities to achieve national objectives. (*DTB* record 35266)

mission

An activity assigned to an individual, unit or force by an authority who has full command, operational command or operational control. (*DTB* record 43728)

mission support (msn sp)

In air operations, the provision of logistic, technical and administrative support to operations.

Note: Mission support includes construction engineering, communication and information systems, supply, transport, electrical and mechanical engineering, food services, human resources and finance services. (*DTB* record 34911)

moral domain

The sphere in which people interact on a psychological, ethical and/or cognitive level. (*DTB* record 41423)

multinational

Adjective used to describe activities, operations and organizations in which elements of more than one nation participate. (*DTB* record 18750)

national interest

An issue that concerns the defence and maintenance of the social, political and economic stability of Canada.

Note: Term and definition standardized by Public Safety Canada and the Translation Bureau. (*DTB* record 46753)

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.

national power

The sum total of a nation's capabilities or potential derived from available political, economic, military, geographic, social, scientific and technological resources.

Note: Leadership and national will are the unifying factors. (*DTB* record 35209)

national security

The condition achieved through the implementation of measures that ensure the defence and maintenance of the social, political and economic stability of a country. (*DTB* record 31720)

national strategy

The art and science of developing and using the diplomatic, economic, and informational powers of a nation, together with its armed forces, during peace and war to secure national objectives. (*DTB* record 35112)

offensive counter-air operation (OCA)

An operation mounted to destroy, disrupt or limit enemy air power as close to its source as possible. (*DTB* record 4956)

operation (Op)

1. A combination of activities with a common purpose or unifying theme.

2. A sequence of coordinated actions with a defined purpose.

Notes: 1. NATO operations are military.

2. NATO operations contribute to a wider approach including non-military actions. (*DTB* record 1053)

personnel recovery (PR)

The sum of military, civil and diplomatic efforts to recover and reintegrate isolated personnel and/or recover persons in distress. (*DTB* record 31303)

physical domain

The sphere in which people live and work. (*DTB* record 41433)

principles of war

Broad precepts distilled from experience that influence the conduct of armed conflict and that should guide all strategic and operational decision making.

Note: There is some variation between the principles accepted by different nations. (*DTB* record 36950)

readiness

Preparedness to respond to government direction.

Note: It encompasses the resources needed to maintain equipment, conduct training, and prepare units for operations. (*DTB* record 34053)

reconnaissance (recce)

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* record 1202)

rules of engagement (ROE)

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* record 5285)

search and rescue (SAR)

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* record 1290)

security (secur)

1. Measures taken to guard against espionage, sabotage, crime, attack, or escape.

2. The measures necessary to ensure designated information, materiel, personnel, activities and installations are protected against espionage, sabotage, subversion, terrorism and damage, as well as against loss or unauthorized disclosure. (*DTB* record 13836)

Sense

The operational function that provides the commander with knowledge.

Note: This function incorporates all capabilities that collect and process data. (*DTB* record 26167)

Shield

The operational function that protects a force, its capabilities and its freedom of action. (*DTB* record 26169)

sortie

In air operations, an operational flight by one aircraft. (*DTB* record 5386)

spectrum of conflict

The full range of relationships between states or groups, reflecting the frequency and intensity of violence. (*DTB* record 35238)

surveillance (surv)

The systematic observation of [air], surface or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means. (*DTB* record 1418, modified)

Sustain

The operational function that regenerates and maintains capabilities in support of operations. (*DTB* record 26170)

sustainment

The ability of a nation or a force to maintain effective military power to create desired effects. (*DTB* record 34949, modified)

task

An activity that contributes to the achievement of a mission. (*DTB* record 20312)

task force (TF)

1. A temporary grouping of units, under one commander, formed for the purpose of carrying out a specific operation or mission.

2. A semi-permanent organization of units, under one commander, formed for the purpose of carrying out a continuing specific task. (*DTB* record 1457)

war

The most extreme manifestation of armed conflict, characterized by intensive, extensive, and sustained combat, usually between states.

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* record 5631)

whole-of-government approach (WoG approach)

An integrated approach to a situation that incorporates diplomatic, military, and economic instruments of national power as required. (*DTB* record 35242)

ABBREVIATIONS

AAR	air-to-air refuelling
ADA	Air Doctrine Authority
ADC	Air Doctrine Committee
ADPA	Air Doctrine Programme Authority
AEW	air expeditionary wing
AO	area of operations
ASUW	antisurface warfare
ASW	antisubmarine warfare
ATF	air task force
C2	command and control
CA	Canadian Army
CAF	Canadian Armed Forces
CAS	close air support
CBRN	chemical, biological, radiological and nuclear
Cdn Air Div	Canadian Air Division
CDS	Chief of the Defence Staff
CF	Canadian Forces
comd	commander
COP	common operating picture
DCA	defensive counter-air
det	detachment
DND	Department of National Defence
DOB	deployed operating base
DTB	*Defence Terminology Bank*
EMS	electromagnetic spectrum
EW	electronic warfare
IM	information management
ISR	intelligence, surveillance and reconnaissance
JFACC	joint force air component commander
JIIFC	Joint Information and Intelligence Fusion Capability
JTF	joint task force
MSE	mission-support element

NATO	North Atlantic Treaty Organization
nav	navigation
NORAD	North American Air Defence Command
OCA	offensive counter-air
OPCOM	operational command
OSE	operations-support element
PR	personnel recovery
RAF	Royal Air Force
RAP	recognized air picture
RCAF	Royal Canadian Air Force
RCN	Royal Canadian Navy
SA	situational awareness
SAR	search and rescue
SOF	special operations forces
TAG	tactical air group
TTP	tactics, techniques and procedures
UN	United Nations
US	United States
USSR	Union of Soviet Socialist Republics