National Defence / Défense nationale

Command & Control of Canadian Aerospace Forces:

CONCEPTUAL FOUNDATIONS

Dr. Allan English

Canada

At the end of the 20th century warfare was increasingly characterized by operations where the forces of different nations fought together in coalitions and different branches of the armed forces (e.g., army, navy and air force) worked together closely to accomplish a mission. These operations are often called combined and joint, respectively. At the beginning of the 21st century, new security challenges have caused many Western nations to have their armed forces work much more closely with other agencies, and this phenomenon has added expressions like Joint, Interagency, Multinational, and Public (JIMP); 3D (defence, diplomacy and development); and "integrated" to the national security lexicon. Working in these environments creates command and control challenges at all rank levels in the military. While there is some literature on the challenges of working in multi-national coalitions, the literature on command and control in joint operations, let alone in the new integrated operating environment, is extremely sparse, despite the fact that joint operations are even more numerous than combined operations and integrated operations are becoming the norm.

Effective command and control (C2) is essential to the successful conduct of military and integrated operations and especially to the application of aerospace power. However, in much of the current C2 doctrine, the terms "command," "control" and "command and control" are not defined clearly or are defined in ways that fail to provide practical help to military professionals in the exercise of command or in the design of command arrangements. Some of the confusion is due to the fact that, as is explained in Canadian Forces leadership doctrine, the "inter-relationships and interconnectedness of command, management, and leadership functions often make it difficult to disentangle the command, management, and leadership effects achieved by individuals in positions of authority." Due to this lack of clarity, the terms command, management, and leadership are sometimes used interchangeably. Nevertheless, the interconnectedness of leadership and command is such that leadership is "an essential role requirement for commanders;" therefore, that interconnectedness is reflected in this publication.

Command & Control of Canadian Aerospace Forces: Conceptual Foundations

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Foreword

This book is not doctrine and it should not be treated as such. Its purpose is much more fundamental. As the title implies, the author provides an overview of the major concepts, or theoretical approaches, that underpin current debate on command and control (C2). Given the complex nature and importance of C2 within the context of modern military operations, it should come as no surprise that the concepts and theories vary widely in focus and scope. Command and Control of Aerospace Forces: Conceptual Foundations seeks to establish a basis for understanding how these basic principles have influenced C2 doctrinal development.

Although the book discusses C2 conceptual foundations from a wide variety of sources, it pays more attention to those that influenced the development of Canadian joint C2 doctrine in general and that might guide the development of Canadian aerospace C2 doctrine in particular. Canadian aerospace doctrine, of which C2 doctrine is a key element, is in a developmental phase and thus influenced by ongoing conceptual debates. Therefore, this work is necessary and timely; necessary in that it will aid in creating a broader understanding of C2 concepts and timely in that it well help to identify C2 principles that will guide aerospace doctrine development.

Therefore, I encourage Air Force members to treat Command and Control of Aerospace Forces: Conceptual Foundations as a companion work to Canadian aerospace doctrine. The information therein will serve to both educate and stimulate the reader with respect to basic C2 concepts and theories. The end result will be a broader base of aerospace professionals better prepared to positively contribute to C2 doctrine from the ground up.

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Introduction

General

At the end of the 20th century warfare was increasingly characterized by operations where the forces of different nations fought together in coalitions and different branches of the armed forces (e.g., army, navy and air force) worked together closely to accomplish a mission. These operations are often called combined and joint, respectively. At the beginning of the 21st century, new security challenges have caused many Western nations to have their armed forces work much more closely with other agencies, and this phenomenon has added expressions like Joint, Interagency, Multinational, and Public

(JIMP); 3D (defence, diplomacy and development); and "integrated" to the national security lexicon. Working in these environments creates command and control challenges at all rank levels in the military. While there is some literature on the challenges of working in multi-national coalitions, the literature on command and control in joint operations, let alone in the new integrated operating environment, is extremely sparse, despite the fact that joint operations are even more numerous than combined operations and integrated operations are becoming the norm.[1]

Effective command and control (C2) is essential to the successful conduct of military and integrated operations and especially to the application of aerospace power. However, in much of the current C2 doctrine, the terms "command," "control" and "command and control" are not defined clearly or are defined in ways that fail to provide practical help to military professionals in the exercise of command or in the design of command arrangements. Some of the confusion is due to the fact that, as is explained in Canadian Forces (CF) leadership doctrine, the "interrelationships and interconnectedness of command, management, and leadership functions often make it difficult to disentangle the command, management, and leadership effects achieved by individuals in positions of authority." Due to this lack of clarity, the terms command, management, and leadership are sometimes used interchangeably. Nevertheless, the interconnectedness of leadership and command is such that leadership is "an essential role requirement for commanders;"[2] therefore, that interconnectedness is reflected in this publication.

Another shortcoming of most past and current doctrine, including C2 doctrine, is that, according to one of the leading scholars on doctrine, Major General I. B. Holley (United States Air Force [USAF] retired), it has been, and remains in many cases, "descriptive" and "prescriptive" in the sense that it describes various principles and tenets and dictates how they should be applied. Holley portrayed this "flawed" approach to doctrine as consisting of "page after page" of "generalizations" and "abstractions" that are difficult to apply in real life situations.[3] Recent additions to doctrine manuals of historical examples of these principles and tenets have helped us better understand the complexities of subjects like C2. However, while this approach has improved the usefulness of doctrine, what is still lacking is a useable framework or model that will help us to understand C2 outside of past experience and that can be used to solve new C2 problems.

Similarly, the approach to air force command and leadership of our principal allies is largely prescriptive and descriptive, and lacks the analytical focus, based on a coherent and overarching approach, that is now appearing in the CF leadership and command doctrine.[4] For example, the most recent analysis of United States Air Force (USAF) leadership training and education in USAF professional military education institutions concluded that there was an "absence of fundamental truths based upon rigorous research of what it means to lead airmen." The author of

this analysis observed that "our schools formally present most service members with academic models having no basis in Air Force experience and informally talk to them about Air Force stories. Sometimes the models support the stories; other times they do not. Many times the stories conflict with each other. At the end of the day, the service member must bridge the intellectual gap."[5] A number of commentators have also noted the lack of USAF leadership and command doctrine.[6] This lack was only partially remedied with the publication of Leadership and Force Development (AFDD 1-1) in February 2004, because this doctrine document is focussed primarily on force development and only eleven pages are given over to a fairly cursory examination of USAF leadership and the USAF as a profession.[7] Likewise, USAF and US joint command and control doctrine focus on processes, planning, training and operations and offer little in the way of analysis or theoretical frameworks of C2.[8]

Unlike the situation in other countries, much work has been done in this area by Canadian military professionals and academic researchers. With the publication by the Canadian Forces of Duty with Honour and Leadership in the Canadian Forces: Conceptual Foundations as well as the work on the human dimension of command by Canadian researchers Ross Pigeau and Carol McCann of Defence Research and Development Canada – Toronto, Canada is at the forefront of Western militaries by producing leadership theories and doctrine that can be used for the rigorous analysis of operational experience. We are, therefore, now able to move to the next phase of writing C2 doctrine, which consists of using theoretical frameworks to provide us with a consistent vocabulary and a coherent way to approach C2 problems. These frameworks give us the tools to diagnose what is right and what is wrong with command arrangements and to make changes to improve them. Furthermore, they not only give us better tools to discuss and design C2 arrangements, they also give us ways to rigorously evaluate the effectiveness of command arrangements and to improve them based on a common understanding of C2.

Approach

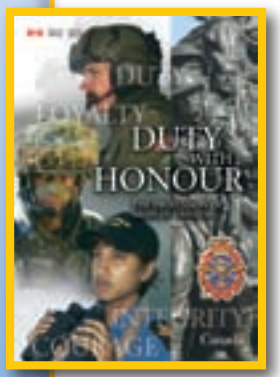
Each nation and each service (or Environment in the CF) in a nation's armed forces has its own unique approach to military operations based on the physical environment in which they operate, their historical experience, and their culture.[9]

Two CF publications have recently codified and described in detail, for the first time, what it means to be a leader and a commander in the CF. As well as providing doctrinal guidance for members of the CF, Duty with Honour and Leadership in the Canadian Forces: Conceptual Foundations (hereafter Leadership in the CF) also provide frameworks and theoretical models to analyze Canadian military leadership and command. Both these publications acknowledge that despite many similarities, there are environmental differences in culture, based on the unique physical environments in which the Canadian Army, Navy and Air Force operate.[10] These unique physical operating environments have produced a unique body of professional knowledge, experience, and therefore, culture for each Environment.[11] Duty with Honour acknowledges that differences among the three Environments are "essential for readiness, generating force and sustaining a multi-purpose, combat-capable force."[12] And these differences account for why "all three Environments often manifest certain elements of the [CF's] ethos in different ways; for example, the influence of history, heritage and tradition or how team spirit is promoted and manifested."[13] Consequently, Duty with Honour recognizes that the CF must accommodate the separate identities of the Army, Navy and Air Force.[14] Leadership in the CF notes that "leaders are formed and conditioned by their social environment and culture;"[15] therefore, we can expect to see differences in leadership styles and command arrangements in the Canadian Army, Navy and Air Force based on these environmental differences in professional expertise and culture.

CF doctrine goes on to discuss Environmental differences in leadership and command based on "distinct and unique bodies of knowledge" that are required to conduct operations in the distinctly

different physical environments of land, sea and air.[16] The "defining document for Canada's profession of arms," Duty with Honour, puts it this way:

…all CF members must master the art of warfare in their own medium if they are to become true professionals in the joint, combined and inter-agency context that characterizes modern conflict. Expertise must be distributed according to the harsh demands of this environment, and the military ethos must accommodate the separate identities forged by combat at sea, on land and in the air.[17]



Based on the environmental differences in operations, there are many different types of doctrine, including combinations of national, service (Environmental), alliance, and joint. Three main types of doctrine apply to Canadian aerospace forces – joint (aerospace forces and another Environment), combined/alliance (Canada and other nation[s]), and Canadian aerospace. Joint doctrine is used to orchestrate the effects of operations involving more than one Environment in the CF or for other nations more than one branch of their armed forces. Combined/alliance doctrine describes the application of aerospace power when two or more nations work together. Some nations, alliances and other groups also publish aerospace doctrine to guide the application of their aerospace power.

While it is essential that Canadian aerospace forces be interoperable with other elements of the CF as well as our allies and partners in coalitions, interoperable doctrine does not imply identical doctrine. Factors such as national policy, history, culture, and geographical location influence the different ways in which nations employ their armed forces, including their aerospace forces. Joint doctrine as well as foreign and combined/alliance aerospace doctrine are found in other CF and allied publications; therefore, this publication focuses on the unique aspects of the command and control of Canadian aerospace forces in the context of joint and other nations' and alliance aerospace doctrine.

Purpose

The purpose of this publication is to establish the conceptual foundations, based on the enduring principles, that can serve as the basis for the command and control of Canadian aerospace forces.

The purpose will be achieved as follows:

- Chapter 1 will summarize the origins of current C2 terminology and describe two theoretical frameworks of command and control that have practical application for 21st century C2;
- Chapter 2 will provide the context for understanding command and control in the 21st century in joint and combined operations, as well as in multinational coalitions;
- Chapter 3 will describe the evolution of current Canadian aerospace C2 arrangements from integration (1968) to 2005 (just prior to General Rick Hillier's CF transformation initiatives)[18] so that the reader will understand the historical and cultural roots of Canadian C2 arrangements;
- Chapter 4 will discuss the context behind current Canadian aerospace command and control arrangements as well as selected issues that have arisen since the start of recent CF transformation initiatives that began in early 2005; and
- Chapter 5 will enunciate principles of Canadian aerospace command and control based on a synthesis of the principles of command and control as espoused by the air forces of Canada's major partners (Australia, Britain and the US) and Canadian experience.

Chapters 1, 2 and 3 provide summaries of material found in Canadian Air Force Leadership and Command: The Human Dimension of Expeditionary Air Force Operations for the reader's convenience so that the history and context underlying the conceptual foundations of the command and control of Canadian aerospace forces is available in one document.[19]

The most important innovation in the approach taken here is the presentation of two theoretical C2 frameworks, in the next chapter, which can be used to analyse, design and evaluate C2 arrangements now and in the future.

Endnotes

1 The idea of national differences in operational-level command styles is examined in Howard Coombs, "Perspectives on Operational Thought," in Allan English, ed., *Leadership and Command and the Operational Art* (Kingston, ON: Canadian Defence Academy Press, 2006), 75-96.

2 DND, *Leadership in the Canadian Forces: Conceptual Foundations* (Kingston: Canadian Defence Academy, 2005), 10-13. Italics in original. Available at http://www.cda-acd.forces.gc.ca/cfli/engraph/leadership/leadership_e.asp

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

4 See for example, UK Ministry of Defence, *British Air Power Doctrine*, AP 3000, Third Ed. (London: The Stationary Office, 1999); and Australia, Royal Australian Air Force, Aerospace Centre, *Fundamentals of Australian Aerospace Power*, Fourth Ed. (August 2002).

5 Mike Thirtle, "Toward Defining Air Force Leadership," *Air and Space Power Journal* 16, no. 4 (Winter 2002), 9-16. Quotes from internet version, np. http://www.airpower.maxwell.af.mil/airchronicles/apj/apj02/win02/vorwin02.html (accessed October 18, 2007).

6 See for example Shannon A. Brown, "The Sources of Leadership Doctrine in the Air Force," *Air and Space Power Journal* 16, no. 4 (Winter 2002), 37-45.

7 See US Air Force, *Leadership and Force Development* (AFDD 1-1) dated 18 February 2004, http://www.dtic.mil/doctrine/jel/service_pubs/afdd1_1.pdf (accessed February 2, 2007). Note that the USAF defines "force development" as "a series of experiences and challenges, combined with education and training opportunities that are directed at producing Airmen who possess the requisite skills, knowledge, experience, and motivation to lead and execute the full spectrum of Air Force missions." AFDD 1-1, vii.

8 See US Air Force, *Command and Control* (AFDD 2-8) dated 16 February 2001(Maxwell AL: US Air Force Doctrine Center, 2001); and DoD, *Command and Control for Joint Air Operations* (JP 3-30) dated 5 June 2003, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_30.pdf (accessed February 25, 2008).

9 See for example Allan English, *Understanding Military Culture: A Canadian Perspective*. (Montreal and Kingston: McGill-Queen's Univ. Press, 2004); and Allan English and G.E. (Joe) Sharpe. "Network Enabled Operations: The Experiences of Senior Canadian Commanders." Defence Research and Development Canada - Toronto, report CR 2006-112, 31 March 2006.

10 Canada, Department of National Defence (DND), *Duty with Honour* (Kingston, ON: Canadian Defence Academy, 2003), 51. Available at http://www.cda-acd.forces.gc.ca/CFLI/engraph/poa/poa_e.asp

11 Ibid., 59.

12 Ibid., 74.

13 Ibid., 25.

14 Ibid., 74.

15 Ibid., 4.

16 Ibid., 19, 25, 59.

17 Ibid., 74.

18 Hillier started these initiatives shortly after his appointment as CDS in February 2005.

19 Allan English and John Westrop, *Canadian Air Force Leadership and Command: The Human Dimension of Expeditionary Air Force Operations* (Trenton: Canadian Forces Aerospace Warfare Centre, 2007). Available at http://www.airforce.forces.gc.ca/cfawc/eLibrary/eLibrary_e.asp

Theories of Command & Control

Chapter 1

General

The CF profession of arms manual, *Duty with Honour,* states that members of the profession of arms in Canada are required to achieve high standards of professional expertise.[1] This expertise comprises "a sophisticated body of theoretical and practical knowledge and skills that differ from those in any other

profession," and the knowledge that is the foundation of the profession of arms is based on "a deep and comprehensive understanding of the theory and practice of armed conflict."[2]

To acquire the necessary professional expertise, military professionals must have a balance among training, education and experience. While the idea that training and experience are essential components of military professionalism is widely accepted, some challenge the idea that developing an understanding and subsequently a mastery of relevant theories is an equally important component of military professionalism.[3] Of course training in certain C2 processes is important so that military professionals may use them effectively, and experience is vital so that military professionals can analyse that experience to improve the practice of their profession. However, just as professional engineers must master certain theories founded in the physical sciences to practise their profession, military professionals must master theories of war, leadership and command to be competent to practise their profession. This mastery is critical for military professionals, as well as others in the defence community, if they are to adapt to change effectively. Therefore, they need to understand the intellectual as well as the technical tools that they use in their work, because in professions, tools are not only physical objects, but also theories, concepts and knowledge. In the case of C2, military professionals must understand theories of C2 to be aware of not only how to use this professional "tool," but also how to modify the "tool" so that it can be used in new or unforeseen circumstances.[4]

Unfortunately for military professionals, the theoretical study of command in a military context is still immature, and in practice, there is confusion among some branches of Western militaries in terms of how they describe their approach to command. Some endorse the concept of "mission command," others endorse a philosophy of "centralized control and decentralized execution," while in other branches the notion of "network-centric" C2 is prominent.[5] Despite the advantages that using emerging C2 theory might bring to armed forces in dealing with this confusion, some members of the profession of arms argue that the use of theoretical frameworks may detract from the practice of command, especially given that they are not fully developed. Pigeau and McCann respond to this argument in this way:

> From a military perspective, attempting to dissect C2 may seem overly analytical and sterile. After all, military commanders have been 'doing' C2 more or less successfully for hundreds of years. Some may argue that too much analysis, especially if it is incomplete, may actually get in the way of excelling in military command and other command-related activities like the operational art. From a scientific perspective, some researchers may view the theoretical framework we propose as too loose and imprecise. Both criticisms have merit, yet both criticisms suffer the same shortcoming. Both assume that only complete knowledge can further the practice and understanding of a field or discipline.[6]

Instead of individual instructors or leaders showing their pupils or subordinates their own personal ways of flying or avoiding dangerous situations in the air, if theories of flight had been taught consistently throughout the RFC, manoeuvres such as spin recoveries would have been learned as a matter of routine. Of course, theories of flight have progressed significantly since the First World War; however, even the rudimentary theories extant at the time, if disseminated and taught widely, would have saved many lives. This is not to suggest that, given the complexity of the human dimension of command, theories of command will ever be taught like aircraft operating instructions; however, an understanding of human behaviour and theoretical command frameworks will

An analogy may clarify why C2 theory, even incomplete theory, is required to maximize the effectiveness of armed forces in the 21st century. In the early days of powered flight, the theories of flight were poorly understood and flying training was based on students copying their instructors' actions with little understanding on the part of either student or instructor of the principles behind their control movements. The causes of spins and other unusual aircraft attitudes were, therefore, not well known, and many deaths resulted due to avoidable flying accidents.[7] Without coherent theory as a guide, showing pilots how to avoid dangerous situations during the First World War was the responsibility of individual leaders. One remarkable case of leadership by technical expertise was that of squadron commander and Victoria Cross winner Lanoe Hawker. His unit was the first to be equipped with DH2 aircraft, which had been rushed into service to counter the "Fokker scourge." At that time the Royal Flying Corps (RFC) was suffering large numbers of casualties at the hands of the newly introduced Fokker E1 fighters. These fighters were the first aircraft to have interrupter gear allowing them to fire their machine guns forward through the arc of their propellers. Unfortunately for the RFC, the DH2 had a number of manufacturing and technical problems, and it was soon dubbed the "Spinning Incinerator" by the pilots who flew it. On 13 February 1916, two of Hawker's best pilots were killed in accidents involving spins on their own side of the lines. Rumours quickly circulated among his pilots that these machines were death traps. A complete collapse in squadron morale seemed imminent, and Hawker had to act quickly. Immediately after the fatal accidents, he took a DH2 up on his own and recovered from every possible spin condition. He then explained the proper manoeuvres to his pilots, and they all practised them until they were proficient in spin recoveries. After that, while Hawker was in command, his squadron did not lose another flier from spinning into the ground. Thus, a potentially serious morale problem was avoided by a commanding officer (CO) demonstrating his flying competence and by taking a personal risk.[8] However, this exceptional demonstration of leadership and flying skill would not have been required if theories of flight had been adequately researched, documented and taught to all RFC pilots.

Hawker

Airco DH2

allow command challenges to be addressed more consistently and effectively by military personnel.

The Origins of Some Command and Control Terms

Background

Most of the formal definitions related to C2 in current military doctrine and usage date from the Second World War, and reflect the outcome of negotiations among the Allies, particularly the US and Britain, over how terms like "command," "control," "unity of command," and "coordination" should be used to ensure the effective employment

of forces in joint and combined operations in that war. Therefore, a brief outline of how some of these terms came to be defined is offered to provide the reader with the context necessary to understand current issues in command and control terminology.

At the beginning of the Second World War, the Canadian Army, Navy and Air Force feared being dominated by other services, both Canadian or foreign, and, therefore, they "jealously guarded their independence."[9] Each service was opposed to any kind of centralization of command and control, and they insisted "on mutual and voluntary cooperation as the only basis for joint planning and command."[10] Cooperation, then, became the main command and control principle amongst the Canadian services, and it entailed working "together for mutually agreed goals."[11]

Unity of Command or Operational Command

The creation of formal defence arrangements between Canada and United States, with the establishment of the Permanent Joint Board on Defence in August 1940, brought a new and unfamiliar command and control term to the attention of Canada's armed forces: unity of command. This principle "was alien to Canadian doctrine and practice."[12] Nonetheless, this command and control principle was deeply entrenched in the US Army (which included the US Army Air Corps) and Navy. Unity of command essentially meant having one commander – from any service – to command the air, ground, and naval forces in a theatre of operations. This "single authority" would be able to choose between strategic plans, resolve the conflicting claims of feuding subordinate commanders for resources, and assign operational priorities. The principle of unity of command aimed to avoid duplication of effort and competition for resources among coequal commanders; this principle also prescribed the establishment of a clear chain of command to minimize delays in issuing orders and to ensure that orders came from only one source.[13]

An official definition of unity of command appeared in the 1941 Joint Canadian-United States Basic Defence Plan No. 2 (Short Title ABC-22):

> Unity of command, when established, vests in one commander the responsibility and authority to co-ordinate the operations of the participating forces of both nations by the setting up of task forces, the assignment of tasks, the designation of objectives, and the exercise of such co-ordinating control as the commander deems necessary to ensure the success of the operations. Unity of command does not authorize a commander exercising it to control the administration and discipline of the forces of the nation of which he is not an officer, nor to issue any instructions to such forces beyond those necessary for effective co-ordination.[14]

This 1941 definition of unity of command closely resembles today's modern definition of the term "operational command."[15] Therefore, during the Second World War unity of command implied, in today's terms, vesting operational command of multi-service forces in a single commander.[16]

Operational Control

The term "operational control" was first used by the Royal Navy in 1941 as a means to increase its influence over Royal Air Force (RAF) Coastal Command maritime patrol operations. However, because it was not precisely defined at first, operational control proved to be an ambiguous command and control principle. The March 1941 "Coastal Command Charter" stipulated that "operational control of Coastal Command will be exercised by the Admiralty through the Air Officer Commanding-in-Chief (C-in-C), Coastal Command."[17] It did not, however, exactly define what "operational control" actually entailed. The naval C-in-C only had the authority to issue "general directives" as to the objectives to be obtained, and it was

the air commander who actually exercised "operational control" by "designat[ing] the day-to-day detailed conduct of air operations."[18] The C-in-C of Coastal Command, Air Marshal Sir John Slessor, described the command and control relationship from his perspective as follows: "the sailor tells us the effect he wants achieved and leaves it entirely to us how that result is achieved."[19] It was therefore not surprising that the RAF felt that the Admiralty's "operational control" over Coastal Command was a "polite myth."[20]

While the British continued to tolerate ambiguity on this issue, the Americans did not. At the end of May 1941, they revealed their definition of operational control to their Canadian counterparts on the Permanent Joint Board on Defence: "Operational control includes the responsibility and authority to dispose and employ available means to require such action by all available forces as will most effectively execute the assigned task."[21] This definition was more precise than the British one, and in late 1943, under American pressure, the Royal Navy and Royal Air Force – after some disagreement[22] – finally agreed on a clear definition of operational control:

> Operational Control comprises those functions of Command involving composition of Task Forces or Groups or Units, assignment of Tasks, designation [sic] of objectives and co-ordination necessary to accomplish the Mission. It shall always be exercised where possible by making use of normal organisation Units assigned, through the responsible Commanders. It does not include such matters as Administration, discipline, Internal Organisation and training of Units… It is recognised that the Operational Authority may in emergency or unusual situations employ assigned Units on any task that he considers essential to effective execution of his operational responsibility.[23]

This definition mirrors very closely the modern definition of operational control, which is "the authority delegated to a commander to direct assigned forces to accomplish specific missions or tasks, which are usually limited by function, time, or location; to deploy units concerned; and to retain or assign TACON [Tactical Control] of those units. It does not include authority to assign separate employment of components of the units concerned."[24] Indeed, this 1944 definition proved to be of great importance, for operational control became the cornerstone command and control principle of the two key post-war Western military alliances, North Atlantic Treaty Organization (NATO) and North American Air Defense Command (NORAD).[25]

Operational Direction

In early 1943, the Western Allies established the Canadian Northwest Atlantic Command, and granted Rear-Admiral L.W. Murray, the Royal Canadian Navy C-in-C in Halifax, "operational direction" over all maritime patrol forces in the new theatre of operations.[26] The problem for Murray was that operational direction was not specifically defined when the new command was stood up on 30 April 1943. Therefore, when Murray began, in the Royal Canadian Air Force's (RCAF) opinion, to exert too much influence on maritime patrol operations, the RCAF sought advice from RAF Coastal Command.[27] Air Marshal Slessor stressed to the RCAF that Murray was exceeding his authority by giving specific and detailed instructions for maritime patrol operations. Instead, Slessor indicated that:

> …what he should tell us is that he wants that convoy protected; and he should give us an order of priority for the convoy; and he should tell us whether in his view, convoy protection at any given place or time should have priority over offensive sweeps; but how you protect [the] convoy is entirely a matter for Johnson [the RCAF Air Officer Commanding-in-Chief Eastern Air Command].[28]

In summary operational direction was understood to be the authority to issue directives as to the objectives to be pursued (i.e., the effect that one wanted to achieve) in operations. It did not include the planning and issuing of detailed instructions for the actual execution of operations, as these functions were a part of operational control. Importantly, this definition of operational direction closely mirrors the relationship between Coastal Command and the Admiralty as indicated in the 1941 Coastal Command Charter (see above). Therefore, one could argue that the Admiralty had "operational direction" not "operational control" over Coastal Command operations.[29] In modern terms, operational direction was the precursor to mission command where the commander sets out their intent and subordinate commanders decide, within certain guidelines, the details of how to achieve that intent. Mission command is discussed in more detail later.

SUPERMARINE STANRAER COASTAL PATROL FLYING BOAT

Implications of Historical Experience for Today

Many principles of operational-level command and control evolved significantly during the Second World War and the definitions of a number of command and control terms forged during this conflict provided precedents for future command and control principles both during the Cold War and today. It must be emphasized, however, that the focus of the command and control principles and terms discussed above was at the operational level of war. If there is a theme that is consistent with all of these definitions, it is that none of these command and control principles granted a commander authority over another service's administration and discipline. This authority instead fell to the command that the service itself exercised through the head of that service (i.e., Chief of the Air Staff, Chief of the Naval/Maritime Staff, Chief of the General/Land Staff, etc.), a practice that continues to this day.

Furthermore, as Slessor stated, higher levels of command should only tell lower levels of command the effects they wanted to achieve and leave it to lower levels of command to work out the details appropriate to their level. This principle was particularly applicable to the RCAF and RAF when dealing with armies and navies who might not have the expertise to request specific aircraft types or weapons

loads, and, therefore were asked to state their requirements in terms of the effects they desired the air force to achieve. The specific choice of aircraft and missions was then the responsibility of the air force based on the commander's intent.

Finally, we should see from this discussion that definitions of terms related to C2 are not fixed, but evolve based on experience, new theories, and the increased complexity of coalition operations. As a contemporary study, *The UK Joint High Level Operational Concept*, puts it: "The current definitions of command [e.g., operational command and operational control] are becoming too crude to apply effectively in a highly dynamic politico-military environment. Therefore the adaptive command and control process also seeks to provide greater flexibility for command and control configurations in order to optimise integration with coalition partners."[30] Consequently, while for doctrinal purposes it is important to understand the terms as they are currently defined, we should be open to changes in definitions over time.

New Ways of Thinking about Command, Control, and C2

The problems with current formal doctrinal definitions of terms like "command," "control," and "command and control" stem from the historical roots discussed above and also from the fact that many current doctrinal definitions, particularly those used by NATO and other groups, are the result of negotiation and compromise and not of theory or research. The US Joint Staff provides a more elaborate definition than NATO's, and specifically emphasizes the legal authority associated with exercising command:

> The authority that a commander in the Armed Forces lawfully exercises over subordinates by virtue of rank or assignment. Command includes the authority and responsibility for effectively using available resources and for planning the employment of, organizing, directing, coordinating, and controlling military forces for the accomplishment of assigned missions. It also includes responsibility for health, welfare, morale, and discipline of assigned personnel.[31]

Despite the differences, one of the striking characteristics of the definitions of command over time is the extent to which they evoke the personal nature of command itself, especially the fact that the authority to command is vested in one individual. In summary, while, in the more restricted sense, command is a legal authority vested in an individual (an authority that can only be drawn from national laws), the expression "command and control" generally conveys the meaning of command proposed by van Creveld in that it is a function that has to be exercised if a military force is to exist and operate in war.[32]

Many contemporary problems with Canadian Air Force command are directly related to this state of affairs. The historical and contemporary origins of these problems are discussed in Chapter 3. The description of how the common usage of these terms has led to confusion in both the study and the application of C2 is described best by Pigeau and McCann:

> These terms ["command," "control," and "command and control"] are recognizably military, and are well-entrenched in the military's doctrinal and operational vocabulary. Yet the manner in which these terms are used, as well as the circumstances of their usage, varies with confusing complexity. For example, some branches of the military endorse the concept of mission command, others endorse a philosophy of centralized control and decentralized execution, while in other services the notion of network-centric C2 is prominent. NATO

employs a dizzying array of C2 nomenclature and authorities: OPCON [operational control], TACOM [tactical command], full command, etc. And if we look for help from official definitions of Command, Control and C2 (e.g., those of NATO), we find that the definitions themselves are circular and redundant. The command definition makes use of the word control, the control definition uses concepts that are part of the definition of command, and the definition of C2 is merely a longer restatement of the definition of control. Add to this confusion the growing and bewildering array of C2 acronyms adopted by militaries around the world (e.g., C2I, C2IS, C4ISR, etc.), and it is no wonder that defence analyst Greg Foster has described the state of Command and Control theory as bleak, using words like "inchoate," "diffuse," "conjectural" and "seemingly random."[33]

In an attempt to put some order into the discussion of C2, two major frameworks, which are cited frequently in the literature on C2, will now be presented. The first was devised by Thomas J. Czerwinski who served in the US Marine Corps and US Army and was on the faculty of the National Defense University; the second was put forward by Canadian researchers Ross Pigeau and Carol McCann. Czerwinski's framework represents the evolution of the theory of C2 in the US literature from its roots in two leading military theorists, Carl von Clausewitz and Martin van Creveld. However, the Czerwinski framework has not been developed in any detail since the publication of the original concept in 1996. Therefore, the Pigeau-McCann framework is emphasized here because it is one of the leading empirically-based models of C2 currently being developed. The Pigeau-McCann model is cited in CF leadership doctrine and in CF aerospace doctrine.[34] Furthermore, it is cited in *The UK Joint High Level Operational Concept* and this document tells us that the framework provides "essential features" to better understand command.[35] Concepts from the Pigeau-McCann framework have also been incorporated recently into definitions of "command" and "control" in NATO joint doctrine.[36] Finally, as a model being developed by Canadian researchers, using Canadian (as well as other) data, it is compatible with the organizational culture of the CF and it addresses the major challenges confronting Canadian decision makers.

The Czerwinski Command Framework

Czerwinski proposed a framework, based on three types of command style, which summarizes many of the concepts in the current debate. He described the first command style, used in the US Army's digitized battlefield concept, as "command-by-direction." This form of command has been used since the beginning of organized warfare, and it is based on commanders attempting to direct all of their forces all of the time. This form of command fell into disfavour in the middle of the 18th century as the increase in the size of armed forces made it increasingly difficult to physically exercise direct command. Czerwinski argued that "command-by-direction" has been resurrected by the US Army because it

believes that technology can provide the commander with the ability to exercise this type of command again; however, he asserted that, because of the size and complexity of the technical support required to support this command style, it will be inadequate and self-defeating if applied to 21st century conflict.

Czerwinski's second style, "command-by-plan," was created by Frederick the Great 250 years ago to overcome the limitations of "command-by-direction." "Command-by-plan" emphasizes adherence to a predetermined design and it has evolved as the norm for many modern military forces in the West. The US Air Force's air campaign doctrine is cited as an example of this type of command system which is characterized by trading flexibility for focus in order to concentrate on identifying and neutralizing an opponent's centres of gravity. Czerwinski claimed that "command-by-plan" is useful only at the strategic and operational levels of war, but if too much emphasis is put on adhering to the plan, this method will be ineffective because of its inability to cope with unforeseen or rapid change.

Czerwinski advocated the adoption of a third type of style, "command-by-influence," to deal with the chaos of war and the complexity of modern operations. This command style, which has also been called mission command or *auftragstaktik*, attempts to deal with uncertainty by moving decision thresholds to lower command levels, thereby allowing smaller units to carry out missions bounded by the concept of operations derived from the commander's intent. In mission command, subordinate commanders are given freedom to achieve the goals set by the commander, but are free to decide, within certain guidelines, the specific ways and means themselves. The emphasis in this method of command is on training and educating troops to have the ability to exercise initiative and to exploit opportunities guided by the commander's intent. The commander's ability to create "common intent," which is discussed in detail later in this chapter, is a key to effective "command-by-influence." Czerwinski's contention that only "command-by-influence" systems are likely to be consistently successful in the 21st century is supported by a number of military communities, notably the US Marine Corps.[37]

The Pigeau-McCann Command Framework

General

Pigeau and McCann devised their framework to address the gaps in the theoretical study of command in a military context and their framework is being evaluated based on data gathered from Canadian military operations.[38] They note that whether involved in disaster relief, peacekeeping operations or war, the CF deal in human adversity. Inevitably, the CF responds to and resolves this adversity through human intervention. Any new theory of C2 must, therefore, assert the fundamental importance of the human as its central philosophical tenet. It is the human–e.g., the CF member–who must assess the situation, devise new solutions, make decisions, coordinate resources and effect change. It is the human who must initiate, revise and terminate action. It is the human who must ultimately accept responsibility for mission success or failure. All C2 systems, from sensors and weapons to organizational structures and chain of command, must exist to support human potential for accomplishing the mission. For example, C2 organizations that are intended to allocate authorities and define areas of responsibility should facilitate the coordination of human effort to achieve mission objectives. If the organization hinders this goal–for example, by confusing lines of authority or by imposing excessive bureaucracy–then the human potential necessary for accomplishing the mission is also compromised. The challenge, then, becomes one of specifying those aspects of human potential that should guide C2 development.[39]

Pigeau and McCann's framework first distinguishes the concept of command from control, giving pre-eminence to command. They then link the two concepts together in a new definition of C2.

Definition of Key Terms

Pigeau and McCann define key terms as follows. **Command** is "the creative expression of human will necessary to accomplish the mission." **Control** is "those structures and processes devised by command to enable it and to manage risk. The function of control is to enable the creative expression of will and to manage the mission problem in order to minimize the risk of not achieving a satisfactory solution. The function of command is to invent novel solutions to mission problems, to provide conditions for starting, changing and terminating control, and to be the source of diligent purposefulness."[40] The functions of command versus control are shown in Table 1-1.

Command	Control
■ Creating new structures and processes (when necessary)	■ Monitoring structures and processes (once initiated)
■ Initiating and terminating control	■ Carrying out pre-established procedures
■ Modifying control structures and processes when the situation demands it	■ Adjusting procedures according to pre-established plans

Table 1-1 Command and Control Functions[41]

Their definition of command, whose influence can be found in the second of five NATO definitions of command,[42] is: *the creative expression of human will necessary to accomplish the mission*. Without creativity, C2 organizations are doomed to applying old solutions to new problems, and military problems are never the same. Furthermore, without human will there is no motivation to find and implement new solutions. For example, rarely does the slavish adherence to rules and procedures (e.g., standard operating procedures [SOPs]), devoid of creativity, produce effective organizations. Indeed, as most labour unions know, a good method for hampering operational effectiveness is to "work to rule" or to follow only "the letter of the law." Nevertheless, well designed rules and procedures are effective in the proper circumstances. Command, therefore, needs a climate of prudent risk taking, one where individuals are allowed to tap inherent values, beliefs and motivations to marshal their considerable creative talents towards achieving common goals.

It follows from their definition that all humans have the potential to command; put another way, that command is an inherently human activity that anyone, if they choose, can express. To limit command only to those individuals who have been bestowed with the title of "Commander," begs the question of what command is in the first place. Notice that their definition allows even junior non-commissioned members to command. If, through their will, they are creative in solving a problem which furthers the achievement of the mission, then they have satisfied the requirements for command.

But if all humans can command, on what basis do Pigeau and McCann differentiate command capability? What differentiates the private from the general officer? What key factors influence its expression? To address these questions, Pigeau and McCann have further refined the notion of command in proposing the concept of

"***effective command***," defined as "*the creative and purposeful exercise of legitimate authority to accomplish the mission legally, professionally and ethically*."[43] This definition highlights the notion of legitimate authority as the basis of effective command in the military. Even though all humans can command, according to their definition of command, the exercise of command by those not in positions of legitimate authority would probably not be deemed effective command in a military context. In this book, the term "command" is used to denote "effective command," using the Pigeau-McCann definition.

Dimensions of Command[44]

To elaborate further on their concept of command, they propose that command capability, as shown in Figure 1-1, can be described in terms of three independent dimensions: competency, authority and responsibility (CAR).

Command requires four essential competencies so that missions can be accomplished successfully. For most militaries, *physical* competency is the most fundamental, one that is mandatory for any operational task, from conducting a ground reconnaissance to flying an aircraft. The second, *intellectual* competency, is critical for planning missions, monitoring the situation, for reasoning, making inferences, visualizing the problem space, assessing risks and making judgements. Missions, especially peace support missions, can be ill-defined, operationally uncertain, and involve high risk. Command under these conditions requires significant *emotional* competency, a competency strongly associated with resilience, hardiness and the ability to cope under stress. It is sometimes described as perseverance in the face of adversity. Command demands a degree of emotional "toughness" to accept the potentially dire consequences of operational decisions. Finally, *interpersonal* competency is essential for interacting effectively with one's subordinates, peers, superiors, the media and other government organizations.

These four competencies define the broad set necessary for effective command.

Authority, the second dimension of command, refers to command's domain of influence. It is the degree to which a commander is empowered to act, the scope of this power and the resources available for enacting their will. Pigeau and McCann distinguish between the two components of command authority: that which is assigned from external sources and that which an individual earns by virtue of personal credibility – that is, between legal authority and personal authority. *Legal authority is the power to act as assigned by a formal agency outside the military, typically a government*. It explicitly gives commanders resources and personnel for accomplishing the mission. The legal authority assigned to a nation's military goes well beyond that of any other private or government organization; it includes the use of controlled violence. *Personal authority*, on the other hand, *is that authority given informally to an individual by peers and subordinates*. Unlike legal authority which is made explicit through legal documentation, personal authority is held tacitly. It is earned over time through reputation, experience, strength of character and personal example. Personal

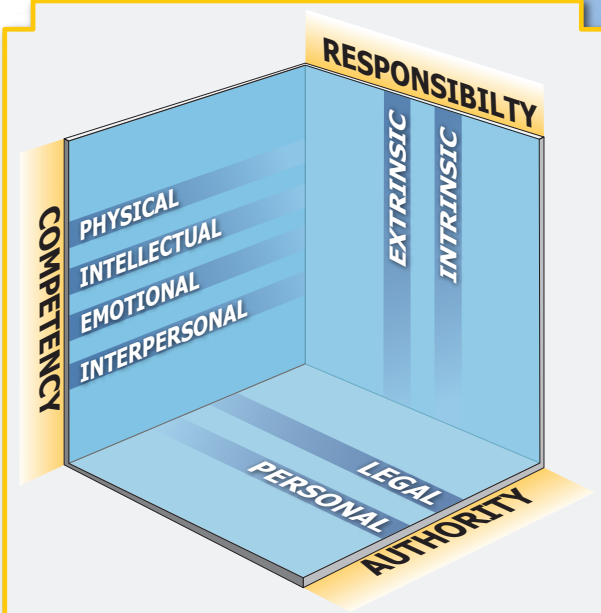


Figure 1-1 – Dimensions of Command Capability

authority cannot be formally designated, and it cannot be enshrined in rules and regulations. It emerges when an individual possesses the combination of competencies that yields leadership behaviour.

The third dimension of command is responsibility. This dimension addresses the degree to which an individual accepts the legal and moral liability commensurate with command. As with authority, there are two components to responsibility, one externally imposed, and the other internally generated. The first, called *extrinsic responsibility, involves the obligation for public accountability*. When a military commander is given legal authority, there is a formal expectation by superiors that they can be held accountable for resources assigned. Extrinsic responsibility taps a person's willingness to be held accountable for resources. *Intrinsic responsibility*, the second component of responsibility, *is the degree of self-generated obligation that one feels towards the military mission*. It is a function of the resolve and motivation that an individual brings to a problem

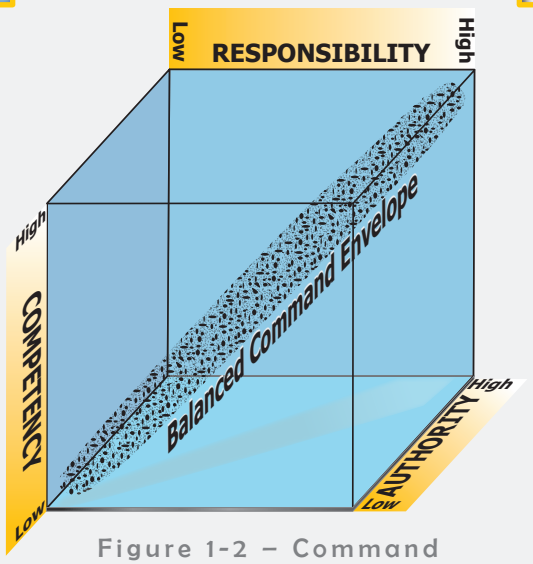


Figure 1-2 – Command Capability Space with the Balanced Command Envelope[47]

– the amount of ownership taken and the amount of commitment expressed. Intrinsic responsibility is associated with the concepts of honour, loyalty and duty; those timeless qualities linked to military ethos. Of all the components in the dimensions of command, intrinsic responsibility is the most fundamental. Without it, very little would be accomplished.

Command Capability Space and the Balanced Command Envelope[45]

Pigeau and McCann propose that competency, authority and responsibility each define one axis of a 3-dimensional volume that encompasses the entire space of command capability (Figure 1-2). That is, military members can each be positioned in this space, with their locations specifying the degree and type of command capability they possess. Individuals with high levels of competency, authority and responsibility – i.e., occupying the far upper right-hand corner of the space – represent high levels of command capability, presumably senior officers. Individuals with low levels of competency, authority and responsibility – i.e., occupying the near lower left-hand corner of the space – represent low levels of command capability, presumably junior non-commissioned personnel. Furthermore, they hypothesize that the command capability of each person in a military organization should *ideally* lie inside the *Balanced Command Envelope (BCE)*, a diagonal column[46] of space running from low competency, authority and responsibility to high, as shown in Figure 1-2. Individuals lying outside the BCE have reduced command capability due to an imbalance in one or more of the command dimensions. For instance, an organization may have put an individual in the position of expecting them to take responsibility for a situation for which they lack the authority (e.g., the resources and power) to influence. Alternatively, an organization may under-utilize individuals with high levels of competency by assigning them tasks with too little authority and responsibility. The point is that being off the BCE runs the risk of compromising command effectiveness – that is, of compromising an individual's ability to creatively express their will in the accomplishment of the mission.

Pigeau and McCann's human-centred definition of command is a powerful tool for deducing some organizational principles. However, the careful reader will notice that simply specifying command characteristics is insufficient for completely describing C2. How can one facilitate and support, for example, command expression? Under what conditions does the creative expression of will best manifest itself? Alternatively, unbridled creativity can lead to uncoordinated activity and organizational chaos. Under what conditions should the creative expression of will be limited or channelled? The answer to these questions is control. Command must execute control both (1) to support and facilitate creative command, while (2) controlling command creativity. Indeed, much of organizational theory can be seen as the attempt to establish the optimum balance between the two functions performed by control.

The Relationship between Command and Control

As we have seen, Pigeau and McCann defined *control* as *those structures and processes devised by command both to support it and to manage risk*. The relationship between command and control is shown in Figure 1-3. Structures are frameworks of interrelated concepts that classify and relate things. The military environment encompasses a host of control structures (e.g., chain of command, order of battle, databases for describing terrain, weapon systems, organizations, etc). Structures are attempts to bound the problem space and give a context within which creative command can express itself. For example, an organization's mission statement is a strategic-level structure whose purpose is to give long-term guidance to all members (including leaders in the organization) on how to apply and channel their motivation and creativity. Once stable structures have been established, processes can be developed to increase efficiency. Control processes are sets of regulated procedures that allow control structures to perform work. They are the means for invoking action. Military rules of engagement (ROE), for example, are formal processes for regulating the use of force. Process increases speed of response and reduces uncertainty.

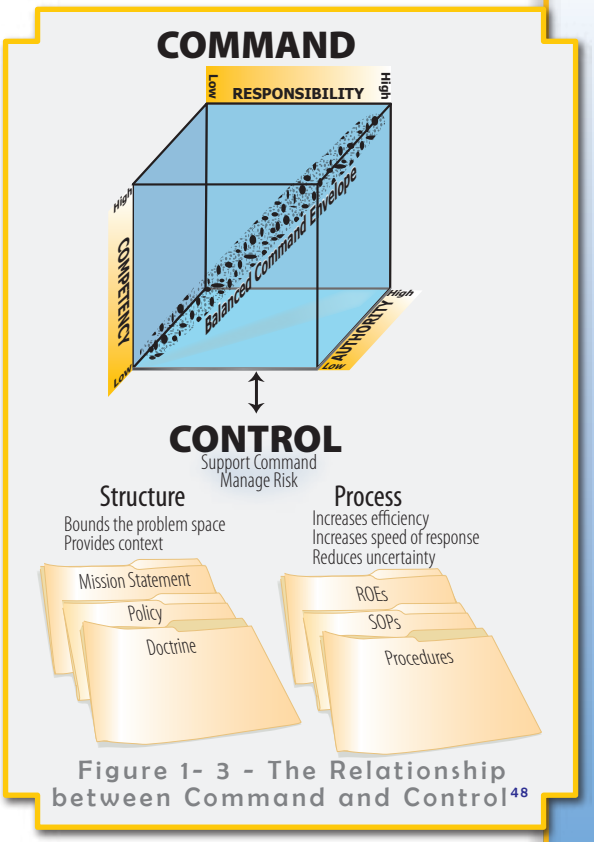


Figure 1- 3 - The Relationship between Command and Control[48]

Knowing which structures and processes to invoke in order to achieve operational success is a key issue for command. Recall that their definition specifies that control is *devised by* command. Structures and processes come into existence only through some creative act of human will. What are the guidelines for knowing when new control systems should be developed or when existing control systems should be allowed to continue? Their definition specifies two broad guidelines. First, structures and processes should exist to support command. They should facilitate (or at least not hinder) the potential for creative acts of will. They should facilitate (or at least not hinder) the expression of competencies (physical, intellectual, emotional and interpersonal). They should clarify pathways for legal authority; they should encourage (not impede) the opportunity to establish personal authority. And finally, they should encourage the

willing acceptance of responsibility while at the same time increasing motivation in military members. From an organizational perspective, any control system that forces its members off the Balanced Command Envelope will, over time, compromise organizational effectiveness.

The second criterion for knowing when control should be invoked is whether it promotes the management of risk. Pigeau and McCann define risk loosely as anything that jeopardizes the attainment of the mission. This includes uncertainties due to personnel (including the adversary), uncertainties in the environment (e.g., weather, terrain, etc), equipment failures, miscommunication, and the unbridled expression of creativity, since such expression may lead to chaos. Imposing an elaborate control structure and process is one way to reduce risk; however, this would come at the expense of inhibiting command creativity–creativity that, inevitably, is needed for solving new problems.

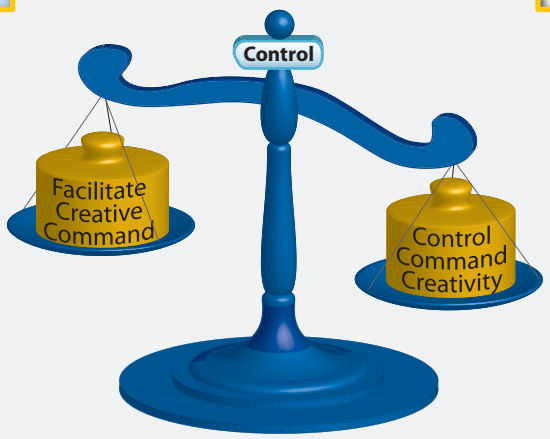
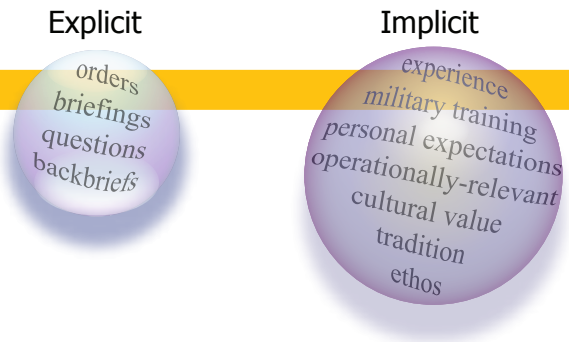


Figure 1-4 – Reasons for Creating Control

Therefore, as shown in Figure 1-4, a tension exists between the two reasons for creating control: to facilitate creative command and to control command creativity. Getting the balance right is a perennial challenge for most organizations. Pigeau and McCann suggest that, as a general strategy, militaries should give priority to facilitating creative command. Mechanisms for controlling command creativity should then be used wisely and with restraint.

Their definitions of command and of control (as separate concepts) were designed to highlight a military's most important asset: the human. However, a military is not simply a collection of independent individuals, each of whom pursues their own interpretation of the mission. Militaries are organizations for coordinated action, for achieving success by channelling the creative energies of their members towards key objectives. It is this important feature of military capability that they emphasize in their new definition of ***command and control***: *C2 is the establishment of common intent to achieve coordinated action*. Without coordinated action military power is compromised. Without common intent coordinated action may never be achieved. In their work Pigeau and McCann have specified some of the issues that must be addressed to make common intent clear. A discussion of the concepts of intent and common intent follows.

Intent and C2



Intent

A key concept in their definition of C2, as we have seen, is *intent*; that is, a specific aim or purpose and its associated set of connotations. When a commander gives the order to "Attack target X by 1300 hours," they not only mean attack target X explicitly, but also mean: "Attack target X while making effective use of your resources, without killing innocent civilians, etc." Thus the commander's intent is made up of two components.

The first is *explicit intent*, that part which has been made publicly available through orders, briefings, questions and backbriefs. It includes communications that can be written, verbalized or explicitly transmitted. But it is impossible to be explicit about every minute aspect of an operation. For expediency's sake some things (actually most things) are left uncommunicated. Thus explicit intent carries a vast network of connotations and expectations–the *implicit intent*. Implicit intent derives from personal expectations, experience due to military training, tradition and ethos and from deep cultural values. Much of implicit intent may be that which cannot be vocalized. And it is usually acquired slowly—through cultural immersion or years of experience. Finally, common intent, shown in Figure 1-5, consists of the explicit intent that is shared between a commander and subordinates immediately prior to or during an operation plus the (much larger) operationally-relevant shared implicit intent that has been developed over the months, and even years, prior to the operation.[49]

Common Intent

Correctly interpreting an aim, purpose or objective—that is, correctly inferring intent—is a fundamental concept in military thought. Military doctrinal literature is rife with terms like commander's intent, intent statements and enemy intent. The smooth functioning of a military organization, particularly during operations, depends upon its members correctly inferring not only the commander's intent but also one another's intent, especially in unanticipated situations for which plans may not have been prepared. In fact, intent is such a profound concept, it is key to their definition of command and control, as we have seen.

The establishment of common intent in C2 is not an end in itself but a means to an end: specifically, to coordinate action in military operations. Intent is more than an aim or purpose; it is an aim or purpose with all of its associated connotations. Intent conveys the idea of needing to interpret an aim in the context of unforeseen circumstances. For example, a military objective may involve securing and stabilizing an area to allow humanitarian relief efforts. Assuming that the physical resources exist to accomplish this objective, what factors are involved for ensuring that the objective is interpreted correctly by those charged with its completion? Is it simply a matter of giving explicit instructions on how the objective should be accomplished? If so, how explicit should these instructions be? Will it be necessary to elaborate on these explicit instructions? If so, how extensive should the elaborations be? At some point elaboration, amplification and clarification must give way to action. When

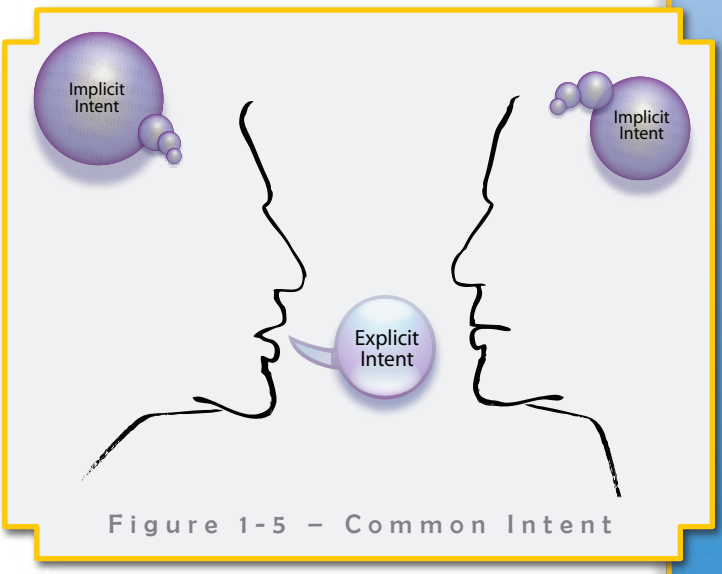


Figure 1-5 – Common Intent

should this happen? In other words, how much effort must a commander expend to ensure that the connotations of the objective are understood by subordinates?

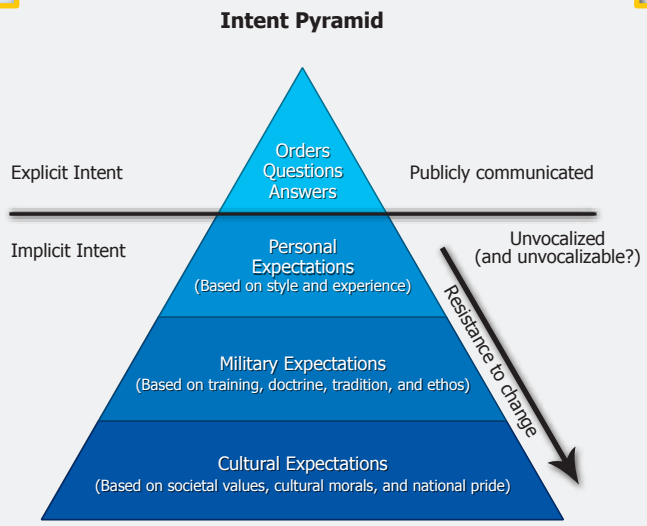


Figure 1-6 - The Intent Pyramid – An Illustration of the Relationship Between Explicit and Implicit Intent[50]

When does commander control give way to subordinate freedom of action? These questions are particularly important when commanders are not familiar with the individual capabilities of their subordinates (for example, during coalition operations) or if the circumstances of the mission are unusual.

Explicit and Implicit Intent

The concept of intent includes an explicit portion that contains the stated objective (as well as all of its elaborations) and an implicit portion that remains unexpressed for reasons of expediency but nonetheless is assumed to be understood. This unexpressed implicit intent guides or bounds (but does not direct) the actions of subordinates when faced with unanticipated circumstances. The intent pyramid in Figure 1-6 reflects the relation between explicit intent and the large unstated implicit intent that underpins it and supports its interpretation. The bottom of the intent pyramid represents the well-entrenched factors (personal, military and cultural expectations) that influence interpretation of the commander's explicit intent. Furthermore, these factors may be very difficult to change, largely because we are often not aware of them.

These explicit and implicit aspects of intent roughly correspond to the two general approaches for achieving coordinated action. Explicit intent corresponds to the requirement for explicit control, and implicit intent corresponds to the necessity for allowing spontaneous behaviour to emerge consistent with the overall objective. However, for the concept of intent to be useful—that is, for it to contribute to coordinated action—it must be shared between one or more individuals. Intent must be common between individuals.

There are a number of mechanisms for sharing explicit and implicit intent, as illustrated in Figure 1-7. The two most important of these mechanisms are dialogue for sharing explicit intent and socialization for sharing implicit intent. If commanders shared implicit knowledge of the mission objective through dialogue and if they shared tacit knowledge on how to interpret the objective through socialization, then the likelihood of having common intent with their subordinates would be enhanced. Two other important factors are that: (1) there must be comparable levels of reasoning ability among subordinates for making decisions when neither the time nor the opportunity exists to obtain advice from the commander; and (2) there must be comparable levels of motivation and commitment to achieve mission objectives.

Balancing Explicit and Implicit Intent[52]

An important consideration for commanders then is: How much effort should they expend in making their intent

explicit in order for them to have confidence that their implicit intent is understood by subordinates?

There are three factors that influence the correct balance between explicit and implicit intent:

- the amount of explicit and tacit knowledge that subordinates share for guiding their actions,
- the degree of comparability that exists in the reasoning ability of subordinates, and
- the level of commitment and motivation towards the mission that subordinates share.

The following paragraphs offer suggestions for how commanders can deal with each of these three issues in turn.

Commanders need to know how well their subordinates understand their explicit intent for the mission, and more importantly, the level of their subordinates' tacit knowledge, or how well subordinates have internalized the guiding principles that bound proper military behaviour and acceptable military solutions. If commanders are not confident that their explicit intent has been understood adequately—that is, they are not confident that subordinates have understood what to do—then their only recourse is to take the time and explain their intent more fully. But if commanders are not confident that subordinates share even the same guiding principles for acceptable behaviour, then they have a much more daunting task. Not only must they be more explicit about what to do in the mission, but they must be explicit about what not to do, which can be very time consuming since unacceptable solutions greatly outnumber acceptable ones. In other words, if commanders are not confident that their subordinates' solutions will be within the bounds of proper military behaviour and acceptable military solutions, then they will not be confident that spontaneous, acceptable, coordinated behaviour will emerge in their absence. Commanders, therefore, must continually assess both the level of overt knowledge about the mission and the level of tacit knowledge about guiding principles that subordinates share for interpreting intent.

Faced with the reality of differing reasoning ability among subordinates, commanders are left with three strategies.

- Commanders should identify, as soon as possible, those individuals who demonstrate a competence for thinking a problem through. These individuals should occupy key roles in the commander's team.
- Commanders should match the difficulty of the task to the intellectual ability of the member. Not all problems are equally onerous, nor are they all equally critical for mission success. Commanders should be judicious in the formation of teams and the tasks those teams are assigned.

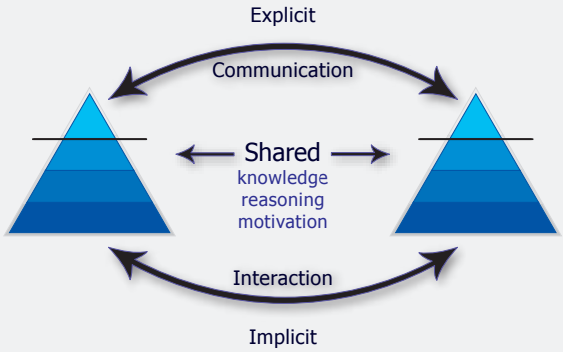


Figure 1-7 – Facilitating the Achievement of Common Intent[51]

- Commanders should ensure that subordinate commanders engage in similar kinds of strategies—that is, carefully choose their teams and allocate tasks according to competence.

Of course, these strategies are not new; however, Pigeau and McCann have provided a theoretical framework for intent that situates these strategies within the larger objective of establishing common intent to achieve coordinated action.

In order to maximize the level of commitment and motivation towards the mission that subordinates share, commanders must tap the creative will of their subordinates at the same time as they explain their intent. They must realize that conveying intent is more than conveying a concept of operation; it is also an opportunity to energize subordinates, to motivate independent thought and action, and to make members commit to working together. As in all aspects of military life, the importance of the leadership skills of the commander cannot be overemphasized in motivating subordinates for a mission.

Achieving coordinated action requires the correct balance of explicit control and spontaneous emergent behaviour. Explicit control is an aspect of explicit intent which depends on the establishment of guiding principles that will allow the commander's intent to be interpreted correctly. But it is one thing to know what must be done (that is, understand explicit intent) under circumstances that may have been envisaged by the commander, and it is quite another to be able to solve a new operational problem in the commander's absence. Even if a subordinate has internalized the correct guiding principles, new problems require intellectual capability to solve. However, it may be unreasonable to expect that every member of a military organization achieve this level of reasoning ability.

Commanders, therefore, must continually estimate the need for explicit control versus allowing subordinates the freedom of action to solve their own operational problems. Achieving the correct balance is key to achieving coordinated action efficiently.

Shared Knowledge	Comparable Reasoning Ability	Level of Commitment and Motivation	Impact on C2
Maximum	Maximum	Maximum	Greatest potential for establishing common intent
Maximum	Maximum	Minimum	Wasted potential for common intent (leadership issue?)
Minimum	Maximum	Maximum	Good potential for common intent if guiding principles for appropriate action exist (means more effort needed for explicating the objective); if shared guiding principles do not exist, unacceptable solutions are a possibility
Maximum	Minimum	Maximum	Some potential for common intent; will need to rely on very detailed plans and explanations
Maximum	Minimum	Minimum	Poor potential for common intent; leadership and detailed plans required
Minimum	Maximum	Minimum	Little potential for common intent; leadership and very detailed, explicit intent are required
Minimum	Minimum	Maximum	Dangerous common intent; over zealousness may lead to uncoordinated chaos with high potential for unacceptable solutions
Minimum	Minimum	Minimum	Least potential for establishing common intent

Table 1-2 - A Method for Diagnosing the Potential for Achieving Common Intent among Subordinates[53]

The definition of C2 used here emphasizes the critical importance of establishing common intent among military members that is necessary for achieving coordinated action. Regardless of where on the C2 continuum between command-by-direction and command-by-influence a military mission lies, individual commanders can nonetheless maximize common intent within their limited span of influence. By paying attention to the amount of explicit and tacit knowledge subordinates share, by assessing their ability to reason based on that knowledge, and by influencing their overall level of motivation and commitment to achieve the objective, a commander can take full advantage of the potential for common intent that resides in their subordinates.

Table 1-2 is a simple example of how a commander can use the three factors to diagnose the potential among their subordinates for achieving common intent. Each factor is identified as either maximally present or minimally present, and all eight combinations across the three factors are listed. We can see that the greatest potential for achieving common intent exists when all three factors are assessed by the commander as being maximally present. Conversely, when all three factors are minimally present, the commander will have significant challenges achieving any kind of action (coordinated or otherwise). The six combinations in between these two extremes offer varying levels of common intent potential. In general, minimum motivation and commitment implies leadership challenges. Minimally shared explicit and tacit knowledge implies that subordinates may fail to understand mission objectives as well as fail to operate within the acceptable solution space. A minimum amount of subordinate reasoning ability implies that their ability to draw inferences in the absence of the commander will be hampered. Each combination of factors requires different responses from the commander in order to yield the greatest likelihood of achieving coordinated action.

Types of C2 Organizations

Based on Pigeau and McCann's definition of C2, there are two contrasting kinds of organizational structures, centralized and decentralized, with a range of possibilities in between. When the proportion of shared explicit intent in a C2 organization is high compared to the amount of shared implicit intent, this is indicative of centralized C2. Members of a centralized organization are explicitly told not only what to do in a particular situation, but how to do it. If the situation changes quickly, however, the generation and dissemination of new orders may not be fast enough. On the other hand, if an organization encourages the sharing of implicit intent, the amount of explicit intent necessary to achieve the same level of common intent will be small. In the military context, de-centralized organizations are consistent with mission command philosophy. Decentralized organizations are flexible, but at the expense of efficiency and a certain loss of control. Note that one type of organizational structure is not necessarily always superior to another type. Based on a number of factors, as seen earlier in Table 1-2, and the circumstances in which the C2 organization is to function, a wide variety of C2 options exist.[54] This range of options is consistent with the notion that there is no "one size fits all" approach to command.

Endnotes

1 Canada, Department of National Defence, *Duty with Honour*, 1, 11.

2 Ibid., 17.

3 Allan English, "Introduction," in Allan English, ed., *The Operational Art: Canadian Perspectives - Leadership and Command*, xii-xiv.

4 D.J. Bercuson, "Defence Education for 2000 … and Beyond," in *Educating Canada's Military*, report of a workshop held at the Royal Military College of Canada 7-8 December 1998, 30.

5 Ross Pigeau and Carol McCann, "Re-conceptualizing Command and Control," *Canadian Military Journal* 3, no. 1 (Spring 2002), 53. Available at http://www.journal.forces.gc.ca/engraph/Vol3/no1/home_e.asp

6 Ross Pigeau and Carol McCann, "Establishing Common Intent: The Key to Co-ordinated Military Action," in Allan English, ed., *The Operational Art: Canadian Perspectives - Leadership and Command* (Kingston, ON: Canadian Defence Academy Press, 2006), 107.

7 Allan English, *The Cream of the Crop: Canadian Aircrew* 1939-1945 (McGill-Queen's University Press, 1996), 42-5.

8 Tyrrel Mann Hawker, *Hawker*, V.C. (London: Mitre Press, 1965), 125, 129, 135, 140-3.

9 Roger Sarty, *The Maritime Defence of Canada* (Toronto: The Canadian Institute of Strategic Studies, 1996), 206.

10 M.V. Bezeau, "The Role and Organization of Canadian Military Staffs," unpublished MA thesis, Royal Military College of Canada, 1978, 68.

11 Bezeau, "Role and Organization," 156. The Canadian government was also wary of the Canadian Armed Forces coming under foreign command. Early in the war, Prime Minister William Lyon Mackenzie King officially established cooperation as the primary command and control principle upon which Canadian Armed Forces operations were to be based. Order-in-Council by the Canadian Government, 17 November 1939, reproduced in David R. Murray, ed., *Documents on Canadian External Relations, Volume 7, 1939-1941, Part I* (Ottawa: Information Canada, 1974), 842.

12 W.A.B. Douglas, *The Creation of a National Air Force: The Official History of the Royal Canadian Air Force Volume II* (Toronto: University of Toronto Press and the Department of National Defence, 1986), 382.

13 Forrest C. Pogue, *The Supreme Command: The European Theater of Operations, United States Army in World War II* (Washington: Office of the Chief of Military History, Department of the Army, 1954), 41; Louis Morton, *Strategy and Command: The First Two Years: The War in the Pacific, United Sates Army in World War II* (Washington: Office of the Chief of Military History, Department of the Army, 1962), 250. Another analogy is that unity of command avoids having "a ship with several captains." Memorandum from Newfoundland Commissioner for Justice and Defence to Commission of Government of Newfoundland, 14 January 1942, reproduced in Paul Bridle, ed., *Documents on Relations Between Canada and Newfoundland Volume I: 1935-1949* (Ottawa: Information Canada, 1974), 916-918.

14 Joint Canadian-United States Basic Defence Plan No. 2 (Short Title ABC-22), 28 July 1941, reproduced in Paul Bridle, ed., *Documents on Relations between Canada and Newfoundland Volume I: 1935-1949* (Ottawa: Information Canada, 1974), 894-899.

15 The similarities between the two definitions are indicated as follows (similarities are bolded and numbered for easier comparison):

Defence Terminology Bank definition of "operational command":

The authority [2] granted to a commander [1] to assign missions or tasks [3] to subordinate commanders, to deploy units, to reassign forces and to retain or delegate operational and/or tactical control as the commander deems necessary [4]. Note: It does not include responsibility for administration [5].

ABC-22's definition of "Unity of Command":

Unity of command, when established, vests in one commander [1] the responsibility and authority [2] to co-ordinate the operations of the participating forces of both nations by the setting up of task forces, the assignment of tasks [3], the designation of objectives, and the exercise of such co-ordinating control as the commander deems necessary [4] to ensure the success of the operations. Unity of command does not authorize a commander exercising it to control the administration and

discipline [5] of the forces of the nation of which he is not an officer, nor to issue any instructions to such forces beyond those necessary for effective co-ordination.

Sources: *Canadian Forces Operations*, B-GJ-005-300/FP-000, Chapter 2, Section I, Subsection 202.2b; and ABC-22 Agreement, 28 July 1941, reproduced in Bridle, ed., *Documents*, 896.

16 Stanley W. Dziuban, *United States Army in World War II Special Studies: Military Relations Between the United States and Canada, 1939-1945*, (Washington: Office of the Chief of Military History, Department of the Army, 1959), 110, 141.

17 Committee on Coastal Command Report, 19 March 1941, British National Archives (formerly Public Records Office [hereafter PRO]), Air Ministry file [hereafter Air] 15/338.

18 Committee on Coastal Command Report, 19 March 1941, 15/338; and Directorate of History and Heritage, Department of National Defence [hereafter DHH] file 79/599, Captain D.V. Peyton-Ward, *The RAF in the Maritime War, Volume II: The Atlantic and Home Waters: September 1939-June 1940* (RAF Air Historical Branch Narrative, nd), 275, 286.

19 Air Marshal J. Slessor to Air Vice-Marshal N.R. Anderson, 24 June 1943, DHH 181.009 (D6734). This was not unlike the RN's understanding of the relationship: "the naval Commander-in-Chief stated his requirements for protection, escorts or patrols and the Air Officer Commanding the Coastal Command Group then issued his orders to meet the Naval requirements." S.W. Roskill, *The War At Sea, 1939-1945: Volume 1: The Defensive* (London: HMSO, 1954) 361.

20 Sir John Slessor, *The Central Blue: Recollections and Reflections* (London: Cassel and Company Limited, 1956), 482. The Chief of the Air Staff, Air Chief Marshal Sir Charles Portal, felt that the provision in the Coastal Command Charter was "a rather meaningless formula and that, in fact, you [CinC Coastal Command] exercise operational control in their interests." Air Chief Marshal C. Portal to Air Chief Marshal P. Joubert de la Ferté, 11 June 1942, Portal Papers, Folder 8A, DHH 87/89.

21 Memorandum from Assistant Chief of the General Staff to the Chief of the General Staff, 31 May 1941, reproduced in David R. Murray, ed., *Documents on Canadian External Relations, Volume 8, 1939-1941, Part II* (Ottawa: Information Canada, 1976), 219.

22 See correspondence between the RAF and the RN from October 1943 to January 1944 in Air 15/339.

23 Commander-in-Chief U.S. Navy to USN Commands, Admiralty, Air Ministry and COS Army, 11 February 1944, PRO, Air 15/339.

24 DND, *Canadian Forces Aerospace Doctrine*, B-GA-400-000/FP-000 (Ottawa: Director General Air Force Development, 2006), 51.

25 Joseph Jockel, *No Boundaries Upstairs: Canada, the United States and the Origins of North American Air Defence, 1945-1958*, (Vancouver: University of British Columbia Press, 1987), 105; Raymont Collecton, DHH 73/1223, files 84 to 99.

26 The Royal Canadian Air Force commander in Halifax (Air Officer Commanding-in-Chief Eastern Air Command) was granted operational control over all maritime patrol assets in the new command, while the RCAF's Air Officer Commanding No. 1 Group exercised local operational control over maritime aircraft based in Newfoundland. This included a large number of American aircraft. Report of Sub-Committee on Command Relations, Atlantic Convoy Conference Minutes, DHH 181.003 (D5027).

27 Commander-in-Chief Canadian Northwest Atlantic to Air Officer Commanding-in-Chief Eastern Air Command, 5 May 1943, DHH 118.002 (D122); Group Captain P.F. Canning to Air Marshal J. Slessor, 27 May 1943, Air 2/8400; Slessor to Portal, 1 June 1943, Portal to Slessor, 1 June 1934, and Slessor to Portal, 3 June, Portal Papers, Folder 8A, DHH 87/89.

28 Slessor to Anderson, 24 June 1943, DHH 181.009 (D6734). Underline in original.

29 Richard Evan Goette, "The Struggle for a Joint Command and Control System in the Northwest Atlantic Theatre of Operations: A Study of the RCAF and RCN Trade Defence Efforts During the Battle of the Atlantic," unpublished MA thesis, Queen's University, 2002, 43.

30 UK Joint Doctrine and Concepts Centre, *The UK Joint High Level Operational Concept*, Analytical Concept Paper (2003), p. 4-2; *Canadian Forces Operations*, B-GJ-005-300/FP-000, p. 2-1, GL-3.

31 United States, Department of Defense, Glossary, Part II – Terms and Definitions, *Joint Operations*, Joint Publication 3-0 (Suffolk: US Joint Forces Command, Joint Warfighting Center, 2006), GL-10.

32 Martin Van Creveld, *Command in War* (Cambridge, MA: Harvard University Press, 1985), 5.

33 Pigeau and McCann, "Re-conceptualizing Command and Control," 53.

34 See DND, *Leadership in the CF*, 9, 10, 125, 135, 137, 144; and DND, *Canadian Forces Aerospace Doctrine*, 49, 57 notes 3, 4, 5 for Chapter 6.

35 UK Joint Doctrine and Concepts Centre, *The UK Joint High Level Operational Concept*, pp. 4-1, 4-2, 4-4. Citation from p. 4-1.

36 NATO, *Allied Doctrine for Joint Operations*, AJP-3(A), (July 2007), p. 2-1, Lexicon 8, 9. See also NATO, AAP-6, p. 2-C-9, the second definition of "command."

37 Thomas J. Czerwinski, "Command and Control at the Crossroads," *Parameters* 26, no. 3 (Autumn 1996), 121-32. Available at http://www.carlisle.army.mil/usawc/parameters/96autumn/contents.htm

38 See for example C. McCann, R. Pigeau and A. English. "Analysing Command Challenges Using the Command and Control Framework: Pilot Study Results," Technical Report, DRDC-TORONTO # TR-2003-034 (1 February 2003). Available at http://pubs.drdc-rddc.gc.ca/BASIS/pcandid/www/engpub/SF

39 This paragraph is excerpted from G.E. Sharpe and Allan English, *Principles for Change in the Post-Cold War Command and Control of the Canadian Forces* (Kingston, ON: Canadian Forces Leadership Institute, 2002), 71-2.

40 Pigeau and McCann, "Re-conceptualizing Command and Control," 56.

41 Pigeau and McCann, "Re-conceptualizing Command and Control," 56.

42 The second definition is: "An order given by a commander; that is, the will of the commander expressed for the purpose of bringing about a particular action." NATO, AAP-6, p. 2-C-9.

43 Ross Pigeau and Carol McCann, "Re-conceptualizing Command and Control," presentation given to Command and Staff Course 31, Canadian Forces College (CFC), 3 Sep 2004. Emphasis added.

44 This section is excerpted from G.E. Sharpe and Allan English, *Principles for Change in the Post-Cold War Command and Control of the Canadian Forces* (Kingston, ON: Canadian Forces Leadership Institute, 2002), 73-5.

45 This section is excerpted from G.E. Sharpe and Allan English, *Principles for Change in the Post-Cold War Command and Control of the Canadian Forces* (Kingston, ON: Canadian Forces Leadership Institute, 2002), 73-5.

46 Whether the envelope is actually linear, as shown below, or some type of curve, is an empirical question that could be addressed through research.

47 This figure is based on Pigeau and McCann, "Re-conceptualizing Command and Control," presentation given to Command and Staff Course 31, CFC, 3 September 2004.

48 This figure is based on Pigeau and McCann, "Re-conceptualizing Command and Control," presentation given to Command and Staff Course 31, CFC, 3 September 2004.

49 This paragraph, somewhat revised, is excerpted from G.E. Sharpe and Allan English, *Principles for Change in the Post-Cold War Command and Control of the Canadian Forces* (Kingston, ON: Canadian Forces Leadership Institute, 2002), 79-80.

50 This figure is based on Pigeau and McCann, "Re-conceptualizing Command and Control," presentation given to Command and Staff Course 31, CFC, 3 September 2004.

51 This figure is based on Pigeau and McCann, "Re-conceptualizing Command and Control," presentation given to Command and Staff Course 31, CFC, 3 September 2004.

52 This section is from Pigeau and McCann, "Establishing Common Intent: The Key to Co-ordinated Military Action," in English, ed., *The Operational Art: Canadian Perspectives - Leadership and Command*, 85-108.

53 Table 1-2 is based on Pigeau and McCann, "Establishing Common Intent: The Key to Co-ordinated Military Action," in English, ed., *The Operational Art: Canadian Perspectives - Leadership and Command*, 106.

54 This material is excerpted from Sharpe and English, *Principles for Change in the Post-Cold War Command and Control in the Canadian Forces*, 78-80.

Chapter 2

General

Command and control arrangements and practices in major Western countries at the end of the 20th century and the beginning of the 21st century were based on what is often referred to today as the "continental" staff system, in which the staff is divided into many functional directorates.[1] This system originated with the French Army in the Napoleonic Wars and was adopted by the US Army in the First World War. The other major approach to staff systems is the so-called Prusso-British approach, which split staffing responsibilities more or less into two equal halves – operations and support. The dominance of US Army doctrine at the end of the 20th century and the

beginning of the 21st century has led to the "continental" staff system almost completely displacing all other staff systems in Western militaries. Until recently, most air forces followed the Prusso-British approach because it seemed most appropriate for air operations.[2] It should be noted that the "continental" staff system was not adopted because of any theoretical or practical superiority but because it was embedded in US Army operational-level doctrine that became, and remains, the dominant higher level C2 doctrine.[3]

But the dominance of US landcentric C2 arrangements and practices is based on more than mere staff systems. That dominance is also based on the ascendancy of a particular approach to military operations – operational art – favoured by the US and many other Western armies. Air Forces and navies are now challenging that supremacy with their own approaches to military operations, and each of these approaches contains embedded assumptions about how operations should be conducted and which C2 arrangements and practices are preferable. Therefore, in order to fully understand Western military command arrangements and practices, it is essential to understand the three major approaches to operations, and they will be discussed next.[4]

Each nation and each branch of a nation's armed forces has its own unique paradigm of how military operations should be conducted based on the physical environment in which they operate, their historical experience and their culture. Based on these factors, there are currently three major ways of conceptualizing military operations at the beginning of the 21st century. They are network-centric warfare (NCW) [network-enabled operations (NEOps) in Canadian usage], effects-based operations (EBO), and operational art. Western armies use operational art as their basic principle for conducting operations, western navies favour NCW and western air forces prefer EBO. While there are similarities among army, navy and air force command and control arrangements and practices, there are also significant differences based on physical operating environment and conceptual framework. Therefore, a "one size fits all" approach to command may not work in today's complex security environment because of these differences.

For example, air forces operate in the least cluttered battlespace. In these circumstances both command-by-direction and command-by-plan (as discussed in Chapter 1) are possible, and they are effective command styles given the nature of modern air warfare. Armies, on the other hand, usually operate in the most complex and chaotic operating environment, and, therefore Western armies have, for the most part adopted the doctrine of mission command, or command-by-influence, so that decisions can, in theory, be taken by those closest to the situation, often down to the level of the individual soldier. Navies, however, operate in an environment of medium complexity, compared to air forces and armies, and, therefore most Western navies in the Anglo-American command tradition have identified the need for a command and control system that can effectively coordinate maritime operations in a relatively complex, multi-threat environment, over a wide area. Within the naval framework, although individuals would be connected via their consoles, they would be operating

as elements of larger systems, such as the various ships' operations rooms (at the lowest level) within the fleet framework. While the Canadian Navy and some other navies in the Anglo-American command tradition are creating and increasingly implementing a unique naval command-by-influence style, navies still have occasion to use the command-by-direction style that they have practised for centuries.

While the notion of networked operations has been embedded in the conceptual approaches to operations of a number of militaries, recently a specific variant, NCW, has come to dominate the debate on change and transformation and it is being used as a template for future American command and control frameworks. This domination came about not because of any overwhelming empirical evidence or because of its wide-ranging practical virtues, but because it was imposed on the US Office of Transformation by one of its leading advocates, the late Arthur Cebrowski. However, there is still considerable confusion as to what the concept of NCW actually entails because the concept itself has been evolving at the end of the 20th century and the beginning of the 21st century and because of its arcane language. Furthermore, as the concept has evolved, it has moved well beyond its naval roots and incorporated a number of models from other domains, for example EBO, information age warfare, mission command, manoeuvre,[5] and elements of the observe, orient, decide and act (OODA) loop, which are not necessarily compatible with the original NCW construct and which are not always well articulated or described themselves. This has caused a great deal of confusion in the debates on NCW-driven transformation and, unfortunately, this confusion has been glossed over in a number of official publications.[6] The following overview of NCW attempts to put this approach to operations in context.

Network-Centric Warfare / Network-Enabled Operations

Network-Centric Warfare

The concept of NCW originated with certain Western navies, and, therefore NCW's basic principles are based on the Anglo-American tradition of naval command and operations at sea. The Canadian Navy's practical experience and its unique relationship with the United States Navy put it in a position to influence both the theory and practice of the nascent NCW concept. The Canadian naval experience has indicated that future operations at sea will likely be composed of *ad hoc* "coalitions of the willing." The differences in culture, technology, and capabilities in such coalitions seem to indicate that C2 in coalition operations will be re-defined as "cooperation and coordination." This new paradigm of "cooperation and coordination" depends on leadership or influence behaviours among peers more than traditional concepts of command involving the exercise of authority over subordinates. Therefore, in coalition operations the leadership concepts of emergent leadership and distributed leadership may be more useful than concepts of authority. In fact one might characterize the high reputation that senior Canadian naval officers have earned in certain operational command positions as a type of emergent leadership based on three sub-classes of personal power (i.e., expert, referent, and connection), rather than position power.[7]

Navies, therefore, perceive systems like NCW as primarily a command and control architecture necessary to effectively coordinate complex, multi-threat maritime operations over a wide area (generally within a theatre of operations, but up to global in scope). Within the naval C2 framework, individuals are connected via their consoles, but they operate as elements of larger systems, such as the various ships' operations rooms within the

fleet framework. Therefore, the notion of mission command (or command-by-influence) in navies, unlike the army model where command is delegated down to the lowest possible levels, might extend down only to the captain of a vessel and a very few of their specially delegated principal officers. Nevertheless, human-centred networks are the basis of the Canadian naval command style, and this style has proven itself to be particularly effective in recent coalition operations where it has been necessary to engage a wide variety of coalition members in a task force and then to ensure their effective participation in operations. Canadian naval commanders therefore appreciate that information technology is an enabler, not an end in itself.[8]

A fundamental criticism of NCW was put forward by Frederick Kagan who asserted that its origins in 1990s business and technical processes were not necessarily conducive to a 21st century theory of war. The idea that in using NCW a military can achieve information dominance over an enemy in much the same way that some successful corporations have used information to dominate their markets is a dubious proposition at best, according to some critics, as unlike customers, enemies will usually try to frustrate attempts to gather intelligence, especially using the technical means favoured by NCW.[9]

Even if NCW is able to fuse information into a common operating picture, Christopher Kolenda argues that the education, culture, and personalities of those viewing the picture will result in diverse interpretations of what is presented. Furthermore, a number of commentators have noted that the more efforts that are taken to standardize both the information and the interpretation of that information, the more likely it is that creativity and originality will be stifled. This suppression of creativity and originality will work against the development of command-by-influence in a NCW environment. Furthermore, it has been argued that information technology will not guarantee self-synchronization in a NCW environment if commanders at all levels do not have the attributes required to do their jobs.[10] Kolenda's criticisms are further developed by Pigeau and McCann.

Network-Enabled Operations

Contemporary command philosophies like NEOps or NCW assume that if a large number of humans are linked together as nodes in a network, and if common and accurate information about the operation is made available to them, self-organizing behaviour will emerge that will yield unsurpassed knowledge superiority and speed of response. What the NEOps philosophy fails to recognize, however, is that detailed and accurate information is only one necessary condition for (self-) synchronized, coordinated action. NEOps assumes that guiding principles for defining acceptable solution spaces are known and are embodied by military members; it assumes that comparable abilities for analyzing a situation and making decisions exist; and it assumes that all members are as committed to achieving the objective as they should be. These are unwarranted assumptions given the fact that theorists view a network as "a moral relationship of trust…[among] a group of individual agents who share informal norms and values,"[11] rather than as a simply physically interconnected node for exchanging information.[12] One way of mitigating these problems is to ensure that commanders are within Pigeau and McCann's balanced command envelope (see Chapter 1) to ensure the required symmetry amongst the competency, authority, and responsibility necessary for effective command.

NEOps has not yet been formally accepted as a principle supporting the transformation of Department of National Defence nor has it been clearly defined, but recent NEOps conceptual statements indicate a similarity to the NCW idea in that NEOps is expected "to generate increased combat power by networking sensors, decision makers and combatants to achieve shared battlespace awareness, increased speed of command, higher operational tempo, greater lethality, increased survivability, and greater adaptability through rapid feedback loops."[13] However, a number of Canadian commentators note that NEOps is more focussed on human factors than NCW. There is also an awareness among

many Canadian commentators that any definition of NEOps should be consistent with Canadian culture and ethos. The Department of National Defence (DND) and the CF should, therefore, be careful about borrowing a concept that may not be compatible with their needs and be cognizant of the fact that implementing NEOps will require more than simply overlaying a networking capability onto an existing organizational or command and control structure. Perhaps most importantly, from a Canadian point of view and based on recent Canadian experience, using NEOps in the JIMP context will require network architects not only to consider the mere use of information technology as an enabler, but also for them to address the much more complex issue of creating effective social networks.

In summary, NEOps as a concept has a promising future if it is predicated on Canadian needs and culture. However, there is significant risk in placing too much reliance on concepts like NCW which put the technological cart before the human requirements that should drive any transformation initiative. Therefore, future development of the NEOps concept should be firmly rooted in the Canadian context and based on Canadian experience. NEOps concept development should be complemented by the relevant experience of others, but it should avoid slavishly copying other frameworks as DND has sometimes done in the past. In the Canadian context of human-centred networks, research to support the development of the NEOps concept should be conducted in the areas related to the human dimension of networks based on theory and on Canadian practical experience. In this way, NEOps could become a suitable model to support the transformation of the CF and DND.

Recently, EBO has regained prominence as an approach to operations, and the following overview attempts to put it in context.

Effects-Based Operations

EBO's roots go back to the 1920s when air power theorists like Douhet asserted that the long First World War stalemate at sea and on land could be overcome in future wars by air forces with their largely unfettered ability to attack enemy centres of gravity. Douhet's modern day disciples have expanded his ideas in more formal expositions of EBO, but the basic concept remains the same – planning and taking actions, ranging from threats to bombing attacks, to cause changes in opponents' behaviour.

A number of commentators have noted that EBO has its roots in ancient (Sun Tzu) and classical (Clausewitz) theories of wars.[14] However, the most recent branch on the EBO theory tree is the one based on the writings of Italian air power theorist Giulio Douhet and American air power theorist and former USAF officer John Warden. Douhet proposed solutions to the problems encountered by Western nations in the First World War where stalemate at sea and on land caused widespread devastation and loss. He advocated a new style of warfare whereby aircraft would directly attack enemy vital centres, what might be called centres of gravity today, and bring future wars to a quick and decisive conclusion.[15] Ideas like these were modified or developed in parallel by airmen in the US and Britain to win or to maintain the "independence" of air forces from armies and navies from the 1920s through to the 1950s.[16] Therefore, Douhet's vision of EBO is the one most commonly used in air force circles; however, Ho notes that there is no authoritative definition of EBO and he describes six different theoretical variants on the EBO theme.[17]

Douhet

In general terms, EBO focuses on causal explanations to see if actions that are planned or taken actually result in the desired effects. The key to achieving success with EBO is in predicting how physical actions can result in behavioural outcomes. In many ways EBO is a new way of describing an old concept because it has been at the heart of theories of air warfare since the earliest air power theorists who were almost always concerned with the effects as much as the means of applying air power. In fact, Douhet's theories were based on the notion of using the physical action of bombing to effect behavioural changes in the leadership of a nation. Critics of EBO have, therefore, used the failures of air power theorists to accurately predict the outcomes (effects) of aerial bombardment to illustrate why true EBO may not be possible.[18] Some of these criticisms are based on the chaotic nature of warfare and the fact that chaos theory tells us that second and third order effects, especially those associated with human behaviour, cannot be predicted with the accuracy necessary to achieve the results EBO enthusiasts have claimed.[19] Other critics of the term EBO note that it was derived from the writings of 20th century air power theorists, and that the term EBO was first used by the USAF in the late 1990s. Because of this recent background and its technological focus, EBO is seen by some as a particularly air force approach to operations. Given the perceived air force origins of EBO, some prefer to use the term "effects-based approach to operations" (EBAO), because, they argue, EBO has become associated with a prescriptive, technologically-based, largely air force way of conducting operations, whereas EBAO conveys the idea of a broader, more philosophical approach to operations.[20]

While acknowledging non-combat aspects of EBO, some in the USAF still present it as largely a targeting exercise. For example Colonel Gary L. Crowder, the Chief of Strategy, Concepts and Doctrine of the USAF's Air Combat Command, in an article purporting to represent the USAF approach to applying air power, focuses on the effects of new precision-guided munitions in executing EBO.[21] Those who favour this targeting approach to EBO have claimed that the initial "shock and awe" bombing campaign in Operation Iraqi Freedom (OIF) was an example of rapid decisive operations (RDO). The shock and awe concept comes from a 1996 paper written by military strategists Harlan Ullman and James Wade titled "Shock and Awe: Achieving Rapid Dominance."[22] The theory appears to be very Douhetian in its concept of destroying the enemy will to resist by imposing "the non-nuclear equivalent of the impact of the atomic bombs dropped on" Japan, and very ambitious in its desire to: "…control the environment and to master all levels of an opponent's activities…resistance would be seen as futile." To many this prescription seemed to fit the description of what was attempted by air forces in the early stages of OIF. Ullman, however, stated that the air campaign in OIF "appears to come out of a book by strategic-air-power advocates, who have argued that you start at the center and work your way out to disrupt and destroy whatever," but that it was not what he envisaged as shock and awe.[23] This example of different interpretations of the shock and awe concept demonstrates once again the problem with a number of current theories of war – they are, as noted earlier, still hazy, ill defined, and subject to different interpretations.

Critics of approaches to EBO that concentrate on targeting as a means of achieving outcomes caution that studying the theoretical foundations and historical examples of this type of EBO proves its futility as an approach to conducting operations. They note that attempts to destroy an enemy's will to resist without destroying all their infrastructure and without physically occupying the territory, such as was attempted in the strategic bombing campaigns of the First and Second World Wars, failed, and that strategic bombing theories, like those of Douhet and Warden, have underestimated the obstacles to achieving their goals. As for the recent shock and awe variant of EBO theory, Kagan asserts that those who advocate this approach to warfare ignore the fact that the destruction of targets and resultant killing of civilians necessary to achieve the desired effect may undermine the political objectives of the campaign.[24] The challenge for champions of EBO will

be to see if modern theories, methods of analysis, and technology can make true EBO possible.[25]

Network-Centric Warfare and Effects-Based Operations

A number of advocates of NCW have recently portrayed EBO as an adjunct to the theory of NCW; however, proponents of EBO would argue that EBO focuses on outcomes more than NCW, which focuses on inputs, i.e., the network. For proponents of EBO, networks are enablers for EBO and should not be seen as the primary consideration in devising new ways of war and other operations.

Whatever their differences, proponents of both EBO and NCW have focussed on the technical rather than the human dimensions of war. Many commentators have identified the need for more attention to be paid to the human dimension of EBO, but the complexity of this effort has been equated to "PhD level warfare."[26] However, like NCW, confusion over what EBO really means has led to a situation where "the concept is neither thoroughly nor evenly understood among military people" and as a result, "[o]nly now is EBO being tentatively and unevenly incorporated into service and joint doctrine."[27] Until a fully developed theory of EBO is validated, however, it will be an uncertain guide for transformation initiatives.

While some in the USAF still present EBO as largely a targeting exercise, more sophisticated variants of EBO have now been incorporated into joint doctrine. Like NCW, the notion of EBO is subject to different interpretations as we know that there is no universally accepted theory of EBO and at least six different variants now coexist. Furthermore, EBO's critics note that in the past it has not lived up to its promises. They point out that the chaotic nature of warfare makes it almost impossible to predict, with the accuracy necessary to achieve the results EBO enthusiasts have claimed, how various actions will achieve the desired second and third order effects, especially those associated with human behaviour.

Even if EBO is not a fully functional theory of war, Western air forces have adopted it as the guiding principle for integrating air operations into joint operations. Building on their experiences in the Gulf War in the early 1990s, Western air forces have created an elaborate C2 system based on the air operations centre (AOC) to coordinate all aspects of air operations for the joint force commander. However, the air force approach to C2 is largely incompatible with some of the C2 concepts now being articulated in NCW policy documents, particularly self-synchronization, self-organization, and mission command or command-by-influence.[28] These incompatibilities will be discussed next.

Synchronization as a concept of operations is emphasized more by land forces than air forces. In comparing USAF and US Army doctrine it can be seen that the USAF focuses on the integration of air power across the entire joint theatre of operations, whereas the US Army tends to think geographically and emphasizes the synchronization of actions in time and space. It has been argued that the Army approach contrasts with the more holistic USAF perspective that focuses on the effects that massing forces through integration can achieve.[29]

In an NCW context, Roddy notes that Cebrowski originally defined self-synchronization as "the ability of a well informed force to organize and synchronize complex warfare activities from the bottom up." And that more recently it has been suggested that "self-synchronization 'calls for lower-level decision makers to be guided only by their training, understanding of the commander's intent, and their awareness of the situation in relevant portions of the battlespace,'" and that "[s]elf-synchronization emerges when units within a force use common information, the commander's intent, and a common rule set – or doctrine – to self-organize and accomplish the commander's objectives."[30]

At fairly low tactical levels when close coordination among many air assets is not essential and when threat levels are low, self-synchronization and command-by-

influence can be employed by air forces; however, in other circumstances these processes can be problematic. For example, when decisions have enormous political consequences, such as the release of nuclear weapons or shooting down civilian aircraft, decision making will be retained at the highest levels, and one would be hard pressed to imagine a plausible scenario where these types of decisions would be susceptible to self-synchronization or command-by-influence processes.[31] A recent *Joint Force Quarterly* article put it this way:

> Because of casual linkages among target sets and the danger of objective fratricide, effects based operations must be orchestrated by a centralized planning and execution authority that has situational understanding of every aspect of the diplomatic, informational, economic, and military campaign.[32]

In other circumstances, such as when large air forces need to conduct operations against an enemy with some credible air defence capability, neither self-synchronization nor command-by-influence are likely to be of much use except for short periods of time at the lowest tactical levels. For example, in Operation Allied Force, an air campaign against a very weak state but one with some air defence capability, complicated command and control arrangements were necessary to coordinate the activities of hundreds of air assets down to the minute (or less). The idea of allowing the vast number of air assets involved in such operations to self-synchronize or to employ command-by-influence is difficult to imagine. One author notes that to achieve unity of effort "the realities of modern joint air operations… require centralized planning and direction" at "the highest levels."[33] Crowder tells us that a critical element in achieving unity of effort while executing EBO, from an air force perspective, is the air tasking order which provides "a common command and control architecture for all the air players that are involved."[34] The nature of complex air operations suggests that, while there may be limited opportunities for self-synchronization and command-by-influence processes, for the foreseeable future air forces will rely on command-by-plan to execute their missions. There are, therefore, unique aspects to employing air power that make NCW's emphasis on synchronization and mission command inappropriate from an air force point of view.

If the principle of self-synchronization seems difficult to apply to air forces, dependant as they are on command-by-plan as represented by air tasking orders produced by discrete organizational structures like the AOC, the idea of a self-organizing system, as proposed by advocates of NCW,[35] seems almost beyond the realm of plausibility. Therefore, air forces today and in the foreseeable future rely on command-by-plan, and in certain cases, such as when a command decision could have important political repercussions, even command-by-direction. While air force C2 organizations and related joint organizations depend on networks to accomplish their tasks,[36] the network is not the focus; it merely enables the activity – EBO.

Operational Art

Like airmen, soldiers after the First World War searched for solutions to the deadlock of the trenches. The solution favoured by most Western armies was manoeuvre, which by the end of the 20th century had become almost an obsession with many of them. In recent times the American Army version of operational art has been adapted by most Western armies as the preferred method to implement manoeuvre warfare.

Operational art has been, in many ways, the dominant paradigm in US military thought in the last 15 years of the 20th century. It was the intellectual basis for the creation of the US worldwide regional command system, so that the world

could be divided into "theatres of operation" and campaigns could be planned and conducted on the operational-level geographical principles favoured by armies.

In an attempt to rectify its mistakes in Vietnam, the US Army engineered the renaissance of a 19th and early 20th century European approach to war based on operational art. The legacy of this renaissance is considerable, as operational art remains the foundation of most Western joint doctrine today. Embedded in this doctrine are the notions of (1) the geographical division of military effort into theatres of war where separate campaigns can be planned and executed, (2) a campaign design process that uses the operational level of war to link tactical actions to strategic goals, and (3) a reliance on extensive written doctrine as the basis for operational art. This approach has been described as an "objectives-based approach to operations" as opposed to an "effects-based approach to operations." In addition, this US Army school of thought has also inextricably linked the notion of manoeuvre on the battlefield with success at the operational level. Finally, implicit in this approach to war is the belief that the decisive actions of war are conducted by land forces.

However, the army concept of manoeuvre on the battlefield is not always compatible with the notion of manoeuvre at sea or manoeuvre as understood by air forces; therefore, the word "manoeuvre" still invokes different mental pictures in different warfighting communities. Recently Boyd's OODA loop model has been adopted by some in the US Army and elsewhere as an example of manoeuvre in the "fourth dimension" of time. Aspects of the OODA loop model have also been used by advocates of NCW to argue for increased speed in decision making cycles or "speed of command." As many critics have noted, however, faster decisions do not necessarily mean better decisions. As with other theories of war, there is still much work to be done before the OODA loop model can be said to provide a precise guide to transformation in networked operations.

To counter the dominant land-centric influence on joint doctrine based on the operational art and manoeuvre concept, air forces and navies have challenged many of the US Army interpretations of these concepts. They have devised their own concepts to explain how operations should be conducted, at the very least in their respective physical environments, and put forward their challenges with ideas like EBO and NCW. This intellectual ferment has resulted in at least five different approaches to operational art.

Besides service differences in approaches to operational art, there are also national differences. It is only recently, however, that some progress has been made in Canada towards examining operational art concepts from a theoretical and doctrinal point of view. In the past there was no sound intellectual base in this country for studies of operational art. Furthermore, an arbitrary bureaucratic process was used to import mostly American Army ideas on the operational art into Canadian doctrine. These situations created a "fragmented" approach to operational thought in this country, which explains why the CF does not always follow the tenets of prevailing Western doctrine.[37]

The Canadian Army and Operational Art

In Canada (as in the US), the Army has the most coherently articulated theoretical approach to operational art, although recent practical experience has led to a somewhat unique development. For example, peace support operations in an alliance or coalition context has been one of the most formative influences on the Canadian practice of operational art. Therefore, unlike many other militaries, the Canadian Army's perception of the operational level of war is not focused on operational manoeuvre or operational logistics, nor is it tied to a theatre of war. Rather Canadian commanders seek to coordinate operational-level systems appropriate to a multi-agency environment and to use the force structures under their command to achieve operational-level objectives.

The Canadian Army's approach to operational art is based on these premises:

- land operations are complex and continuous, regularly involving physical and psychological isolation and more often than not, until too late, unseen lethality;
- adversaries are often non-state and motivated by issues other than that of policy;
- these adversaries attack in unpredictable ways using the strengths of an opponent as its weakness to gain a temporary advantage that can be exploited;
- conflict is not confined to discernable regions and involves all aspects of the spectrum of conflict in a specific area including the diminishing distinction between combatants and non-combatants; and
- effective joint, multi-national and multi-agency operations are the key to success in future operations.

Therefore, the objective, or endstate, of the Canadian manoeuvrist approach to operational art is to impede the enemy's ability to conduct warfare as a cohesive force. In this vision, manoeuvre warfare should be based on these principles:

- focus on enemy vulnerabilities not ground;
- avoid enemy strength and attack their weaknesses;
- focus on the main effort; and
- be agile.

Given their circumstances, successful practitioners of Canadian manoeuvre philosophy have had to place much greater emphasis on the creation of shared awareness in order to overcome the ambiguity and corresponding friction found in current operational environments. One way of creating this shared awareness is by commanders at all levels using what the Canadian Army calls mission command or command-by-influence, sometimes called "trust leadership."

Since the 1990s the Canadian Army has explored how technology can facilitate its version of manoeuvre warfare. Terms such as digitization, NCW, network-centric operations, network-enabled capability, and NEOps have all been used in an attempt to define this fluid relationship between operations and emerging technology. However, whatever terminology has been used, Canada's Army sees itself as a doctrine-based organization that uses technology to increase its capability to practice manoeuvre warfare. Therefore, for Canada's Army, ideas of NCW or NEOps do not constitute a fundamental change in the manner in which it will conduct operations, but reflect a need to use emerging technology in a way that will support the user and enable manoeuvre doctrine so that Canada's small professional army can operate in today's complex environment of conflict. Networks created by the Canadian Army show that it views human, not technical, factors as the primary consideration in the creation of these networks. Furthermore, because of financial and other limitations these networks are hybrid in nature, where the technology employed is not always the latest variant, but only what is required to carry out the mission. In this situation command is predicated on communication, dissemination of intent, creation of shared awareness, and decentralized decision making.

Modern Theories of Manoeuvre – The OODA Loop

Manoeuvre, or manoeuvre warfare, is a concept that has at least as many interpretations as the variations on the spelling of the word. Despite these variations, it has become a driving concept behind many theories of war at the operational level, and almost an obsession with some military professionals who study or practice the operational art. Historical concepts of manoeuvre are discussed elsewhere,[38] but

at the beginning of the 21st century the concept of manoeuvre is firmly embedded in US Army operational art theory, and now NCW. The fundamental assumption underlying operational plans is that they will be "manoeuvrist," and current concepts of manoeuvre embraced by the US Army, and other branches of the armed forces, have been strongly influenced by a model developed by USAF Lieutenant-Colonel John Boyd. He retired in 1985 and died in 1997, and he had little in the way of command or combat experience, but he based his model on observations of fighter pilots in training and in the Korean War. His OODA (observation-orientation-decision-action or Observe, Orient, Decide, Act) Loop model, shown in Figure 2-1, was designed to enable US forces to fight smarter, employing mission-type orders (or command-by-influence) to effect a sort of "military judo" on the enemy by creating friction and exploiting enemy mistakes.[39]

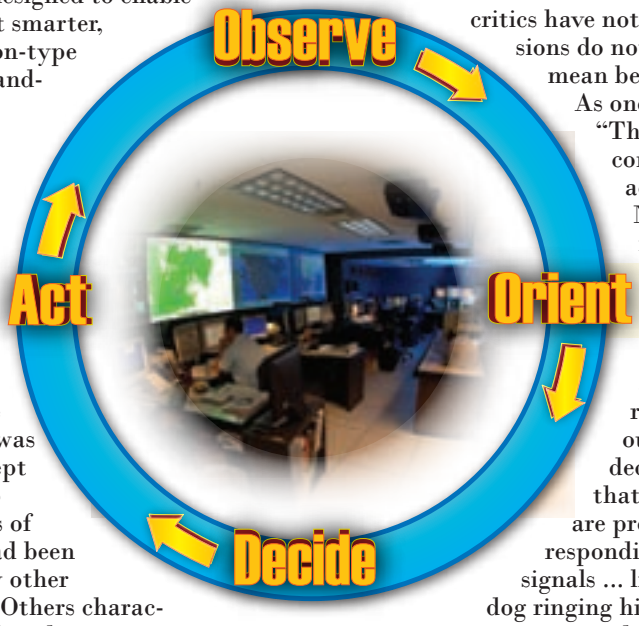


Figure 2-1 – OODA Loop

Boyd's model, which has been referred to as the "Boyd Theory," was not a novel concept but, according to some, a synthesis of much of what had been written before by other theorists of war. Others characterize it as a profound new theory of warfare. Boyd's model is simple but elegant. In it, every decision occurs in time-competitive OODA cycles. This process implies that military decision makers need a psychological and temporal orientation instead of the usual physical and spatial orientation. There is a need for mental agility and creativity, comfort with ambiguity, and the confidence to allow subordinates to use their initiative. Boyd's model portrays the most important manoeuvres as taking place inside the enemy's mental processes (the enemy's OODA loop); therefore, the most important manoeuvre space is in the fourth dimension of time.[40]

Boyd's model calls for commanders and their staffs to constantly revise their mental models to stay inside an opponent's OODA loop. This process also has the effect of creating a mind-set more predisposed to fight the enemy rather than fighting according to a pre-set plan, as is common with plan-based methods currently in use. Boyd's model is therefore congruent with pattern recognition theories of decision making, such as those of Gary Klein, that advocate naturalistic or intuitive decision making in time-sensitive situations.[41]

The OODA loop concept has been used by advocates of NCW to argue for increased speed in decision making cycles or "speed of command."[42] However, as many critics have noted, faster decisions do not necessarily mean better decisions. As one critic put it: "The 'speed of command' characteristic of the NCW environment could lead to some undesirable effects. 'We may find ourselves acting so rapidly within our enemy's decision loop that we largely are prompting and responding to our own signals ... like Pavlov's dog ringing his own bell and wondering why he's salivating so much.'"[43]

Boyd never attempted to publish his ideas, but William S. Lind codified them in his *Maneuver Warfare Handbook* specifically tailored for the United States Marine Corps (USMC). In it Lind posited that future ground combat would be dominated by those who could decentralize actions, accept confusion and disorder while avoiding all patterns and formulas of predictive behaviour.[44] Proponents, like Lind, of manoeuvre based on the Boyd Theory advocate a more dynamic approach to strategy and operational thinking than is currently found in some

US military circles. Critics of the current system point out that the OODA model contrasts with the inherently analytical nature of US Army planning and decision making, which neglects the role of synthesis as an enabler of intuition in the Boyd Theory. This has caused rifts in the US Army where some advocate radical and bold culture shifts to allow for true mission command, while others suggest that the present model of centralized planning and decentralized execution is sufficient to meet future needs. Polk argues that true manoeuvre warfare, as described by the Boyd model, cannot be practiced by the US Army because toleration of mistakes and the use of initiative are antithetical to US Army culture today. This may not bode well for the future because in a culture where conformity is rewarded more than initiative, those who rise to command the Army are being selected on criteria that will not allow them to be proficient practitioners of the operational art as it was envisioned by Boyd.[45]

This situation is exacerbated, according to Polk, because one of Boyd's most important insights, his emphasis on the importance of time, has been lost in a doctrinal "dumbing down process." Too often, Polk claims, the OODA loop process is portrayed as one of making decisions more quickly than an enemy. But "out-OODAing" an enemy is more a process of achieving temporal effects than just being faster (or slower) than an enemy in decision making. Fadok argues that Boyd's approach is predominantly Clausewitzian because manoeuvring inside the enemy's mental processes as depicted by the OODA loop is a more philosophical, abstract and nonlinear approach than the approach advocated by Warden. In other words, Boyd's theory is about "err-power"—how to make the enemy lose versus how to win ourselves.[46]

Most theorists of manoeuvre agree on the *ends* of manoeuvre warfare: to defeat the enemy quickly, decisively and with minimum loss. The *means* of achieving these ends; however, are varied and depend largely on which warfighting community the "manoeuvrist" comes from. Theorists tend to focus on the means they know best, and true joint manoeuvre theory is handicapped by the largely single-service approach taken by the US services. Furthermore, support and logistics, for some the heart of the operational art, is often overlooked in manoeuvre theory.

Few would argue that manoeuvre is not a necessary part of the operational art, but a number of commentators remind us that manoeuvre today has been portrayed as a solution for problems that are beyond its capacity to solve. First, it is often portrayed as a solution for the perceived predisposition for casualty aversion in the West, when in fact manoeuvre warfare between roughly equal opponents (e.g., the last Hundred Days battles of the First World War and the Eastern front in the Second World War) has resulted in very high casualty rates indeed.[47] Second, it has become a mantra for some that automatically excludes other possibilities for fighting, like defensive attrition, which are then not fully explored when devising operational plans. In today's climate of doctrinal flux, perhaps it is best to keep an open mind. Remember that the word "manoeuvre" conjures up many possibilities in different warfighting communities, but that a great deal more study is required before all its possibilities are clearly understood.

Manoeuvre in a Canadian Context

Throughout the last hundred years the doctrinal paradigm of Canada's Land Forces has migrated from that of attrition to manoeuvre; therefore, the Canadian Army has become the leading proponent of manoeuvre in the CF. Using Lind's precepts, it has articulated its vision of manoeuvre warfare for land operations in its current keystone doctrine manual of April 1998, *B-GL-300-000/FP-000 Canada's Army: We Stand on Guard for Thee*. For example, it provides a key tenet of manoeuvre warfare, comprehension of the higher commander's intent, as a principle component of command:[48]

> The principle of subsidiarity is to be applied. Subordinate commanders are to be given, to the greatest extent possible, the responsibility, information, and resources to act as the tactical situation demands, without further reference to higher authority. In effect subordinates are empowered to perform and respond to situations as their commander would have, had their commanders been there in person. To realize this command philosophy, leaders must know their subordinates intimately and trust them implicitly; subordinates in turn, must not only be skilled in the military art, but fully aware of their responsibilities to their commander and committed to fulfilling them.[49]

This philosophy is predicated on a particular state of mind or manner of thinking rather than techniques and procedures.[50] It is an attitude that strives to defeat an adversary by destroying their source of moral, cybernetic or physical power.[51] The objective, or endstate, of the manoeuvrist approach is to negate the enemy's ability to conduct warfare as a cohesive force.[52] In this vision, manoeuvre warfare should: focus on enemy vulnerabilities not ground; avoid enemy strength and attack their weaknesses; concentrate on the main effort; and be agile. In order to achieve these ends the manoeuvrist commander should: support manoeuvre with fire; exploit tactical opportunities; act boldly and decisively; avoid set rules and patterns; use mission type orders; and command from the front.[53] These ideas were further affirmed in *Conduct of Land Operations – Operational Level Doctrine for the Canadian Army* issued in July 1998.[54]

The Canadian Army's concept of manoeuvre emphasizes that the defeat of the enemy can best be achieved by "bringing about the systematic destruction of the enemy's ability to react to changing situations, destruction of [their] combat cohesion and, most important, destruction of [their] will to fight." Nevertheless, Canadian Army doctrine recognizes that "attrition may not only be unavoidable, it may be desirable," depending upon "the commander's intent for battle." The use of operational art by land forces in Canada is founded on the command philosophy of what they call "trust leadership." Using this philosophy, commanders at all levels are expected "to issue mission orders along with their intent and then allow their subordinates to get on with their tasks." However, it is recognized that this philosophy may be difficult to achieve in practice, "since it is inherent to the nature of the military to over-control its subordinates, and with modern information and communication facilities, it is becoming increasingly easy to do so." Canadian Army doctrine cautions us not to confuse the concept of manoeuvre warfare with manoeuvre. While manoeuvre is defined as "*the employment of forces through movement in combination with speed, firepower, or fire potential, to achieve a position of advantage in respect to the enemy in order to achieve the mission*" [emphasis in original], manoeuvre warfare is described as "a mind set." Canadian Army doctrine goes on to say that "There are no checklists or tactical manuals that offer a prescribed formula on how to employ manoeuvre warfare. Leaders at all levels must first understand what is required to accomplish a superior's mission and then do their utmost to work within the parameters set out for that mission." It concludes by describing manoeuvre warfare as "an attitude of mind; commanders think and react faster than their foes in order to mass friendly strengths against enemy weaknesses to attack [their] vulnerabilities be they moral or physical."[55]

Proponents of manoeuvre believe the physical conduct of military operations to be circuitous. They visualize the efforts of military forces as being directed towards the creation, exploitation and enhancement of misdirection rather than force on force confrontation. Manoeuvrist military activities will disorient, disrupt and strain enemy systems to the breaking point by attacking indirectly [their] centres of gravity.[56] In essence, the tempo of operations must be such that the enemy is forced to conform to our plans, to the point where [they] can no longer react in a coherent manner. Moreover, the concept of directive control is utilized to provide a philosophy of command.[57]

Directive control, sometimes known as directive command, uses higher commanders' intent, mission analysis and designation of a main effort to promote rapid manoeuvre in the physical and conceptual sense.[58] Effective implementation of this method of command is contingent upon decentralization of authority. In conjunction with awareness of the larger purpose of tasks[59] this permits subordinates to implement operations that employ rapid tempo and synergistic effects to achieve decisive results.[60] The differences between command in attrition and manoeuvre warfare are simplistically depicted in Table 2-1.[61]

Warfare

Attrition	Manoeuvre
■ Physical	■ Psychological
■ Position	■ Fluid
■ Centralized Authority	■ Decentralized Authority

Table 2-1 Parameters of Command[62]

Manoeuvre and the Contemporary Operational Environment

Manoeuvre doctrine enables a small professional army to conduct operations across the spectrum of conflict, from peace support and related activities to kinetic operations.[63] It supplies commanders with the flexibility to employ military power in a manner designed to effectively utilize limited resources in most types of situations.[64] Nonetheless, it has been recognized in recent years that, in order to be successful, practitioners of manoeuvre philosophy had to place much greater emphasis on the creation of shared awareness in order to reduce the ever present ambiguity and corresponding friction of current operational environments.

This recognition has come from the experiences of modern peace operations. These military activities involve comprehensive campaigns that simultaneously address diplomatic, informational, military and economic aspects of the environment. At the same time the setting is asymmetric and usually non-permissive with innumerable state and non-state actors.[65] As we have seen, land operations are complex and continuous, regularly involving physical and psychological isolation and more often than not, until too late, unseen lethality.[66] Adversaries are often non-state and motivated by issues other than that of policy. They attack in unpredictable ways using the strengths of an opponent as its weakness to gain a temporary advantage that can be exploited. Conflict is not confined to discernable regions and involves all aspects of the spectrum of conflict in a specific area with diminishing distinctions between combatants and non-combatants. Effectiveness in joint, multi-national and multi-agency operations is the key determinant of success.[67] Furthermore, due to the increasing role of technology, the intellectual dimension of warfare has increased. It is no longer viewed as a clash of wills between two opposing commanders, but a contest of thinking, interconnected adversaries each trying to triumph over the other.[68] For the Canadian Army the military aspects of such warfare are a prescription for manoeuvre philosophy and require mature, experienced leaders, in addition to cohesive units, capable of independent operations.[69] The Summary of Conclusions from the CF *Debrief the Leaders Project (Officers)* reinforces these ideas and indicates that officer professional development will need to emphasize critical thinking, strategic conceptualization and effective decision making, as well as the ability to understand and work in diverse cultures.[70]

The report drew the following conclusions:

- While the prime function of the CF remains the application of military force in support of government policy, the use of force will be in discrete amounts fully integrated with, and usually subordinated to political, diplomatic and economic measures.

- The need for global security will continue to place a great premium on leadership in the future, but new competencies are needed to supplement traditional leadership competencies as defined by another era of war and fighting.

- Strategic and operational knowledge and skill sets must be created, over and above the excellent tactical training that historically has characterized the CF.

Conclusion

Command and control arrangements and practices are influenced by national and military culture and historical experience as well as the physical environment in which each environment of the Armed Forces operates. The three major ways of conceptualizing military operations at the beginning of the 21st century have been shaped by these influences and are reflected in the approaches to military operations, and C2, of the Canadian Army, Navy and Air Force.

The Canadian Army's post-Cold War experience has demonstrated that the challenges posed by peace support operations in post-conflict situations are best met with holistic solutions that identify issues that must be addressed simultaneously, in a distributed fashion, across elements of national power in order to achieve the desired result. This methodology is achieved best with the human-centric not the network-centric approach, advocated by many in the US military. Nevertheless, doctrinally, the Canadian Army is very similar to the US Army in that it shares the US Army's philosophical and command approaches, namely operational art and manoeuvre, the continental staff system, and a preference for mission command.

Since the end of the Cold War, the predominance of ad hoc "coalitions of the willing" in many military operations has led some to suggest that C2 in coalition operations should be re-defined as "cooperation and coordination," since this expression reflects the reality of C2 in these operations today rather than "command and control" derived from more rigid Cold War C2 arrangements.[71] Moreover, this new paradigm of "cooperation and coordination" appears to emphasize leadership or influence behaviours among peers over traditional concepts of command involving the exercise of authority over subordinates. Therefore, in coalition operations the leadership concepts of emergent leadership and distributed leadership may be more useful than concepts of authority. In fact one might see the high reputation that senior Canadian naval officers have earned in certain command positions as a type of emergent leadership based on three subclasses of personal power (i.e., expert, referent, and connection), rather than position power.[72] Likewise, these leadership behaviours have stereotypically been attributed to air force leaders, and it is appropriate, therefore, that the Canadian Air Force become involved in research into new approaches to C2.

These developments in C2 practice remind us of the necessity to remain conceptually flexible when discussing issues related to command. The reappearance of terms, with origins in the Second World War, like "cooperation and coordination" in the C2 lexicon also serve to remind us that past experience and historical accounts of the evolution of C2 can provide us with valuable insights that can aid us in understanding the continuing evolution of command concepts.

Endnotes

1 By 1917, the original continental staff system had evolved into four principal functions: Personnel (G-1), Intelligence (G-2), Operations (G-3), Logistics (G-4). J.D. Hittle, *The Military Staff: Its History and Development* (Harrisburg, PA: The Stackpole Company, 3rd Edition, 1961), 124.

2 Two major works that discuss the origins of staff systems are Van Creveld, *Command in War*; and Hittle, *The Military Staff: Its History and Development*. The authors of this reference manual are grateful to Maj Paul Johnston for his work, summarized in a draft paper "Organization for Canadian Air Force Command and Control" dated April 2005 for some of the ideas presented here. It is interesting to note that the 2005 reorganization of 1 Cdn Air Division HQ had certain characteristics of the operations and support split seen in the Prusso-British approach.

3 See Allan English, "The Operational Art," in Allan English, et al., eds., *The Operational Art - Canadian Perspectives: Context and Concepts* (Kingston, ON: Canadian Defence Academy Press, 2005), 14-23, for a discussion of the dominance of US army doctrine in this era.

4 The material that follows is based on Allan English, Richard Gimblett, and Howard Coombs, "Beware of Putting the Cart before the Horse: Network Enabled Operations as a Canadian Approach to Transformation," DRDC Toronto, Contract Report CR 2005-212 (19 July 2005).

5 The concept of manoeuvre as it applies to armies, navies and air forces is discussed in English, "The Operational Art," in English, et al., eds., *The Operational Art*, 34-51 and below.

6 These issues are discussed in more detail in English, et al,, "Beware of Putting the Cart before the Horse."

7 For a detailed discussion of naval leadership and command see Allan English, Richard Gimblett, Lynn Mason and Mervyn Berridge Sills, *Command Styles in the Canadian Navy* (DRDC Toronto, Contract Report CR 2005-096, 31 January 2005). The concept of emergent leadership is discussed in DND, *Leadership in the Canadian Forces: Conceptual Foundations*, 8-10, 54, 77-8, 80-1, 125, 130.

8 English et al., "Beware of Putting the Cart before the Horse," 93.

9 Frederick W. Kagan, "War and Aftermath," *Policy Review* 102 (August/September 2003), 3. Available at http://www.hoover.org/publications/policyreview/3448101.html (accessed March 4, 2007).

10 Christopher D. Kolenda, "Transforming How We Fight: A Conceptual Approach," *Naval War College Review* 56, no. 2 (Spring 2003), 103, 114.

11 Frank Fukuyama, *The Great Disruption: Human Nature and the Reconstitution of Social Order* (New York: Free Press, 1999), 199.

12 This paragraph is excerpted from Pigeau and McCann, "Establishing Common Intent: The Key to Co-ordinated Military Action," in English, ed., *The Operational Art: Canadian Perspectives - Leadership and Command*, 104.

13 Michael H. Thomson and Barbara D. Adams, "Network Enabled Operations: A Canadian Perspective," (Defence Research and Development (DRDC) - Toronto contract report CR-2005-162, 13 May 2005), 5.

14 See for example Joshua Ho, "The Advent of a New Way of War: Theory and Practice of Effects Based Operations" (Singapore: Institute of Defence and Strategic Studies, Working Paper no. 57, December 2003), 3-4.

15 See Claudio Segre, "Giulio Douhet: Strategist, Theorist, Prophet?" *Journal of Strategic Studies* 15 (September 1992), 351-66 for a summary of Douhet's theories.

16 These issues are discussed in detail in Phillip S. Meilinger, ed. *The Paths of Heaven: The Evolution of Airpower Theory* (Maxwell AL: Air University Press, 1997), Chapters 1-8.

17 Ho, "The Advent of a New Way of War," 5-10.

18 There is an extensive literature on this topic. See for example Segre, "Giulio Douhet: Strategist, Theorist, Prophet?"; Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell Univ Press, 1996); and W. Hays Park, "'Precision' and 'Area' Bombing: Who Did Which, and When?" *Journal of Strategic Studies* 18 (March 1995), 145-74.

19 See for example John F. Schmitt, "Command and (out of) Control: The Military Implications of Complexity Theory," *Marine Corps Gazette* 82, no. 9 (September 1998), 55-8; John D.

Hall, "Decision making in the information age: moving beyond the MDMP military decision-making process)," *Field Artillery* (September-October 2000), 28-32; and Christian Rousseau, "Command in a Complex Battlespace," in English, ed., *The Operational Art: Canadian Perspectives - Leadership and Command*, 55-84.

20 For more details on this issue see Allan English and Howard Coombs, eds., *Effects-Based Approaches to Operations: Canadian Perspectives* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, in press).

21 Gary L. Crowder, "Effects-Based Operations: The Impact of Precision Strike Weapons on Air Warfare Doctrines," *Military Technology* 27 no. 6 (June 2003), 16-25.

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23 Excerpt from "Introduction," Harlan Ullman and James Wade "Shock and Awe: Achieving Rapid Dominance" in *Washington Post* (30 March 2003), p. B03.

24 Kagan, "War and Aftermath," 5-8.

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26 Ho, "The Advent of a New Way of War," 23-4.

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33 Ibid., 98.

34 Crowder, "Effects-Based Operations: The Impact of Precision Strike Weapons on Air Warfare Doctrines," 16-25.

35 US Department of the Navy, "FORCEnet: A Functional Concept for the 21st Century," [2005?], 12.

36 Stephen Fought, "The Tale of the C/JFACC: A Long and Winding Road," *RAF Air Power Review* 7, no. 4 (Winter 2004): 10-11.

37 These issues are discussed in more detail in English, et al., "Beware of Putting the Cart before the Horse."

38 Allan English, "The Operational Art," in English, et al., eds., *The Operational Art - Canadian Perspectives: Context and Concepts*, 34-51.

39 John A. English, *Marching Through Chaos: The Descent of Armies in Theory and Practice* (Westport, CT: Praeger, 1996), 167; and Robert B. Polk, "A Critique of the Boyd Theory — is it relevant to the Army?" *Defense Analysis* 16, no. 3 (December 2000), 257-8.

40 Polk, "A Critique of the Boyd Theory," 257-60. For more on Boyd's ideas see also Grant T. Hammond, "From Air Power to Err Power: John Boyd and the Opponent's Situational Awareness," in Peter W. Gray and Sebastian Cox, eds., *Air Power Leadership: Theory and Practice* (London: The Stationary Office, 2002), 107-28.

41 Polk, "A Critique of the Boyd Theory," 271.

42 US DoD, Office of Force Transformation, *The Implementation of NCW*, 5, 7.

43 Pierre Forgues, "Command in a Network-Centric War," *Canadian Military Journal* 2, no. 2 (Summer 2001), 29. Available at http://www.journal.forces.gc.ca/engraph/Vol2/no2/home_e.asp.

44 Polk, "A Critique of the Boyd Theory," 258.

45 Ibid., 265, 267, 270. See Allan English, *Understanding Military Culture: A Canadian Perspective*, especially chapters 4 and 6 for more detail on dysfunctional aspects of US Army culture.

46 Ibid., 272; and David S. Fadok, "John Boyd and John Warden," in Phillip S. Meilinger, ed., *The Paths of Heaven: The Evolution of Airpower Theory* (Maxwell AL: Air University Press, 1997), 388-9.

47 For example, the highest casualty rates suffered by the Canadian Corps occurred during the mobile warfare phase of the last "Hundred Days" of the war. The 45,830 casualties it incurred between Amiens and Mons represented 20 percent of the Canadian Expeditionary Force's casualties for the entire war and more than the 44,735 casualties suffered by Canadian Army in the Northwest Europe campaign in the Second World War. In addition, in the Second World War, the mobile campaigns on the Eastern front claimed more lives than all the other theatres of that war combined. John English, *Marching Through Chaos*, 62-4.

48 Michael Wyly believes the two key principles of manoeuvre warfare to be an understanding of the higher commander's intent and that of the designation of the main effort or "*Schwerpunkt*" Michael Duncan Wyly, "Teaching Maneuver Warfare," in Richard D. Hooker, Jr, ed., *Maneuver Warfare: An Anthology* (Novato, California: Presido Press, 1993), 257-8.

49 DND, *Canada's Army: We Stand on Guard for Thee*, B-GL-300-000/FP-000 (np, 1998), 87. It has been argued that the history of the Canadian Land Force in the 20th century does not lend itself to the institutionalization of the philosophy required to affect a manoeuvre type doctrine and related concepts such as that delineated in *We Stand On Guard For Thee*. The experiences of the Boer War, First and Second World Wars, Korea, the Cold War, and peacekeeping, as well as the interludes between major conflicts, have produced a vision of conflict that seems to rely on a symmetrical vision of the battlefield. This perspective is predicated on an understanding of conflict as an orderly and progressive series of engagements, battles, and campaigns that will result in victory. However, it can also be opined that Canadian land operations from the early 1990s onwards have prompted a re-evaluation of the past lessons to embrace the reality of the present – an asymmetric, chaotic environment where decisions are made in minimal time under less than ideal circumstances. In this setting the precepts of manoeuvre warfare, like the principle of subsidiarity, are reinforced.

50 Lieutenant-Colonel Roman J. Jarymowycz, "Doctrine and Canada's Army – Seduction by Foreign Dogma: Coming to Terms with Who We Are," in *The Army Doctrine & Training Bulletin: Canada's Professional Journal on Army Issues* 2, no. 3 (August 1999), 50. Available at http://www.army.forces.gc.ca/CAJ/default_e.asp?view=more&issueID=17

51 Joe Strange, *Centers Of Gravity & Critical Vulnerabilities: Building on the Clausewitzian Foundation So That We Can All Speak the Same Language*, Marine Corps University: Perspectives On Warfighting, No. 4 (Quantico, Virginia: Defense Automated Printing Service Center, 1996 [2nd ed.]), ix.

52 Lieutenant-Colonel (Retired) Chuck Oliviero, "Response to 'Doctrine and Canada's Army – Seduction by Foreign Dogma: Coming to Terms with Who We Are' by Lieutenant-Colonel Roman J. Jarymowycz, Vol. 2, No. 3, August 1999," *The Army Doctrine & Training Bulletin* 2, no. 4 (Winter 1999), 140. Available at http://www.army.forces.gc.ca/caj/documents/vol_02/iss_4/CAJ_vol2.4_full_e.pdf

53 Colonel Eric MacArthur (Retired), former Chief of Staff of Canadian Forces College, provided this summary. A more complete version can be found in *Canada's Army*, 100-105.

54 DND, *Conduct of Land Operations – Operational Level Doctrine for the Canadian Army*, B-GL-300-001/FP-000 (Director of Army Doctrine, 1998).

55 DND, *Land Force Tactical Doctrine Volume 2*, B-GL-300-002/FP-000 (Director of Army Doctrine, 1997), 1-4 to 1-5.

56 Polk, "A Critique of the Boyd Theory," 266.

57 Paul Johnston, "The Myth of Manoeuvre Warfare: Attrition in Military History," in *The Changing Face of War*, ed. Allan English (Montreal and Kingston: McGill-Queen's University Press, 1998), 27-8.

58 Captain Ian Hope, "Manoeuvre Warfare and Directive Control: The Basis for a New Canadian Military Doctrine Part 2 of 2," *The Canadian Land Force Command and Staff College Quarterly Review* 5 no. 1/2 (Spring 1995), 10.

59 Ibid., 10.

60 Richard E. Simpkin, *Race to the Swift: Thoughts on Twenty-First Century Warfare* (London: Brassey's Defence Publishers, 1985; paperback reprint, 2000), 230.

61 Richard Simpkin describes these qualities as the parameters of command. Ibid., 229. Dr. James Schneider has further delineated the psychological domain of command as the ability of commanders to impose their will in order to carry an idea through the planning phase to successful execution while overcoming the inherent friction of combat. Schneider views the physical domain of war as the process of destruction of an army's ability to operate within the cybernetic and moral realms of conflict, and thus disrupting the cohesion of the organization. James J. Schneider, *Theoretical Paper No.3: The Theory of Operational Art* (Fort Leavenworth, KS: United States Army Command and General Staff College, 1988), 6-7.

62 Simpkin, *Race to the Swift*, 206. The concepts of attrition and manoeuvre in this context are discussed in detail in Allan English, "The Operational Art," in English, et al., eds., *The Operational Art - Canadian Perspectives: Context and Concepts*, 34-48.

63 Through kinetic or high intensity types of operations one attempts to overwhelm the enemy through all means available (but primarily violence), and the focus is normally on the destruction of the enemy.

64 This was also the case in Operation Desert Storm, as noted in Captain Ian Hope, "Changing a Military Culture: Manouvre Warfare and a Canadian Operational Doctrine, Part 1 of 2," *The Canadian Land Force Command and Staff College Quarterly Review* 5, no. 1/2 (Spring 1995), 5.

65 John Hillen, "Peace(keeping) in Our Time: The UN as a Professional Military Manager," *Parameters* 26, no. 3 (Autumn 1996), 17-34. Available at: http://www.carlisle.army.mil/usawc/parameters/96autumn/hillen.htm.

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71 See English, et al., "Beware of Putting the Cart before the Horse," 30-8 for a more detailed discussion of this issue.

72 See Allan English, et al., "Command Styles in the Canadian Navy," 95-111, for a discussion of these leadership styles in a Canadian naval context.


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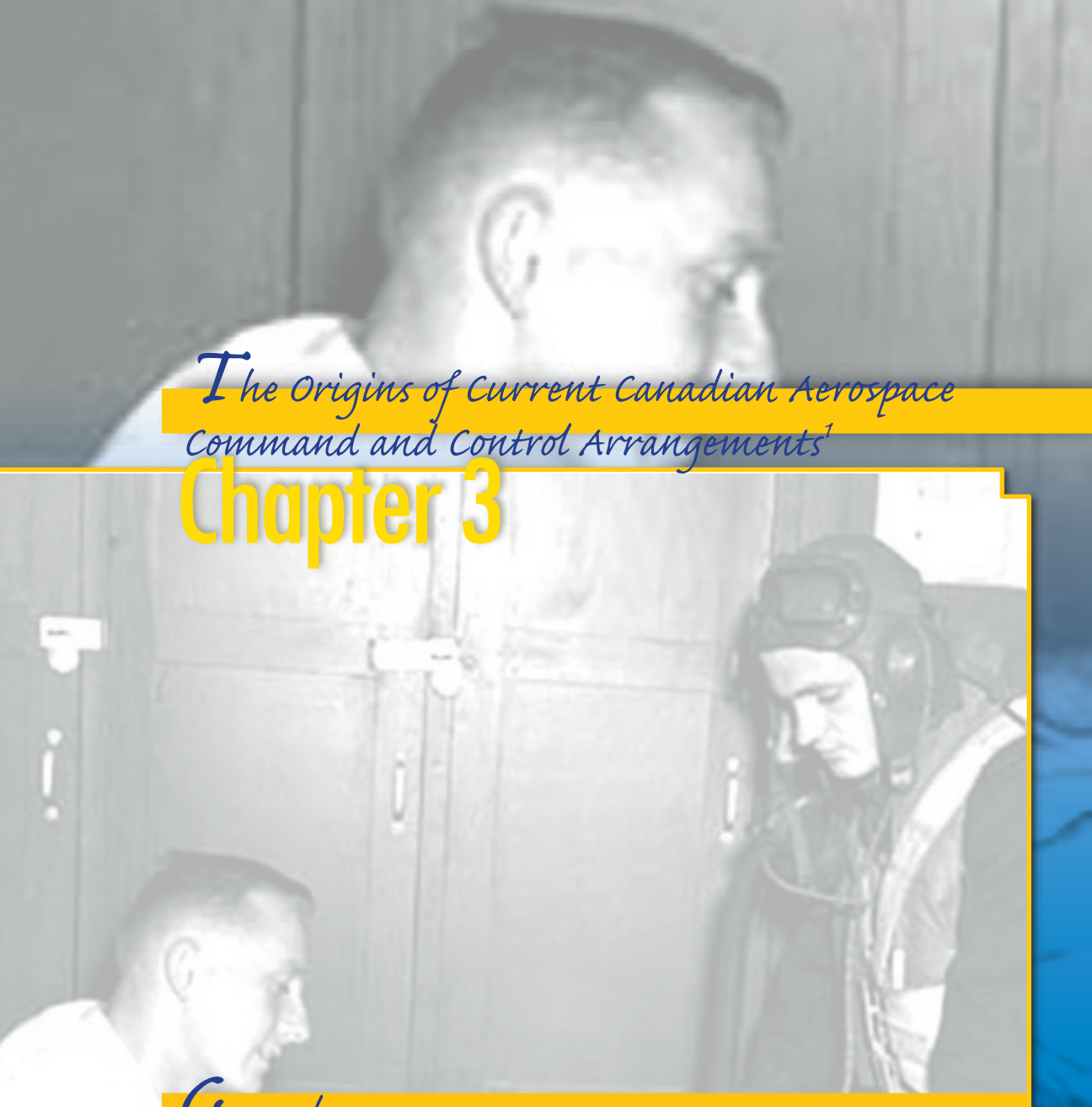


The Origins of Current Canadian Aerospace Command and Control Arrangements[1]

Chapter 3

General

While military organizations have much in common, we have also seen that each service (or Environment in the CF) in a nation's armed forces has its own unique approach to military operations based on the physical environment in which they operate, their historical experience, and their culture. This chapter describes the evolution of current Canadian aerospace C2 arrangements from

integration (1968) to 2005 (just prior to General Rick Hillier's CF transformation initiatives) so that the reader will understand the historical and cultural roots of Canadian C2 arrangements.

Historical Overview

Command has been one of the most contentious, yet one of the least studied, issues throughout the history of Canada's air forces. In both World Wars the vast majority of Canadian air force commanders who commanded during operations did so at the tactical level.[2] A very few senior officers commanded at what might be described, at best, as the operational level, notably in No. 6 Group, RAF Bomber Command, but even these officers commanded at a very low operational level. In the Second World War, the RCAF created a massive training organization as part of the British Commonwealth Air Training Plan (BCATP) in Canada, but, unlike the RAF Canada in the First World War, Canadians filled most of the command positions in this training organization. Nevertheless, the Official History of the RCAF noted that Air Force Headquarters was at times "out of its depth" because RCAF officers who rose to senior rank in the Second World War "had not been properly prepared to organize, control, supply, and direct a large air force."[3] While most senior RCAF officers in Canada exercised largely administrative command in an extensive training organization, a few exercised operational-level command in the North American theatre, notably in Eastern Air Command. However, some of those commanding Eastern Air Command were judged by the official historians of the RCAF to have inadequate leadership skills. By the end of the war, many Canadian senior officers had acquired command experience, but, as noted by C.P. Stacey, Canada's pre-eminent military historian, wartime policies "'broke the back' of the RCAF" and prevented it from fielding a "national air force" with the same higher command opportunities as those enjoyed by the Canadian Army.[4] The RCAF's problem of lack of higher command experience in the Second World War has parallels to the situation now being faced by the Canadian Air Force where, since the disbandment of the functional groups in 1997, there are very few command positions for Air Force general officers.[5]

The Cold War saw the RCAF rise from the ashes of the Second World War demobilization to become, from the 1950s until its disbandment in 1968, a relatively large air force focused on conducting operations. The command issues of this era are briefly described elsewhere,[6] but this is an era that requires much more research to fully understand how the RCAF, for the first time in its history, created a large operational, as well as administrative, command structure. Even though the unified CF adopted many of the RCAF's command models in 1968, splitting Canada's air forces among various organizations with no central body to provide a focus for all air operations and doctrine had serious repercussions for air force command and control and leadership.[7] The current situation where the Air Force command

structure is the result of a series of ad hoc re-organizations, driven by budget cuts and force reduction targets, is a direct outcome of this dispersion of Canada's air forces. Even the formation of Air Command in 1975 was unable to provide a solution to the Air Force's command problems, as staff responsibilities were split between Winnipeg and Ottawa, a situation that continues to this day. Without coherent Air Force doctrine above the tactical level, particularly doctrine related to command and control, expediency has been the driving principle behind most changes to the structure of Canada's air forces at the end of the 20th and the beginning of the 21st century. This has led to piecemeal, often dysfunctional, C2 arrangements that continue to afflict the Canadian Air Force to this day.

This chapter, therefore, outlines those historical experiences, since the unification of the CF in 1968, which led to the Canadian aerospace C2 arrangements at the beginning of the 21st century.

The CF Air Element and the Fragmentation of Command Unification: Canada's Air Forces 1968-1975

Overview of Unification

Prior to unification, Canada's national defence organization comprised a single Department of National Defence. Within the Department were three independent military services: Royal Canadian Navy (RCN), the Canadian Army and the RCAF. The head of each service (designated "Chief of Staff") reported directly to the Minister of National Defence, and was supported by a complete headquarters to control and administer his service. Governments of the day generally viewed this organization as ineffective because advice to the minister was seen as parochial and often too focussed on narrow single service issues; moreover, coordination between the three service headquarters was problematic. The senior military advisor to the Minister of National Defence (MND), the Chairman of the Chiefs of Staff Committee, was responsible for coordinating service issues through approximately 200 standing "tri-service" committees, but he had no executive authority to implement any committee recommendations.

In 1960 the Royal Commission on Government Organization (the Glassco Commission) focussed its attention on DND. Its report identified numerous shortcomings in the administration of defence, including a dysfunctional committee system, the steady growth of an administrative "tail" in relation to operational "teeth," and lack of executive leadership. To rectify these problems, the Commission recommended that the Chairman of the Chiefs of Staff Committee be given executive powers, provided with an appropriate staff, and that the position be re-titled "Chief of Canadian Defence Staffs."[8]

Major changes in the structure of DND occurred in the 1960s culminating, in 1968, in the unification of Canada's armed forces under MND Paul Hellyer. A number of factors influenced these changes. The most dramatic one was the Cuban Missile Crisis of 1962 during which Canadian military forces responded separately to their alliance commitments and were "largely responsive to allied commanders" and not the Canadian government. When Prime Minister "John Diefenbaker tried to exercise control over the armed forces, he found that the central administration in Ottawa had no national plans, no intelligence capabilities, and no reliable structure for commanding and controlling the forces." One year later, the next Prime Minister, Lester Pearson, decided to rectify this situation and appointed "the tough-minded and ambitious" Paul Hellyer as MND. His reforms to DND have been

well documented, and, therefore are only summarized here.

In March 1964, Hellyer, released a new *White Paper on Defence*. The paper outlined the objectives of the Liberal government's new defence policy, which, he argued, could not be dissociated from foreign policy. These objectives were: "To preserve the peace by supporting collective defence measures to deter military aggression; to support Canadian foreign policy including that arising out of our participation in international organizations, and to provide for the protection and surveillance of our territory, our air-space and our coastal waters." The White Paper noted that: "Our major defence contribution for some time will continue to be participation in collective defensive arrangements, namely the North Atlantic Treaty Organization." [9]

More significantly, the paper went on to review the problems in DND identified by the Glassco Commission and concluded that: "There is only one adequate solution. It is the integration of the Armed Forces of Canada under a single Chief of Defence Staff and a single defence staff. This will be the first step toward a single unified defence force for Canada. The integrated control of all aspects of planning and operations should not only produce a more effective and coordinated defence posture for Canada, but also result in considerable savings."[10] This latter point appeared to be critical to Hellyer, as the Glassco Commission had noted that 43 percent of the 1954 annual defence budget was spent on equipment; by 1963 the figure was 13 percent, and it was projected that by 1965-66 there would be no money available for equipment purchases. Therefore, one of the key goals of unification was to provide sufficient savings "to permit a goal of 25 percent of the budget to be devoted to capital equipment being realized in the years ahead." [11]

The White Paper indicated that developing a new unified force structure would be "an evolutionary process." The new CF structure would group forces according to the major functional roles identified in the paper: NATO Europe; Mobile Forces (both in Canada and for NATO); Air Forces (including additional resources for

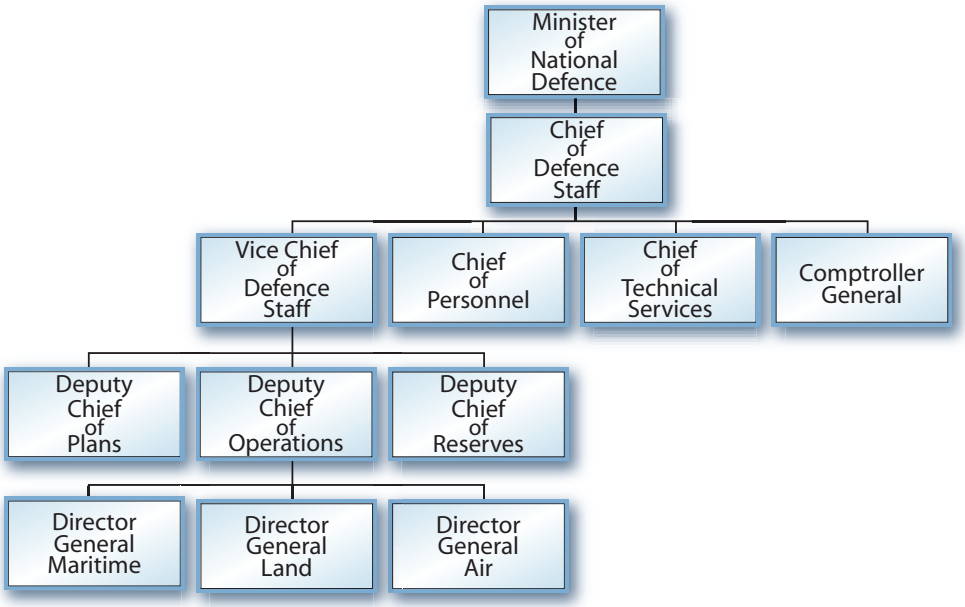


Figure 3-1 – Canadian Forces Headquarters Organization at Unification (1964)

direct support of ground forces); North American Air Defence; Air Transport (additional resources to enhance mobility of ground forces) and Maritime Forces (including helicopters and fixed wing aircraft).[12]

As a preliminary move towards total unification, the Government introduced Bill C-90 "Integration of the Headquarters Staffs," which directed the replacement of the separate service chiefs by a single Chief of the Defence Staff (CDS) and the creation of an integrated Canadian Forces Headquarters (CFHQ) to replace the three separate service headquarters. Accordingly, as the first step in integrating Canada's armed forces under Bill C-90, Air Chief Marshal F.R. Miller was appointed the first CDS on 1 August 1964. At the same time, heads of new functional branches within the new CFHQ were also appointed.[13]

As the senior officer in the new CFHQ, the Chief of the Defence Staff was responsible to the MND for control and administration of the Canadian Forces. Reporting to the CDS were four functional branch heads: the Vice Chief of the Defence Staff (VCDS), the Chief of Personnel, the Chief of Technical Services, and the Comptroller General. (See Figure 3-1 for the CFHQ organization.) Responsibility for military operations was vested in the VCDS, who had three deputies to assist him - the Deputy Chief of Plans, the Deputy Chief of Operations, and the Deputy Chief of Reserves. Reporting to the Deputy Chief of Operations were three Directors General, each responsible for supervising maritime, land or air operations and for determining operational requirements.[14]

The new CFHQ staff was given the responsibility for determining the makeup of the new CF command structure, consistent with the defence priorities outlined in the White Paper. Following extensive planning and review, a new integrated command structure was announced in June 1965, with direction that all separate service establishments were to be re-allocated to the appropriate new CF commands by 1 April 1966. In Canada, six new functional commands would replace the existing eleven service commands. The two Canadian formations in Europe (1 Air Division and 4 Canadian Infantry Brigade Group [4 CIBG]) were initially excluded from the reorganization plan.

To complete the unification process, Bill C-243, the "Canadian Forces Reorganization Act," was placed before the House in November 1966. The Bill was a set of amendments to the National Defence Act, which changed the law establishing three services, creating instead one service to be called the Canadian Armed Forces. The Bill also directed the adoption of a standard rank system (so-called "army" ranks) and of a new service dress uniform to be worn by all ranks, irrespective of the commands to which they were assigned. The transfer of personnel between units of different commands would be facilitated by a new unified personnel management system. Royal assent was given to the Bill on 8 May 1967 and unification officially occurred on 1 February 1968.[15]

The Reorganization Act, while dissolving the three services, did nothing specifically to affect the units and formations of the services as they were then constituted. At the time the new Canadian Forces came into being, its constituent units and elements were the same ones that existed within the RCN, Army and RCAF, but re-distributed to the new unified CF commands.

The CF Organizational Concept for Unification

The organizational structure adopted for the unified CF was derived directly from the RCAF model. This new CF structure (illustrated in Figure 3-2) recognized four levels of command: CFHQ (the national level); commands and formations (generally functional organizations, what might be called the operational level today); bases (regional or local support organizations); and units (tactical organizations, like squadrons, assigned to specific commands). At each level of command, there was a designated commander, responsible for the effective and efficient discharge of his command responsibilities, as prescribed in Queen's Regulations and Orders. Officers commanding commands and formations

exercised command over all bases, units and elements assigned to the command or formation, while commanders of bases and units exercised command over all officers and non-commissioned members at the base or unit.[16]

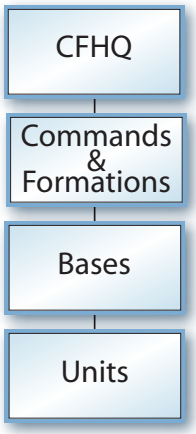


Figure 3-2 – Four Levels of Command

Below the national-level CFHQ, the CF was organized into functional commands which reflected the major commitments assigned by the government. Irrespective of their service origin, all forces devoted to a primary mission were to be grouped in a single command. Command headquarters staffs were to be organized in a structure corresponding to the four branches of CFHQ: Operations, Personnel, Technical Services, and Comptroller. Where warranted, commands were authorized to introduce intermediate headquarters (formations) below the command level.[17]

The next level in the vertical organization of the new command structure was the base, which was introduced as the foundation for administration and local support. This organizational concept was derived from the RCAF "station" model, and generally was not found in RCN or Canadian Army force structure. The primary role of the CF base was to support units or formations lodged on, or otherwise attached to it, by providing personnel accommodation and messing, and administrative, technical and comptroller services as required. The units and formations lodged on a base might be largely self-supporting, or totally dependent on the base for support, depending largely on their requirement for mobility.[18]

The range and scale of support services provided by a base was to be especially tailored to each unit's situation, but would need to cover the services which were beyond the capabilities of individual units and which were not provided by external agencies. To assist the base commander in executing his responsibilities, a base headquarters was created in a structure that replicated the four branches in the command headquarters and in CFHQ. Bases were assigned to the new parent commands according to the primary operational or training functions being performed by units at the base.[19]

Unification and the CF "Air Element"

In the unified CF there was no component of the organizational structure that replicated the former services and use of the terms "navy," "army" and "air force" was actively discouraged. In their place, terminology reflecting environmental "elements" (sea, land and air) was introduced. The term "air element" became the approved term to describe the Canadian "air force" in the CF context. The term was never formally defined, but was generally recognized to encompass all CF units (and their personnel) engaged in, or directly supporting, "air" operations, (e.g., flying squadrons and aircraft maintenance units). Also considered part of the "air element" were all other CF personnel in "air" classifications or occupations (i.e., pilots, air navigators, air traffic control) employed in other than "air element" units.

The absence of an overarching concept of what the "air element" comprised, or of an approved definition, limited the usefulness of the term, except as a generic identifier. Although attempts were made to portray the scattered parts of the "air element" as the CF equivalent of an air force, the inference was incorrect. The CF "air

element" had no top-down organizational basis, either administratively or operationally; rather it was a bottom-up aggregation of assorted air units and personnel. CF personnel did not enrol in the "air element," nor did the "air element" have formal status in the CF organizational structure. These deficiencies would be partially addressed later with the stand-up of Air Command in 1975 and which is described later in this chapter.

Furthermore, while it was frequently suggested that the "air element" was the direct descendent of the RCAF, this was inaccurate. Both the post-war RCN and Canadian Army possessed their own integral aviation forces, and these were also subsumed by the "air element" during the process of unification. Thus, in addition to RCAF units and personnel, the "air element" included all aviation forces previously belonging to the RCN and the Canadian Army. Although more modest in numbers than their RCAF counterparts, these RCN and Canadian Army aviation forces were nonetheless important contributors to the make-up of the "air element," both operationally and administratively.

Operationally, the pre-unification functions and roles of the RCN and Canadian Army aviation forces were different from (and not duplicated by) those executed by RCAF units. Following unification, these unique RCN and Canadian Army roles and functions were assigned to the CF "air element," in addition to those carried over from the RCAF. Thus, the number of functions and roles undertaken by the CF "air element" was greater in scope than those previously assigned to the RCAF. In effect, the breadth of operational functions executed by the "air element," and hence its operational capability, was substantially greater than that of the former RCAF.

From an administrative (personnel) perspective, the differences in training and education provided to personnel engaged in flying operations in the three services were not accommodated in the unification process. These differences were in part related to the inherent differences in the environments in which each of the former services' personnel engaged in flying operations worked, and were reflected in service-unique personnel policies. In the unified CF, universal training and education policies were applied to all personnel of the "air element," and because they were frequently modelled on RCAF practice they were not necessarily optimized for air personnel performing functions previously the mandate of the RCN or Canadian Army aviation.

These operational and administrative considerations influenced "air element" organizations and operations, and continue to be reflected in issues related to the "warfare communities" of today. To properly understand the derivation of these "warfare community" issues, it is necessary to appreciate the RCN and Canadian Army lineage of the CF "air element," not merely its RCAF ancestry.[20]

Operational and Personnel Considerations of Unification

The "air element" of the unified Canadian Forces was an amalgamation of three different organizations: the RCAF (a separate air service), Canadian Army aviation (individual air units in a number of army branches), and the RCN Aviation Branch (a major operational component of the RCN). These organizations had been created in the post-war reconstitution of Canada's three military services, each with some responsibility for operating Canadian military aircraft to achieve defence policy objectives. While all of these organizations carried out various air functions, because the operating environments were different for each service, there was very little overlap in the functions carried out by each organization, and the RCAF, Canadian Army aviation, and the RCN Aviation Branch were inherently different organizations.

At the tactical level, organic army aviation units executed their assigned air functions in direct support of the army field forces. They operated from austere locations in

the field alongside the army units and formations they supported, and, therefore army aviation units needed to have an inherent capability to deploy and operate with them. When deployed in the field, logistics support to army aviation units was provided through the army logistics chain. In a similar manner, organic naval aviation forces executed maritime air functions in direct support of maritime surface and sub-surface operations. They operated from surface vessels as part of a ship's company, and were organized to deploy with and receive support from their parent ship. In contrast, air force units executed a variety of combat and combat support air functions, often at some distance and independent from other services or air force units. They operated a variety of larger, primarily fixed wing aircraft, usually from fully developed airfields. Support services were provided at these airfields through air force logistics organizations and were individually tailored to each unit.

While the three constituents of the former services were amalgamated into a single unified CF "air element," the distinctive operational functions and operating environments of the former services were not (and could not be) similarly unified. Accommodating these inherent differences dictated that the organization and personnel establishment of units undertaking army tactical aviation operations in the field would be different from those of units involved in the conduct of maritime air operations from shipborne platforms, or from air force units involved in operations (whether air defence, counter-surface or air transport) launched from fixed airfields. Logistics support arrangements for these different force structures also needed to be similarly accommodated and specifically tailored to each situation. Based in part on the requirement to deploy with the supported land or maritime force, provision of logistics support for tactical aviation and shipborne maritime air forces through logistics structures of the supported force appeared to be the most appropriate approach. Likewise, air force support capabilities deploying with various types of air force operations required capabilities tailored to each deployment situation.

In part to accommodate the inherent differences in their operational functions and operating environments, the training and professional development provided to officers of the three former services engaged in flying duties varied considerably. While the basic and advanced flying training necessary to achieve pilot "wings" standard was relatively consistent amongst the three services (the RCAF providing much of the flying training to its two sister services), post-wings career opportunities and professional development afforded to junior officers engaged in flying duties in the three services was considerably different.

Following on aircrew training experience gained with RAF Canada in the First World War and the BCATP in the Second World War, the RCAF focus was on recruiting personnel directly for aircrew positions. Distinct aircrew classification (pilot, navigator, radio officer) training was then provided for these direct entry candidates, with only limited emphasis on leadership or general military training. This was appropriate for the RCAF, as most aircrew were engaged under short-service (five year) commissions and only a small percentage (usually university graduates) were offered permanent commissions. Officers with a short-service commission could generally not progress beyond Flying Officer (i.e., lieutenant) rank and hence had little opportunity (or need) to exercise leadership over other RCAF personnel. Officers with a permanent commission had enhanced career prospects, and following an initial period of flying employment were afforded the opportunity to develop their professional and leadership skills. This was accomplished through attendance on staff school and staff college courses and through postings to headquarters staff positions.

Unlike the RCAF, the Canadian Army did not accept direct entry candidates for flying training, but instead took junior officers qualified in their primary branch occupation, (i.e., armour, artillery or service corps), and "cross-trained" them as pilots. This is the approach generally favoured by other allied armies, including, until recently, the US Army. In this army construct, aviation is a secondary

qualification awarded to army officers already qualified in a primary occupation qualification. In the Canadian Army, there was no separate "pilot" branch list, officers were held on their primary corps or regimental list, with an additional aviator qualification. Unlike the RCAF, in which an aviator's career was irrevocably linked to flying, the Canadian Army aviator was first and foremost an officer of his branch or corps. He could spend only a fraction of his military career engaged in flying operations, and these would be directly related to his primary occupation as an artillery, armoured or service corps officer.

The RCN approach was a combination of the RCAF and Canadian Army approaches. The Navy recruited directly into the pilot branch, but personnel policies ensured that naval aviators were integrated into the mainstream of naval operations and could aspire to and progress to command positions afloat. After an initial flying tour, junior naval aircrew officers were normally given extensive training in general seamanship skills and were also required to qualify in naval operations. Once qualified, they would go on to serve tours as members of a ship's company and ultimately could progress to appointments as captains of surface vessels. Admiral R.H. Falls, who became CDS in 1974, was a naval aviator who progressed to command of not only an RCN air squadron, but also of the carrier HMCS *Bonaventure* and of the Canadian Flotilla Atlantic.[21]

In the unified CF, training and professional development provided to all "air element" aircrew personnel was generally patterned on the RCAF model. This policy was based on the air force concept of large aircrew classifications (or occupations), focussed primarily on operating aircraft. Personnel were recruited directly into these classifications, extensive training was provided to achieve "wings" standard and subsequent employment operating aircraft was assured for several years. Emphasis in this early part of an aircrew officer's career was placed on gaining experience and skill as an aircraft operator, with limited focus on professional military and leadership skills or on obtaining expertise in "air warfare" functions.

The RCN and Canadian Army had a more holistic career development approach, emphasizing the development and employment of aircrew as professional "naval" or "army" officers, in parallel with development as aircrew. This approach was more appropriate for these services, recognizing that naval and army aviators would be deployed frequently, working in operational environments where regular interaction with military personnel from other units was the norm and where professional competence in all aspects of warfare on land or at sea was required. In the unified CF personnel system, assignment of aircrew officers to and between any of the commands was the norm; however, the universal (air force) training provided to all aircrew was not necessarily optimal for those assigned to maritime- or land-centric commands.

The New CF Command Structure

The new CFHQ defence staff, appointed in August 1964, was given responsibility for planning the make-up of the new CF command structure. Their objective was to create a force structure which would accommodate the roles detailed in the White Paper. The underlying organizational premise was that all forces devoted to a primary role would be grouped into a single command, with sufficient resources assigned to allow the commander of that command to discharge his assigned responsibilities. Following lengthy study and ministerial review, the new CF functional command structure was approved in June 1965.

Under the new structure, the commands in Canada were reduced to six from eleven. Previously a mixture of regional and functional commands, the new CF field structure, shown in Figure 3-3, consisted of six functional commands: Mobile, Maritime, Air Defence, Air Transport, Materiel, and Training. In addition to the six major commands, the CF structure also included the Communications System (elevated to command status in 1970), and a Reserves and National Survival Organization. As noted earlier, the two Canadian formations

assigned to NATO Europe, 4 CIBG and 1 Air Division, were initially unaffected by this CF reorganization. Commencing in October 1965, commanders were appointed and headquarters were established to fully develop the structure of the new functional commands.[22] Each of these is described next.

Mobile Command

The first and largest of the new CF commands, Mobile Command (MOBCOM), was stood up on 1 October 1965 with headquarters at St-Hubert, Quebec. Its mission was to maintain combat-ready land and tactical air forces (fixed- and rotary-wing) capable of rapid deployment, both for NATO service in Europe and for United Nations peacekeeping operations worldwide. The creation of Mobile Command involved the disbandment of four regional Army headquarters: Eastern Command, Quebec Command, Central Command and Western Command, as well as the 11 subordinate area headquarters that had the responsibility for administering some 40,000 Regular Army, 40,000 Militia and 100,000 cadet personnel.[23]

A vital component of Mobile Command was to be its tactical aviation element, operating under the Chief of Tactical Aviation. Mobile Command was therefore established as a joint (air-land) command, with a force structure integrating both air and land element units. Its command headquarters organization was equally joint, headed by a "land element" lieutenant general (three star) commander who was supported by two deputy commanders. An "air element" major general (two star) was Deputy Commander – Operational Support, while a "land element" major general was Deputy Commander – Operations. Of the 62 officers in the headquarters, 20 were "air element" officers who were assigned not only to the Chief of Tactical Aviation, but also filled positions throughout the organization.[24] Over the next ten years, as new equipment was delivered, a number of new "air element" units were created and the air component of MOBCOM grew considerably, becoming the largest "air force" in the CF.

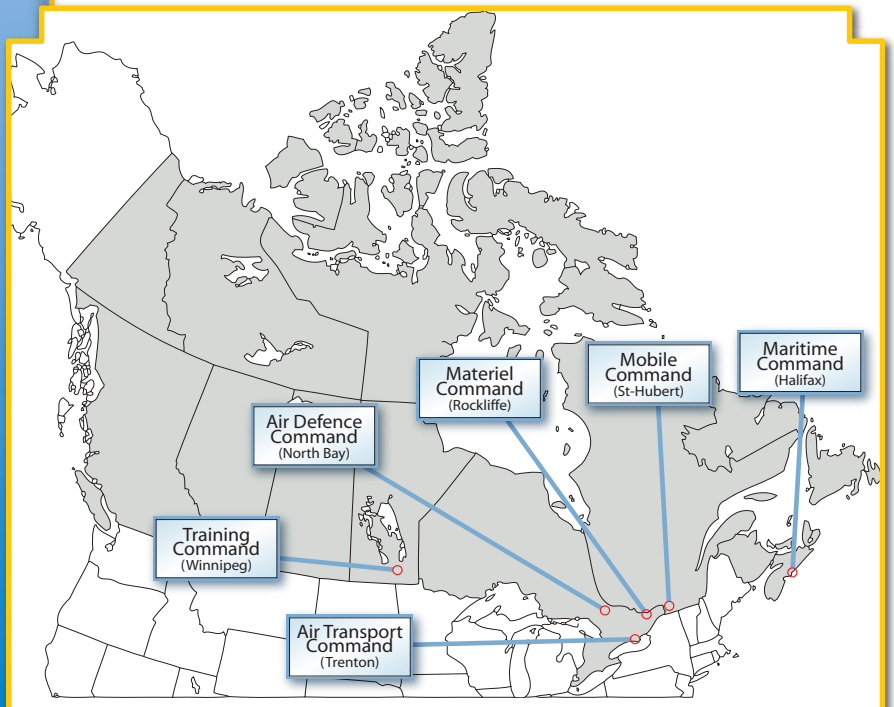


Figure 3-3 – Canadian Forces Six Functional Commands

In August 1968, the Chief of Tactical Aviation Branch was separated from MOBCOM HQ and reorganized as Headquarters, 10 Tactical Air Group (10 TAG), the newly created aviation formation. The Commander 10 TAG was "double-hatted"[25] as Chief of Staff (Air) to the Commander MOBCOM and as a commander in his own right of a subordinate formation, 10 TAG. In July 1970, in concert

with the latest restructuring of CFHQ, 10 TAG Headquarters was completely separated from MOBCOM headquarters. The original integrated (joint) air-land headquarters was slowly disappearing, with MOBCOM focussing more on establishing itself as a separate "service," comparable to the former Canadian Army, but within the context of the unified Canadian Forces.[26]

With the creation of the new CF command structure, Mobile Command became Canada's first joint air-land command in 1965, charged with providing forces that could be rapidly deployed. Air and land element officers worked side by side in this headquarters and were responsible for the command and control of this new command. No detailed assessment of the success of these command arrangements has yet been done, but in theory the joint headquarters should have been able to provide a better capability to conduct joint operations than the previous arrangement of single service headquarters. However, five years into this experiment in joint C2, the beginning of the "disintegration" of the integrated command structure can be seen when 10 TAG was completely separated from MOBCOM headquarters.[27] This "disintegration" of the CF continued with the formation of Air Command (which will be discussed later) five years after the separation of 10 TAG from MOBCOM. Another sign of "disintegration" of the CF was the closure of the Joint Air Training School at Rivers, Manitoba in September 1971. It is ironic that this joint school, which was started after the war because of the recognition of the importance of joint training and which was also a precursor to today's emphasis on joint operations, was closed as part of a unification base consolidation program designed to save money.[28]

Maritime Command

Maritime Command (MARCOM) was formally established on 17 January 1966 and embodied all of Canada's surface and sub-surface naval forces as well as all (RCAF and RCN) maritime air units on both coasts. Its headquarters was located in Halifax, with a Pacific sub-command in Esquimault. The creation of Maritime Command involved the disbandment of the former RCN Atlantic and Pacific Commands as well as the RCAF Maritime Air Command. The RCAF contribution to MARCOM consisted of four squadrons of fixed-wing maritime patrol aircraft, while the RCN Naval Aviation contribution was two squadrons, one fixed-wing maritime patrol aircraft and one helicopter. The primary role of Maritime Command would continue to be anti-submarine warfare, although there was planning underway to enhance its capability for general-purpose tasks.[29]

Maritime Command was a joint (air-sea) command, with significant contributions from the air and sea elements, and a joint headquarters staff. Prior to unification the RCAF and RCN had instituted a joint command structure comprising three commanders: the Maritime Commander, the Flag Officer Atlantic Coast (FOAC), and the Air Officer Commanding Maritime Air Command (AOC MAC). In peacetime the FOAC was designated the Maritime Commander, with the AOC MAC acting as his deputy. With unification, only the Maritime Commander remained, a position filled by a sea element three star equivalent officer. Senior air element representation in MARCOM was retained by having a two star "air element" general designated as Chief of Staff (Operations), the next senior position in the headquarters. By 1973, however, the senior air position had been downgraded to a one star Chief of Staff (Air), one of three coequal branch heads in the operations division.[30]

Air Defence Command

In recognition of the importance of air defence during the Cold War and the ongoing Canadian commitments to the North American Air Defense agreement, the Air Defence Command (ADC) organization remained essentially the same as it had been within the RCAF. However, economies were to be achieved through consolidation by moving the Command's headquarters from St-Hubert, Quebec to North Bay, Ontario where Northern NORAD Region headquarters was already located. ADC continued to have responsibility for providing airborne intercep-

tors and ground control facilities to defend North American airspace within the mandate of NORAD.[31] To execute its responsibilities, ADC operated three

CF101 VOODOO

squadrons of CF101 Voodoo interceptors, as well as two squadrons equipped with the Bomarc surface-to-air missile system. These operational forces were directly supported by a number of radars, command and control, and space surveillance facilities.

Air Transport Command

Like ADC, Air Transport Command's (ATC) organization remained essentially the same as it had been within the RCAF. With headquarters at Trenton, Ontario,

CC106 YUKON

ATC was responsible for providing the CF with strategic and tactical airlift capa-

CC130 HERCULES

bility, as well as air search and rescue operations within the Canadian areas of responsibility. ATC operated a fleet of Yukon and a fleet of Hercules aircraft for strategic transport and a variety of smaller aircraft for tactical transport, communications and search and rescue.[32] In January 1969 the Air Reserve, comprised of six squadrons of Otter aircraft, was transferred from ATC to MOBCOM.

CC123 OTTER

Materiel Command

Materiel Command was created on 1 August 1965, with headquarters at Rockliffe, by amalgamating elements of the former RCN and Canadian Army logistics organizations with the RCAF's Air Materiel Command. The Command was responsible for providing necessary supply and maintenance support to the other operational commands. Materiel Command was presented with one of the most formidable tasks of the integration period, to mould the three disparate service systems into a single automated CF supply system. Because of the complexity and magnitude of the project, it was estimated it would take up to five years to implement; in the mean time the three service systems would continue to function to ensure that logistics support to operational forces was in no way diminished. The command had no operational air element units assigned to it.[33]

Training Command

Training Command was formed on 1 January 1965, with headquarters in Winnipeg, by amalgamating training elements of the RCN and Canadian Army with the RCAF's Training Command. It was assigned responsibility for all individual training, including flying and

ground trades training, for all personnel in the CF. A new CF training program was to be developed, which would correspond to a new CF trades structure which was also being developed. Where skills were common to two or more Environments, it was planned to centralize the training at one facility. It was anticipated that it would take several years to fully implement the new CF training program. The Command had no operational air element units assigned to it.[34]

NATO Europe – 1 Air Division

The European-based 4 CIBG, with headquarters at Soest, West Germany, and 1 Air Division with headquarters at Metz, France were initially not included in the

CF104 STARFIGHTER

1965 command reorganization. At the time, 1 Air Division comprised eight CF104 squadrons divided among three wings, with six squadrons in the nuclear strike role based in Germany and two squadrons in the reconnaissance role based in France. In 1966 the French government announced that it was withdrawing its forces from NATO and requested that all NATO forces be withdrawn from its territory. Canada arranged to take over the French air base at Lahr, West Germany in exchange for the Canadian base at Marville, and No. 1 Wing and 1 Air Division headquarters redeployed to Lahr in April 1967.[35]

In 1970, the Government issued a new white paper, *Defence in the 70's*. This document reversed the government defence priorities promulgated in the 1964 paper, and directed a 50 percent reduction and consolidation of Canada's NATO forces, including the elimination of the nuclear strike role. Under this new policy, 1 Air Division was to be reduced from six to three squadrons, and downgraded from "command" to "formation" status as 1 Canadian Air Group (1 CAG). The three remaining squadrons would all be based at Baden Soellingen and were to be re-roled for conventional ground attack.[36] On 1 July 1970, 1 CAG and 4 Canadian Mechanized Brigade Group became formations within a new CF command, Canadian Forces Europe, with headquarters at Lahr. The airfield at Lahr was retained as the airhead for Canadian air transport operations in Europe, and as a deployment airfield for US Air Force "Rapid Reaction" squadrons.

Unification and the Problems of the Air Element

One of the primary objectives of unification was to resolve inter-service rivalries which surfaced when matters of resource allocation or support of one service by another had to be resolved. Prior to unification, the three services functioned independently, sought to maximize their resource allocations and zealously guarded their own service interests. Unification did not directly address resource allocation issues, but moved the decision making authority down in the organization. Resource allocation issues now had to be resolved internally within the CF, generally between the CFHQ and command levels. In comparison with the land and maritime elements, the interests of the air element were poorly served by the unified CF command structure. The two major joint CF commands, Mobile Command and Maritime Command, were headed by three star equivalent officers, who were increasingly stressing their land and maritime lineage, and championing land and maritime programs respectively. The air element, with forces spread amongst four commands, each headed by two star equivalent commanders, was at a disadvantage in advancing its programs.

This disadvantage had an adverse effect on the air element because resource management in DND became the critical issue in

the 1972-75 timeframe. The new Defence White Paper, *Defence in the 70's*, published in 1971, imposed a three year freeze on the defence budget at $1.8 billion. In the face of severe fiscal constraint, the operational commands were required to significantly reduce their expenditures on operations. The air element commands resorted to mothballing operational aircraft and reducing flying rates to achieve the needed budget cuts. The joint land and maritime commands chose cost reduction options which minimized reductions in their traditional roles, and offered up reductions primarily in their air element activities. As a result, air element programs were disproportionately reduced across the CF.[37]

This, and similar, experiences prompted many senior airmen to question the logic of the unified Canadian Forces structure given the adverse effect it was having on the CF air element's interests. Through the mechanism of the annual Air Commanders Conference, Canada's senior airmen were able to identify several problems with the unified structure which were considered detrimental to the well-being of the "air element," and which merited concerted attention. The main five problems, as the senior airmen saw them, were:

- **Fragmentation of operational air element forces**. Each of the operational CF functional commands had an air element component, but these operated in isolation from each other with no overarching coordination or control. In effect, each command had (or was) its own mini "air force," but with no supporting structure. This fragmented organizational structure violated two doctrinal principles of air power application: unity of effort and centralized control. Experience has shown, and doctrine confirms, that air power is most effectively applied when it is organized as a unified force, and when control of that force is centrally executed at the highest practicable level.[38]

- **Subordination of the air element**. Related to the issue of fragmentation, the growing subordination of the air element within the two "joint" commands, MARCOM and MOBCOM, was a matter of concern. The original senior air positions in these joint headquarters had been downgraded over time, with the result that the "air element" component was no longer perceived as a coequal partner with the land and sea components, but was increasingly viewed as a subordinate.

- **Lack of strategic oversight and leadership.** Within the CFHQ organization, oversight of air element programs was managed at too low a level, and there was no senior position designated as the air element advocate. Within the VCDS Branch, responsibility for CF military operations was vested in the Deputy Chief of Operations branch, with air policy and doctrine being the responsibility of the Director General Air Forces (DGAF), a brigadier general. This change was significant for the air element, as Canada's air forces went from a pre-integration position of having a three star Chief of the Air Staff with direct access to the MND to a one star officer with three layers of bureaucracy between himself and the MND. Even though a 1972 National Defence Headquarters (NDHQ) reorganization elevated the senior air element officer in NDHQ to the two star level, he was still precluded from participating in senior (three star level) CFHQ councils or from providing appropriate strategic leadership to the air element.[39]

- **Declining esprit de corps**. Prior to unification, the Chief of Air Staff, Air Marshal C.R. Dunlap, voiced his concerns over maintaining air element esprit de corps in a unified force: "One joins the Air Force, not a regiment, not a corps – allegiance and pride is centred in the Air Force as a whole – one is willing to make great personal sacrifices for the sake of making the RCAF superior to any other air force or, in fact, than any other service."[40] The two "joint" commands were increasingly assuming the mantle of successors to the former services, claiming institutional loyalty and engendering esprit de corps formerly associated with the RCN and Canadian Army. The air element had no similar single institution within which to develop its own esprit de corps.

- **Professional development and doctrinal deficiencies.** Following unification, the land and sea elements had retained their core educational institutions, the Canadian Land Forces Command and Staff College (CLFCSC) and the Canadian Forces Maritime Warfare Centre (CFMWC), respectively, while the air element lost the resources previously dedicated to professional education related to air warfare amongst air force personnel. The basic levels of air warfare education that had been provided on entry to the RCAF were not found on the new CF unified basic officer or recruit courses, and at more senior levels the air force promotion and staff college entrance exams were phased out. With the conversion of the RCAF Staff School and Staff College in Toronto to unified CF institutions, professional education directly related to air warfare almost disappeared.

Furthermore, with the conversion of its educational institutions in Toronto to unified CF institutions, the RCAF extension program, which provided professional military education to RCAF officers, and the *RCAF Staff College Journal*, which was the RCAF's professional journal, were eliminated. These changes also had a detrimental effect on the development of Canadian air doctrine as the RCAF Staff College, since its foundation in 1943, had been one of the key institutions in the development of Canadian air doctrine. Unification did not affect land and sea warfare professional education or doctrine to the same extent because the land and sea elements of the CF kept their core educational institutions alive in the CLFCSC and CFMWC. Therefore, air doctrine in the 1970s in Canada degenerated into the views of separate air warfare communities cobbled together into one volume with little coherence or consistency. It was recognized by senior officers both inside and outside of the Air Force that this situation was threatening to fracture Canadian air power and to divide it into small, divided functional communities that, without central direction, would not be able to provide the air capabilities required by the CF.[41]

Corrective Measures – A Window of Opportunity

Having determined the scope of the problems facing the air element within the unified force structure, Canada's senior airmen turned their attention to corrective measures. Several proposals were developed, including a suggestion considered by some to be extreme – to put all of Canada's military air resources into one organization for the first time in its history. In 1974 the senior airmen were provided with a window of opportunity to advance their ideas. Canada was in the midst of a recession, and cabinet had directed that the DND budget was to remain frozen. DND was in a state of financial crisis, operations were again reduced, capital programs deferred, and the CF establishment was to be reduced from 83,000 to 79,00 in 1975, with possible further reductions to 73,000. The CDS convened an extraordinary meeting with commanders of commands to seek additional areas for possible expenditure reductions.

In response, senior airmen initially proposed the idea of an Air Command based only on an amalgamation of ATC, ADC and some air-related positions in Training Command, but did not include 10 TAG or Maritime Command air elements. Lieutenant General W.K Carr, the DCDS and an air element officer, actively supported the proposal and offered up manpower savings of 110 positions through consolidating the various air headquarters staffs. As the proposal would have no impact on MOBCOM or MARCOM, there was initially no resistance from those commanders. General J.A.Dextraze, the CDS and a land officer, agreed to take the proposal to government. The MND, James Richardson (a former Second World War RCAF pilot), was strongly supportive of Carr's proposal, especially as the headquarters was to be situated in his Winnipeg riding. The proposal was forwarded to cabinet, with personnel reductions now identified as 155 positions.[42]

With approval of this partial solution seemingly assured, senior airmen

now worked to incorporate 10 TAG and Maritime Command air elements into the proposal. Additional arguments were prepared to overcome anticipated opposition from MOBCOM and MARCOM commanders, including the exclusion of land and maritime airmen from air element career progression considerations. Commander MARCOM was approached initially with the expanded proposal and he was in general agreement, but with the proviso that operational control of maritime air resources remain with Commander MARCOM. With this precedent established, Commander MOBCOM was finally persuaded to accept the proposal, with similar reservation on retaining operational control of 10 TAG forces. With agreement from these commanders, the CDS agreed to support the expanded proposal, and in January 1975 he announced formation of the new command.[43]

As promulgated in CANFORGEN 15/75 "Formation of Air Command," the CDS explained the decision: "The purpose of forming Air Command is to unify all air resources, regular and reserve, so that their employment and development can be coordinated in the most effective and economical manner to achieve Canadian Defence objectives. Additionally, Air Command will help to provide a clear identity and focus for all airmen within the Canadian Forces…" The new command would encompass all air assets of the Canadian Forces, but with operational control retained by user commands, i.e., Mobile Command, Maritime Command, and CF Europe. The new command would, however, have CF-wide jurisdiction over air doctrine, flight safety and common air policy, including training standards.[44]

Although the CDS had sanctioned the creation of Air Command in January 1975, detailed establishments and command arrangements had not yet been finalized, and it required considerable effort by planners to resolve the concerns of the other commands and NDHQ. In creating the new command structure, air planners had to accommodate three primary restrictions imposed by the CDS: reorganization costs had to be minimal, manpower savings (155 positions) had to be achieved, and command and control arrangements had to be agreed to by all parties affected. In most instances, the existing command and control mechanisms were unique, and tailored for individual situations, and therefore had to be replicated in the new command structure.

For example, Air Defence and Air Transport were autonomous commands with complete headquarters staffs. Operationally, Air Defence Command was controlled by the NORAD Commander-in-Chief (CINC) located in Colorado Springs, while Air Transport Command responded to taskings from NDHQ. 10 TAG was a formation of Mobile Command, with some units under operational control of the Land Combat Groups. 1 Canadian Air Group was a formation of Canadian Forces Europe, under operational control of NATO's 4th Allied Tactical Air Force in times of tension and war. Also in Europe, 444 Tactical Helicopter squadron was an autonomous unit assigned to 4 Canadian Mechanized Brigade Group. The air units of MARCOM and the flying schools of Training Command had no intermediary headquarters formation to report to, and reported through their associated base and/or ship directly to their parent command.

To accommodate these disparate command and control arrangements, the planning staff developed an initial concept, which organized the command and control of air resources around a number of functional formations, designated "air groups." Each of the groups would provide air support to a specific user command, with split command and control arrangements similar to those existing with NORAD and NATO assigned forces. Under this plan, Air Command would exercise administrative control over all groups, bases, and squadrons, while operational control of individual groups was assigned to the user command. Air Command Headquarters (AIRCOM HQ) would have a complete staff for administration and technical support, while the group headquarters would be small and responsible only for planning operations. In this concept, base commanders were responsible to AIRCOM HQ for the provision of support to assigned units and responsive to the formation commanders for operational matters.

The initial plan proposed six subordinate groups: Air Defence Group (ADG); Air Transport Group (ATG); Maritime Air Group (MAG); 10 Tactical Air Group (10 TAG); 1 Canadian Air Group (1 CAG); and an Air Training Group. Many of these formations already existed in some form or other, which minimized re-organization costs. To achieve additional personnel savings, a subsequent proposal suggested the elimination of the Air Transport and Training Groups, with these functions to be controlled directly by AIRCOM HQ. The elimination of a dedicated Air Transport formation was not supported, however, and the final iteration of the plan was a compromise, leaving Air Transport Group as a separate group but assigning control of air training to AIRCOM HQ.

Once the group structure had been accepted in principle, it remained to finalize headquarters establishments and confirm command and control arrangements with the user commands. While the groups recognized that their responsibilities were limited to operational matters, the two former commands were reluctant to see existing headquarters support staffs dismantled and recreated in AIRCOM HQ. The split control of bases was also seen as a matter of concern, as was the proposed rank (BGen) of the Commander ADG (whose American counterparts were all of MGen rank), and the relationship between the groups and the Director General Aerospace Engineering and Maintenance in NDHQ. Some of these issues remained unresolved until well after the new command structure was inaugurated.

On 2 September 1975, Air Command took its place as a command of the Canadian Forces. With headquarters in Winnipeg (occupying facilities previously accommodating Training Command Headquarters), Air Command became responsible for the provision of "operationally ready regular and reserve air forces to meet Canadian, continental and international defence commitments." To meet that responsibility, it had under its command 29 squadrons, 16 bases, 20 radar stations and 4 early warning radar sites. It operated a fleet of some 850 aircraft of 22 different types, flying over 300,000 hours annually. It was also responsible for providing trained air personnel for the CF, as well as air advice to the air units deployed in Europe. It comprised 22,829 military and 7,838 civilian personnel, making it the largest command of the Canadian Forces.[45]

Summary

The unification of Canada's armed forces in 1968 into one service was the culmination of a process, often referred to as integration, which had begun in 1923 with the creation of a single Department of National Defence. A number of factors in the 1960s accelerated change in DND and precipitated the radical changes that unification brought to Canada's armed forces. A key factor was the Cuban Missile Crisis of 1962 when Canadian military forces were perceived by many politicians to have been unresponsive to the Canadian government's wishes in this crisis. The Cuban Missile Crisis also brought to the forefront criticisms of a fragmented and inefficient Canadian military command and control system based on three separate services—the Canadian Army, the RCN and the RCAF. Another important factor that fuelled unification was the perception that the military budget was not being spent prudently because in the mid-1950s close to one half of the annual defence budget was spent on capital equipment, yet by 1963 only 13 percent was being spent on capital equipment, and there were projections that this amount would drop even further in the near future. Therefore, two key goals of unification were to provide an effective C2 framework for the CF that would ensure its responsiveness to civilian government control and to provide enough savings to allow 25 percent of the defence budget to be spent on capital equipment purchases.

A number of commentators have questioned the wisdom of unification as it was eventually implemented. While few would quibble with the aims of the proponents of unification of providing a mechanism for coordinating Canada's defence policy, of integrating common functions, and of significant financial savings, many ask whether it was necessary to take the unification process as far as it was taken, especially with the creation of a novel

command and control structure in a very short period of time.

The first major step towards unification was the reorganization of the military headquarters under Bill C-90, which created the new position of Chief of the Defence Staff to replace the three separate service chiefs and an integrated Canadian Forces Headquarters to replace the three separate service headquarters. The first CDS was appointed in August 1964 and his CFHQ staff devised a new command structure for Canada's armed forces that was announced in June 1965 and was to be implemented by 1 April 1966.

The new structure was based on the RCAF model of functional commands, and it had four levels of command: the national level (represented by CFHQ); functional organizations, what might be called the operational level today (represented by commands and formations); regional or local support organizations (represented by bases); and tactical organizations (represented by units, like squadrons, assigned to specific commands).

The new functional command structure was designed to reflect the major commitments assigned by the government to the armed forces. Therefore, irrespective of their service (i.e., Army, RCN or RCAF) origin, all forces with a common primary mission were assigned to a single command. The result was six new functional commands in Canada, Mobile, Maritime, Air Defence, Air Transport, Materiel, and Training, all stood up before unification in 1968.

The next level below the functional command level in the new structure was the base, which was introduced as the foundation for administration and local support. The base concept was derived from the RCAF "station" model, where the primary role of this level in the organization was to support units assigned to it, by providing personnel, administrative, technical and comptroller services as required. The commander of a base, like the commander of a RCAF station, was not in the operational chain of command.

While the official implementation of unification on 1 February 1968 changed some visible characteristics of Canada's armed forces, such as separate services and distinctive (returning to different colours for the three different Environments) uniforms, many organizational changes had already been implemented before that date. Nevertheless, the unification process was complex and Hellyer's original plans were modified over the years. Many of these modifications were caused by factors that still have relevance today and can be seen influencing General Hillier's recent transformation efforts.

Among the new functional commands created in the 1960s, as we have seen, Mobile Command and Maritime Command were true joint commands, in today's parlance. However, not long after the creation of these commands, the centrifugal "strong service" culture began to pull away parts of their structures so that these two commands began to become more like the old army and navy respectively. From an air force perspective, the most visible sign of this "disintegration" occurred when 10 TAG Headquarters was completely separated from MOBCOM Headquarters in July 1970 during a CF restructuring. The effects of this "disintegration" was that Mobile Command and Maritime Command increasingly became centres of influence for the land and sea elements of the CF, both in terms of creating cultural centres of gravity for those elements and in terms of representing those elements in the higher councils of DND. Without a similar centre of influence, the CF air element was perceived by many to be at a disadvantage in the bureaucratic struggles that are part of any large organization like the CF.

Others believed that unification, between the years 1968 and 1975, had almost destroyed Canada's air force as an institution. The new CF "air element" was a combination of the RCAF, the RCN Aviation Branch and Canadian Army aviation assets. Without an overarching concept or definition of the "air element" in the CF, it became a loose amalgam of air resources dispersed throughout the CF. Each of the operational CF functional commands had an air element component; therefore, each command had (or was) its own mini "air force," but there was no central command or control framework for CF air resources.

This was reflected in CF air doctrine in the 1970s which had little coherence or consistency. The dispersion and diversity of air element personnel plus the lack of a centralized air element command structure, similar to those of Mobile Command and Maritime Command for the land and sea elements respectively, caused a number of problems, for example in the training and professional development as well as the employment of this diverse group of air element personnel.

It is ironic that even though the general organizational principles and some specific organizational parts adopted for the organization and command and control of the new unified CF were derived directly from the RCAF model, their application almost destroyed the air force as an institution. The period from unification in 1968 until the formation of Air Command in 1975 was a difficult one for the CF "air element." In the new unified CF command structure, operational "air element" forces and personnel were distributed among the four Canadian commands and one European command. As we have seen, this dispersion of air resources had significant effects that included the fragmentation of operational air element forces among various CF organizations; the subordination of the air element relative to the land and sea elements; a lack of strategic-level oversight and leadership; declining esprit de corps; and serious professional development and doctrinal deficiencies.

In 1974, due to severe budget pressures on the CF, a window of opportunity opened for senior air element officers to attempt to redress these problems. They used this window of opportunity to tout the creation of Air Command as a way to save money and positions, by consolidating numerous air element headquarters positions into a more rational structure, as well as to address these problems. The result was that in September 1975 Air Command, composed of all the air assets and air element personnel from across the CF, became the largest command of the Canadian Forces. The structure that Air Command adopted was not the result of a holistic planning exercise, but, much like the unification process, the result of compromise and reorganization of structures already in being. While perhaps not perfect, it went a long way towards addressing the concerns of Canada's senior air element officers over the fragmentation of air power thought, expertise, and application.

The Struggle to Centralize Air Force Command: Canada's Air Force and Air Command 1975 – 2005

Introduction

The CF's air resources were dispersed and fragmented after unification in 1968, and as we saw above, this resulted in a number of serious problems in the CF's "air element." Air Command was formed on 2 September 1975 to rectify these problems, including the disjointed command and control of the CF air element and the lack of a central focus for all air operations and doctrine. The creation of this new command was brought about by the amalgamation of two existing CF commands, Air Defence and Air Transport Commands, together with the air elements of Mobile, Maritime and Training Commands. Air Command was created to bring the principal constituents of the CF air element together under a single commander and to permit a more efficient and flexible employment of air resources. With headquarters in Winnipeg, Air Command's first commander, Lieutenant-General W.K. Carr, had jurisdiction over air doctrine, flight safety and common air policy matters, such as training standards, for all air units in the Canadian Forces.

The initial euphoria over the creation of Air Command was relatively short-lived as NDHQ did not decentralize any of its day-to-day administrative functions relating to air resources, for example the Chief of Air Operations policy group as well as certain air technical and administrative authorities remained in Ottawa. Furthermore, while a basic argument for the formation of the command had been the rationalization of command and control, the organizational posture adopted by the command itself seemed to complicate, rather than streamline, command and control of air resources.

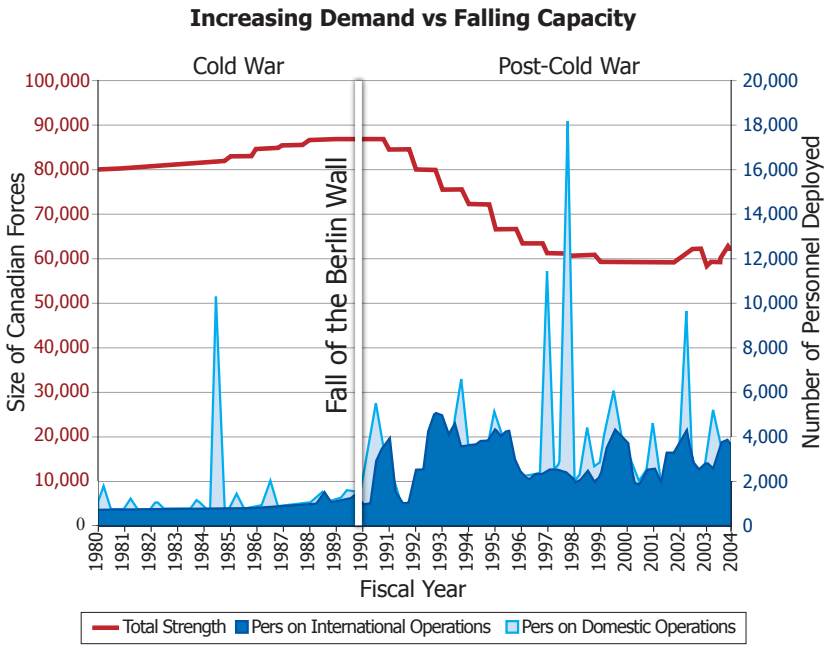


Figure 3-4 – Personnel Operational tempo at Overall Strength 1980-2004[51]

Changes in the CF's force structure in response to changes in the international environment, in particular détente and the end of the Cold War, also had detrimental effects on Air Command. From a position as the largest CF command when formed in 1975, as a result of major reductions in the CF during post-Cold War period, Air Command shrank considerably and became the second largest CF command. Because of post-Cold War budget cuts, the CF was reduced from to the strength of about 90,000 Regular Force personnel that it had grown to in 1990 to approximately 62,000 Regular Force personnel today.[46] While the CF Regular Force was reduced by about 20 percent of its total strength as a result of cuts in the 1990s, the Air Force was reduced by 48 percent in the same time period.[47] Today's Air Force consists of about 14,500 Regular Force military personnel, the smallest Canadian air force personnel establishment since the Second World War.[48] While the Air Force was cut by almost one half in terms of both personnel and aircraft in the post-Cold war period, its taskings for expeditionary operations doubled.[49] During this same period the CF had the number of its personnel deployed on operations increase three-fold. This situation is depicted graphically in Figure 3-4. During the 30 years covered by this section, Air Command changed its organization and command structure frequently in response to internal and external pressures. However, during the last half of the period Air Command found itself increasingly hard-pressed to keep up with the tempo of operations, and its personnel were adversely affected by the extremely high personnel tempo. The Chief of the Air Staff at the time, Lieutenant General Ken Pennie, summed up the seriousness of the situation in early 2005: "The air force is 'beyond the point where even constant dedication is sufficient to sustain the capabilities needed to meet assigned Defence tasks,' [and the Air Force] 'remains fragile due to chronic underfunding and asymmetric cuts to personnel. Our Wings and Squadrons are too hollow to sustain the current tempo of operations.'"[50]

The Command and Control Structure of Air Command – The First 12 Years

The role of Air Command when it was created was to provide operationally ready air forces to meet Canadian national and international defence commitments. The Commander Air Command had jurisdiction over all air activities in the Canadian Forces, except those under command of Canadian Forces Europe. The incumbent was also a designated NORAD Component Commander, responsible for the readiness of Canadian Forces resources committed to the air defence of North America. In addition, the incumbent was designated as Commander, Prairie Region, with regional responsibilities focussed on provision of aid of the civil power.[52]

The Headquarters Structure

Air Command Headquarters was established in Winnipeg, in facilities previously occupied by Training Command. The headquarters staff was organized into five branches, all reporting to the Commander through the Deputy Commander in his capacity as Chief of Staff:

- **Chief of Staff Operations (COS OPS)** - responsible for overseeing air operations, plans, requirements, doctrine, force structure, intelligence and security;
- **Chief of Staff Support (COS SUP)** - responsible for providing support to all air operations, including aircraft maintenance, logistics, telecommunications and information services, as well as construction engineering;
- **Chief of Staff Personnel (COS Pers)** - responsible for military and civilian personnel matters, including chaplains, doctors, and dentists;
- **Chief of Staff Training and Reserves (COS T&R)** - responsible for air, technical, and professional air force training and education, as well as cadets and reserves; and
- **Command Comptroller (CCompt)** - responsible for accounting and financial services, as well as for the organization and establishment of the Command plus its management consulting services.

The Air Group Structure

The basic organizational concept embodied in the Air Command structure was the doctrinal tenet of centralized control with decentralized execution. This was achieved through a functionally-based field organization, with all operational air resources organized into formations according to their primary operational function and designated "Groups." The group headquarters were small, and established to exercise operational command over units assigned to the group. This functional organization was designed to permit the group commanders to focus primarily on air operations, while leaving Air Command Headquarters responsible to provide the necessary administrative and technical support functions. This organizational structure also facilitated the transfer of operational control of Air Command forces to the user commands: Maritime Command, Mobile Command, NATO, and NORAD.

As originally established, the Air Command structure, shown in Figure 3-5, included:

- **Air Defence Group (ADG)**. Previously an independent CF command (Air Defence Command) with headquarters in North Bay, this Group was responsible for providing airborne interceptors and ground control facilities to defend North American airspace within the mandate of NORAD. The Group headquarters was a smaller version of the former Command headquarters, with most

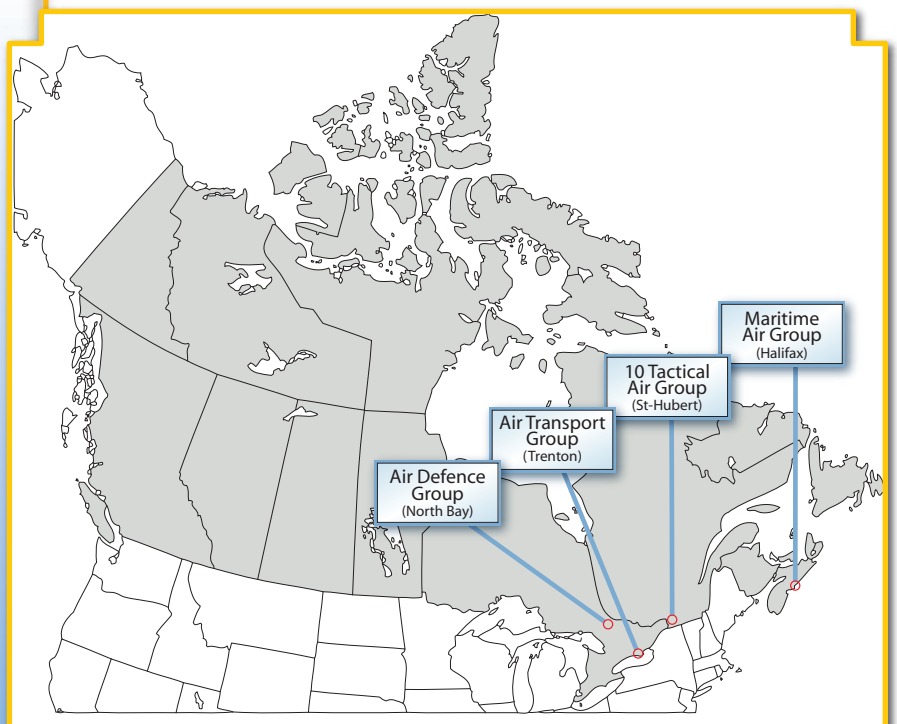
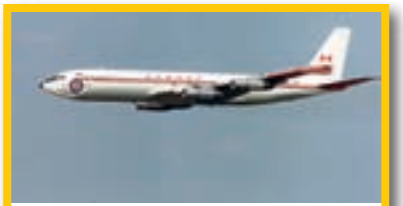


Figure 3-5 – Air Group Structure

support staff positions transferred to the new Air Command Headquarters. To execute its responsibilities, the Group continued to operate three squadrons of CF101 Voodoo interceptors: 409 Sqn at Comox, 416 Sqn at Chatham and 425 Sqn at Bagotville. These operational forces were directly supported by a number of radars, command and control, and space surveillance facilities. Bases assigned to ADG included Cold Lake, Bagotville, North Bay and Chatham.

- **Air Transport Group (ATG)**. Previously an independent command (Air Transport Command) with headquarters in Trenton, Air Transport Group was responsible for strategic and tactical airlift for the Canadian Forces, as well as air search and rescue operations within the Canadian areas of responsibility. The Group headquarters was a smaller version of the former Command headquarters, with most support staff positions transferred to the new Air Command Headquarters. ATG operated a fleet of Boeing 707 (CC137) and CC130 Hercules transports for strategic transport, and a variety of smaller aircraft for tactical transport, communications and search and rescue. The four primary transport squadrons were: 437 Sqn at Trenton (CC137), 412 Sqn at Uplands (Cosmopolitan, Challenger), 436 Sqn at Trenton (CC130) and 435 Sqn at Namao (CC130). Bases assigned to ATG included Edmonton, Trenton, Ottawa and Gander.



CF137 BOEING 707

- **10 Tactical Air Group (10 TAG)**. Previously a formation of Mobile Command, 10 TAG was transferred to Air Command, but retained its headquarters in St-Hubert co-located with Mobile Command. The role of

CC109 COSMOPOLITAN
CC144 CHALLENGER

10 TAG was to provide combat ready tactical aviation (helicopter) and tactical air (fighter) forces to support the operations and training of Mobile Command. Operational control of 10 TAG resources was delegated to Commander Mobile Command, and Commander 10 TAG was also designated Chief of Staff (Air) [COS (Air)] in the Mobile Command Headquarters. The 10 TAG helicopter squadrons operated Kiowa, Twin Huey and Chinook helicopters which were co-located with their Mobile Command formations. They included 403 Sqn and 427 Sqn at Petawawa, 422 Sqn

CH135 TWIN HUEY
CH136 KIOWA

at Gagetown, 408 Sqn at Edmonton, 430 Sqn at Valcartier and 450 Sqn at Uplands (Ottawa). The tactical air

CC147 CHINOOK

squadrons operated the CF5 Freedom Fighter and included 434 Sqn at Cold Lake and 433 Sqn at Bagotville.

CF5 FREEDOM FIGHTER

- **Maritime Air Group** (MAG). MAG was a new formation, comprising all air assets previously assigned to Maritime Command (MARCOM). MAG Headquarters was established in Halifax, co-located with MARCOM Headquarters. Operational control of MAG resources was delegated to Commander MARCOM, and Commander MAG was designated COS (Air) in the MARCOM HQ. MAG was responsible for the operational tasking of maritime aircraft in providing aerial surveillance and control of the maritime approaches

CP107 ARGUS

to Canada. To execute this responsibility, MAG operated a fleet of Argus, Tracker and Sea King aircraft. MAG squadrons included 449 Sqn and 415 Sqn at Summerside, 404 Sqn and 405

CP121 TRACKER

Sqn at Greenwood, 407 Sqn at Comox, and VS 880, 406 Sqn, 423 Sqn and 443 Sqn at Shearwater. Bases assigned to MAG included Comox, Shearwater, Greenwood, and Summerside.

CH124 SEA KING

Several changes were made to the Air Command organization in the years following its formation in 1975. The most important were the creation of two new groups, and the restructuring of one of the original groups. The first new group to be created was Air Reserve Group (ARG), formed in 1976 with headquarters at Winnipeg. It was a relatively small formation comprising approximately 950 personnel, and was distinguished by a unique command and control arrangement which catered to the particular needs of reserve personnel. Under this arrangement, ARG Headquarters exercised administrative control over all Air Reserve personnel; however, the Air Reserve units they belonged to remained under the operational control of the appropriate functional group headquarters.

The second new group to be formed was 14 Training Group, established in August 1981 also with headquarters in Winnipeg. Since its inception in 1975, Air Command training had been controlled directly from the Command Headquarters by the Deputy Chief of Staff Training and Reserves. It became increasingly apparent, however, that training matters were not receiving the staff attention that they required, and that the establishment of a distinct training group was warranted. Therefore, 14 Training Group was created and given responsibility for establishing Air Command training policy and controlling all training units, except for the operational training squadrons which remained under their respective group's control. Coincident with the formation of this new group, the Central Flying School was re-established as the centre of excellence for flying training methods and the central Air Command training standardization body. As an economy measure, 14 Training Group was disbanded in 1994 and responsibility for control of all air training reverted back to Air Command Headquarters.

A third major change to Air Command's organization occurred in July 1982 when Air Defence Group was disbanded and replaced by a new formation, Fighter Group. This new group took over responsibility for the air defence and air sovereignty functions of the former Air Defence Group, as well as the tactical fighter function which had been the responsibility of 10 Tactical Air Group. Fighter Group Headquarters was created by amalgamating 10 TAG Headquarters fighter staff with Air Defence Group staff. This reorganization was in part a result of the acquisition of smaller numbers of one fighter type, the CF18 Hornet, to replace larger numbers of three fighter types of aircraft, CF101 Voodoo, CF104 Starfighter and CF5 Freedom Fighter. With a reduced fleet of only one type of aircraft available for existing commitments, it was deemed critical to consolidate control of all fighter resources and operations under one commander to provide for maximum flexibility in the use of fighter resources.[53]

CF18 HORNET

The Base Structure

While Air Command was organized largely along the functional lines traditionally used by air forces, there was an organizational anomaly—the base. Positioned between the group level and the squadrons and units, commanders of Air Command bases were directly responsible to Air Command for the effective and efficient operation of their bases, and they were also responsive to the appropriate group commander(s) for the operational readiness of the squadrons and units assigned to their bases. Since only Air Command Headquarters was established with the requisite administrative and technical support staff to address the needs of the bases, the administrative chain of command went from Air Command directly to the base commanders bypassing the group headquarters. However, the operational chain of command went from Air Command directly to the group

commanders, and then to the individual units, effectively bypassing the base commanders. This split chain of command was reflected in the early Air Command organizational diagrams where bases were depicted as reporting directly to Air Command Headquarters, while individual units were aligned under the groups to which they were assigned.[54]

The Air Command base alignment was consistent with CF organizational policy, which was partially derived from the RCAF "station" model. For a number of reasons the CF base structure initially adopted by Air Command became a major irritant to senior Air Command personnel. Base commanders were generally dissatisfied with their exclusion from the operational chain of command, while group commanders were concerned with their limited ability to influence the prioritization of support functions by base commanders, who were not in their chain of command. To correct these deficiencies and to bring the organization more in line with the original RCAF "station" model, a minor reorganization was undertaken in 1976, which resulted in all operational Air Command bases (excluding training bases) being assigned to the most appropriate group.[55]

This revised base alignment introduced a number of organizational inconsistencies, and continued to be a source of dissatisfaction. While bases were now assigned to the air groups, all units at a base did not necessarily belong to the group to which the base was assigned. For example, CFB Comox was assigned to MAG, but supported flying units belonging to MAG, ADG and ATG. As a result, base commanders could now find themselves included in several operational chains of command, with competing demands from the group commanders concerned. Although formalized in Air Command orders, the role of the base commander in the operational chain of command was still not in accordance with CF Organization Orders, nor was it consistent with the original Air Command organizational concept. These organizational inconsistencies remained unresolved until 1992, when the decision was made to reorganize Air Command in accordance with a "wing" organizational structure. This next major reorganization was strongly influenced by changes in the world security situation which are described next.

Restructuring in 1993 – The Wing Concept

In part to accommodate the significant reductions in personnel and equipment brought about by declining defence budgets, Air Command initiated planning for a major reorganization in 1992. The most significant aspect of this reorganization was to be the introduction of "wing" formations throughout the Command. This reorganization initiative, based on the wing structure, was approved by the Minister of National Defence effective 1 April 1993. A commemorative booklet issued at the time pronounced the reorganization to be an event of historic significance: "A new chapter has thus been opened in the rich history of Canada's military aviation."[56] While perhaps of historical significance, the operational relevance of this major reorganization was less apparent.

The wing had long been a recognized structure in Canadian air force organizations, first appearing in 1919 with the creation of 1 Canadian Wing of the RAF. It reappeared in various configurations during the Second World War, the post-war reorganization, the unification period and ultimately during the stand-up of Air Command. In each of these iterations, the wing was an operational organization, comprising two or more squadrons, usually tasked for the same function (i.e., air transport, air defence, etc.) and under the command of a single commander. Squadrons comprising a wing might be assigned to the same base; however, the primary consideration in establishing wings was command and control efficiency, not squadron location. Historically, not all air force squadrons were assigned to a wing organization, hence the wing structure was not originally intended to be a distinct level of command, applied across an air force structure, but an organizational expedient designed to accommodate force employment realities.

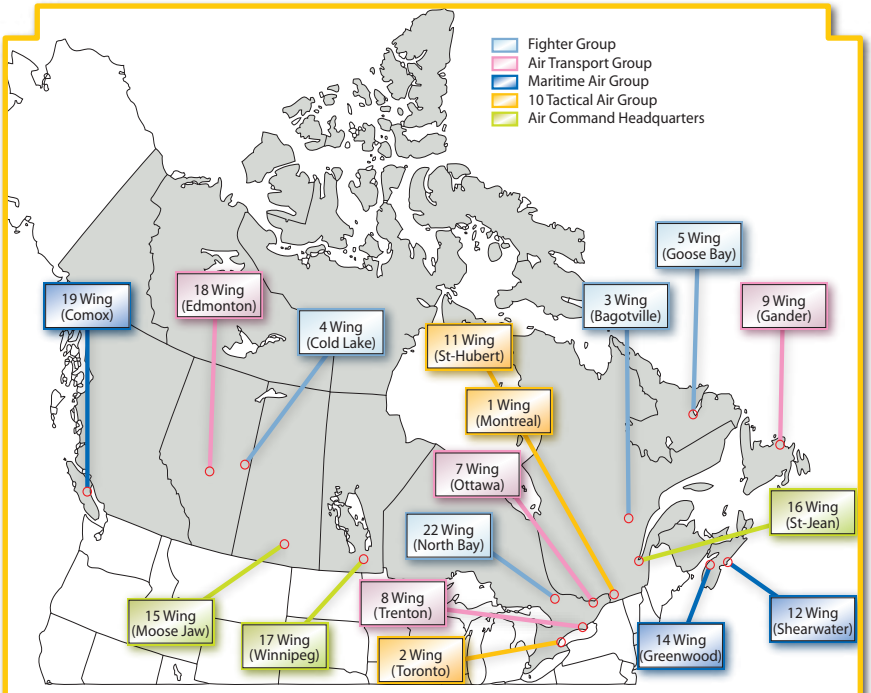


Figure 3-6 – Air Command Wing Structure

The 1993 Air Command "wing" reorganization was undertaken to address the ongoing concerns of senior air force officers with the CF base structure, in particular with the largely administrative role assigned to air force base commanders and their lack of involvement in operations. Although the post-unification CF organizational structure was generally patterned on the RCAF model, with CF "bases" replacing RCAF "stations," the principal support function of the CF base was contentious among some senior air force personnel from the time Air Command was first established. As noted in the "Master Implementation Plan for the Wing Concept," "the underlying philosophy of a 'base' as defined in Canadian Forces Organization Orders (CFOOs) has always been foreign and inappropriate to Air Command." [57]

From the Air Command perspective at the time, there were five distinct but related problems associated with the CF base structure:

- CF organizational orders established the role of the base as providing accommodation and support services to units assigned to it. This support focus did not align with Air Command's view that the primary role of an air base was to conduct air operations.
- CF organizational orders placed the commander of an air base outside the operational chain of command. Air Command considered that base commanders were essential command elements in the operational chain of command and that the organizational structure should reflect that operational role.
- The CF base concept was an impediment to the efficient management of resources at an air base because Air Command felt the base commander should be the focal point for command at an air force base with the authority, responsibility and accountability for both operations and support.
- The CF base concept inherently separated the "operations" and "support" functions. It failed to recognize that support to operations at an air base is an integral and vital part of air operations.

- CF base nomenclature did not reflect the operational character of an air force base, nor the air force team concept. For the majority of CF members, the term "base" equated to "support," which was perceived to have little direct relationship to air force "operations." [58]

To redress these organizational deficiencies, Air Command initiated a command-wide reorganization, based on a universal "wing" structure. The reorganization was to be accomplished by creating 17 numbered wings, primarily by superimposing a "wing" structure over the existing base organizations. The objective was to create an organization in which one individual would be "double-hatted" as both Wing Commander (WComd) and Base Commander (BComd), and that individual would have clear authority, responsibility and accountability for both the operational role of the wing, as well as for the continuing support role of the base. Within the new Air Command structure, the generic role assigned to a wing was: "to provide ready air forces to carry out operational missions and tasks or, in some instances, to conduct training. Within the wing, the role of the base remains to provide support." [59]

The underlying principle for the new wing structure was thus "one wing, one boss," with the WComd responsible for conducting air operations, while maintaining authority over all those support functions and resources essential to the successful execution of air operations. The "wing" reorganization introduced four principal changes to the existing Air Command structure:

- All Air Command units and elements at a location, including the base where applicable, were assigned to a numbered wing, which in turn was assigned to the appropriate group.
- The commander of an air force installation was designated a formation commander (the Wing Commander), and was placed in the operational chain of command.
- Wing nomenclature (squadrons, flights) was introduced to replace CF base-related terminology (branches, sections).
- Internal organizational changes were introduced, including the incorporation of aircraft maintenance within the operations function.

As originally constituted in 1993, the Air Command wing structure, illustrated in Figure 3-6, reflected the following numerical designation and group assignment of wings:

- **Fighter Group** - 3 Wing (Bagotville), 4 Wing (Cold Lake), 5 Wing (Goose Bay), and 22 Wing (North Bay);
- **Air Transport Group** - 7 Wing (Ottawa), 8 Wing (Trenton), 9 Wing (Gander) and 18 Wing (Edmonton);
- **Maritime Air Group** - 12 Wing (Shearwater), 14 Wing (Greenwood) and 19 Wing (Comox);
- **10 Tactical Air Group** - 1 Wing (Montreal), 2 Wing (Toronto) and 11 Wing (St-Hubert); and
- **Air Command Headquarters** - 15 Wing (Moose Jaw), 16 Wing (St-Jean), and 17 Wing (Winnipeg).

To assist the WComd in executing their operational and administrative responsibilities, a standardized wing structure was also to be established. Although each wing structure could vary somewhat according to its composition, role and size, all wings would include four principal branches, generally mirroring those in Air Command Headquarters. Each branch was to be under the direction of a senior officer of LCol or Maj rank:

- **Wing Operations Officer (W Ops O)** – responsible to the WComd for the efficient and effective conduct of operations;
- **Wing Logistics Officer (W Log O)** – responsible to the WComd for the effective and efficient conduct of logistics functions;
- **Wing Administration Officer (W Adm O)** – responsible to the WComd for the efficient and effective

provision of personnel administration and personnel services functions; and,

- **Wing Comptroller (W Compt)** – responsible to the WComd for financial, establishment and information technology functions.

Within the wing organization, the W Ops O was to be considered to be "first amongst equals" of the commanding officers of units in the wing. For day-to-day operational matters the unit COs would report to the W Ops O, who was responsible for coordinating the wing's response to meet assigned tasks. However, unit COs would continue to have direct access to the WComd for non-operational matters. To enhance the team effort in conducting air operations, all aircraft maintenance activities were consolidated under the purview of the W Ops O, either directly as independent maintenance organizations or as a distinct maintenance component of an operational squadron.

Although widely acclaimed by senior airmen at the time, in retrospect the wing structure reorganization seemed more preoccupied with addressing perceptions than with reality.[60] The underlying objective centered on enhancing the operational role (and perceived importance) of air force base commanders; however, the correlation with increasing operational effectiveness was never made. The secondary objective was a somewhat abstract undertaking to enhance intrinsic bonds between "operators" and "support" personnel at a base. These objectives might well have been accomplished through less drastic measures than imposing a "wing" structure throughout the Command. As few changes were made to the Air Command or group headquarters structures to accommodate the new wing structure, anomalies were introduced to the original organizational concept.

Within the Air Command structure, the air groups had been established as operational formations, with little responsibility (or staff) for administration, while Air Command Headquarters was established to handle most administrative matters. Accordingly, the operational chain of command extended from Air Command through the groups to the individual units, an operational posture which facilitated transfer of operational control to user commands. The administrative chain of command ran from Air Command to the bases and then to the units, an administrative posture which accommodated the absence of administrative staffs in the group headquarters. Double-hatting base commanders as wing commanders not only added the base commander to the operational chain of command, but also required that group commanders become more actively involved in administrative issues, activities for which they were neither staffed nor specifically accountable.

The wing reorganization effectively added a level of command, which was neither required nor consistent with CF organizational principles. It created two levels of formations (groups and wings) below the Air Command level, with little if any operational benefit. Since there was limited "operational authority" to spread around, if group commanders were already delegated "operational command" over units assigned to their group, the extent of operational authority they might subsequently delegate to the wing commanders below them was debatable. For those groups that transferred operational control of their units to user commands, the operational role of the wing commander was problematic. Certainly when Air Command units were deployed on expeditionary operations, since the (home) base commander was outside the in-theatre operational chain of command, the role of the (home) base commander in the command and control of deployed units was unclear.

Superimposing a wing structure on existing base organizations also created a regionally-based wing structure, which did not align with the existing functionally-based group structure. The units comprising the newly created wings were merely those currently assigned to the base; hence, there was no functional consistency to the wing organization. Although each wing was nominally assigned to a functional air group, the individual units assigned to a particular wing might well belong to different groups. For example, a CF18 squadron belonging to Fighter Group, but based at a Maritime Air Group base and hence part of

that wing (e.g., 19 Wing Comox), would seemingly be operationally responsible to the Commander MAG, while operational taskings would emanate from NORAD/ Fighter Group HQ, and be directed only to the squadron.

The Air Command assertion that "the primary role of a base is to conduct air operations" is a simplistic conceptualization with limited application. Air operations are executed by operational air units (flying squadrons), which may or may not be carried out from a particular air base. The degree of base involvement with air operations is directly dependent on the functions being executed. For example, for tactical aviation (helicopter) units and shipborne maritime air detachments, bases in Canada are of little operational relevance. For other aerospace functions, including air transport and tactical air (fighter) operations, air bases can have significantly more relevance, but focussed primarily in the context of providing support and protection rather than command and control.

Not long after Air Command had reorganized according to the "wing" principle, another major reorganization effort was required based on a government mandated CF-wide reorganization.

Restructuring in 1997 – the MCCRT

In response to the recommendations of the Special Joint Committee on Canada's Defence Policy, the 1994 White Paper announced that a new streamlined CF command and control structure, based on sound military command and control principles, would be put into place by mid-1997, and that, to respond to the need to increase the proportion of operational personnel in the downsized CF, headquarters staff were to be reduced by "at least one third." Under this structure, the command of military operations would continue to be exercised by the Chief of the Defence Staff, normally through a designated operational commander, but one layer of headquarters was to be eliminated.[61]

To implement these directed changes, the Department of National Defence established a Management Command and Control Re-engineering Team (MCCRT). This team consisted of 110 personnel devoted to re-engineering activities in all major sectors of the Department. From 1995 to 1997 the MCCRT conducted an end-to-end review of management processes and organizations with a target of reducing the resources dedicated to headquarters (NDHQ) by 50 percent, well above the one third reduction mandated by government. The team ceased its 30-month effort in June 1997, when the remaining renewal responsibilities were transferred to the Vice Chief of the Defence Staff.[62]

As part of the MCCRT process, each of the CF commands was given responsibility for conducting companion reviews. The Air Force Command and Control Reengineering Team (AFCCRT) was therefore established, with a mandate to dramatically reduce resource levels associated with the headquarters function of the air force, from a baseline defined by the MCCRT in NDHQ. The objective was to replace the existing air force headquarters structures with a fully process re-engineered, operationally effective command and control structure, but with 50 percent fewer personnel. The foundation for this re-engineering project was the five "core processes" identified by the AFCCRT: strategic direction, force employment, force generation (personnel), force generation (materiel) and corporate services. These were based on, but not identical to, the four core processes developed and used by the MCCRT: strategic direction, force employment, force generation and corporate services. After a lengthy research and planning period, new air force strategic and operational level headquarters structures were developed, approved, and formally established in June 1997.[63]

In implementing the AFCCRT plan, Air Command Headquarters and the four group headquarters were disbanded and replaced by a streamlined command and control structure. This new structure consisted of an "operational-level"[64] headquarters in Winnipeg, 1 Canadian Air Division (abbreviated as 1 CAD at the time and now abbreviated as 1 Cdn Air Div) which incorporated Canadian NORAD

Region Headquarters and was formally designated 1 CAD/CANR HQ, and a "strategic-level" staff organization to support the newly created Chief of the Air Staff position. This new staff, harkening back to RCAF and RAF tradition, was called the Air Staff, and was to be embedded in the MCCRT-redesigned NDHQ structure in Ottawa. Although the Command Headquarters in Winnipeg was disbanded, Air Command continued to exist as a major constituent of the Canadian Forces under command of the Chief of the Air Staff. The former headquarters facility in Winnipeg, the Bishop Building, was used to accommodate the staff of the new 1 CAD/CANR HQ.

The Air Staff at NDHQ

Under this new structure, strategic-level direction and command of Air Command was vested in the Chief of the Air Staff, who was located in NDHQ and who had two distinct mandates: (1) to act as senior advisor to the Chief of the Defence Staff on air force issues; and (2) to be Commander of Air Command. The Chief of the Air Staff (LGen) heads the Air Staff which includes three general officers, an Assistant Chief of the Air Staff (MGen), a Director General Air Personnel (BGen) and a Director General Air Force Development (BGen). The rest of the Air Staff comprises 13 functional directorates, headed primarily by officers of colonel rank (or civilian equivalent), and includes:

- Air Public Affairs,
- Air Strategic Plans,
- Air Force Employment,
- Air Requirements,
- Air Comptrollership and Business Management,
- Air Personnel Production and Development,
- Air Programs,
- Air Staff Coordination,
- Air Staff Operational Research,
- Flight Safety,
- Air Personnel Management and Services,
- Air Civilian Management Services, and
- Air Reserves.

1 Canadian Air Division HQ

Under this new structure, the operational control of Air Command forces was delegated to the Commander of 1 Canadian Air Division headquartered in Winnipeg. Tactical control of air force units was delegated to the 13 wings, equivalent elements and units that comprise 1 Cdn Air Div. The Canadian NORAD Region Headquarters (CANR) was integrated into the headquarters in Winnipeg as the Commander of 1 Cdn Air Div (MGen) also commands the CANR and is supported by a Deputy Commander (NORAD Region – a BGen USAF). 1 Cdn Air Div HQ was organized according to the continental staff system, and includes seven main staff divisions, headed by officers of varying ranks:

- A1 - Personnel and Training (BGen),
- A2 - Intelligence (LCol),
- A3 - Operations (BGen),
- A4 - Support (BGen),
- A5 - Review and Corporate Services (Col),
- A6 - Telecom and Information Services (LCol), and
- A7 - Plans and Doctrine (Col).

Wing Headquarters

Part of the AFCCRT mandate was to determine if, in developing the new command and control structure, disconnects with the wings had been introduced. It was also tasked to determine the most effective means for the new structure to interface with the wings and ensure optimum generation of mission ready

air forces. One proposed initiative in this regard was to create "A-staffs," based on the original 1 CAD HQ model, at each of the wings to ensure consistent points of entry for operations-related activities. The AFCCRT team was dismantled before this initiative was completed, and most wings continued to function with the four-branch organization introduced with the 1993 "wing" reorganization.

A Critique of the AFCCRT

Considerable effort was expended by AFCCRT in studying and re-engineering the air force command and control structure; however, the result has a number of organizational inconsistencies. For example, AFCCRT identified five "core processes" as the foundation of the re-engineering effort, but the correlation between these and the command and control structure produced by AFCCRT is not readily apparent. If the five AFCCRT processes were indeed "core" to the air force's day-to-day operation, then the organizational precept of "departmentalization" would dictate that these processes should form the basis of the air force command and control organization. In effect, there should be five principal branches in the headquarters, each responsible for overseeing one of the "core" processes, i.e., Director Strategic Direction, Director Force Employment, etc.

Yet this approach was not taken, and neither the 1 CAD HQ "A-staff" structure nor the NDHQ/Chief of the Air Staff (CAS) organization was aligned with the five AFCCRT core processes. (It should be noted that Air Command was not alone in this practice, as NDHQ did not reorganize around the "core" MCCRT processes either.) While the Air Staff structure in Ottawa includes some AFCCRT terminology, the organizational model is not directly derived from its core processes. The new 1 Cdn Air Div HQ organization, on the other hand, seems to be essentially a "slimmed-down" version of the former Air Command HQ structure, overlaid with a modified version of an air force "continental" staff system,[65] employing "A-staff" designations (A1, A2, etc.), which were not part of the AFCCRT project.

Most surprising in this reorganization process is the absence of any evidence of the application of the air force dictum of "centralized control and decentralized execution" in the design of the new command and control structure. This was deemed to be the overriding consideration in the design of the original Air Command / group structure in 1975, but it seems to have been ignored in the AFCCRT redesigned structure. There is also no evidence of any distinction between the operational and administrative chains of command in this new structure. In the original Air Command structure, the group headquarters were only in the operational chain of command; however, in the AFCCRT version of this structure 1 Cdn Air Div HQ is effectively in both. Since Air Command and its subordinate formation 1 Cdn Air Div are essentially the same organization, a natural division of responsibility and authority between their commanders is not readily apparent. Although the terms "strategic" and "operational" are used to describe the mandates of the two headquarters, it is unclear whether 1 Cdn Air Div HQ is intended to be an "operational-level" headquarters or whether it is an "operational" headquarters in the sense of a headquarters that directs the conduct of operations.[66]

Furthermore, while the former Air Command structure reflected the importance of the major operational air force functions, as embodied in the functional group headquarters structures, the AFCCRT-designed headquarters almost totally ignores them. The operational functions (air transport, SAR, etc.) are the primary "outputs" of the air force, and, therefore authority and responsibility for their provision should be readily identified at all levels of the Air Command organization. Within the Air Staff, however, there is no identifiable staff accountability for any of the air functions, while within 1 Cdn Air Div HQ, only the A3 Ops Readiness division has discrete sections dedicated to each of the air functions. In the absence of formal organizational structures focussed on functional capabilities, the Air Force has instituted two ad hoc constructs to

mitigate this omission: the Air Force Capability Framework (AFCF) and Capability Advisory Groups (CAGs).[67]

The Air Force Capability Framework

At the same time as the Air Force dismantled its functionally-based group structure, it introduced the Air Force Capability Framework.[68] First promulgated in the Air Command 1996-2001 Business Plan, this was primarily a construct to explain how the Air Force would structure and prepare itself for the delivery of air power. It was designed to capture the entire spectrum of Air Force operational and support activities and outputs. The AFCF also provided the framework for producing all air force business plans, and formed the output base line for activity-based costing and resource management across the air force. As such, the AFCF was the single most important element of the business planning and resource management methodology in the air force.[69]

The AFCF was comprised of six operational capabilities, AFs 1-6, and three support capabilities, SCs 1-3. The six operational capabilities were:[70]

- **AF 1 - Aerospace Control**. Provide national aerospace surveillance, enforcement, offensive air capabilities, air-to-air refuelling, and management, which contribute to the collective defence arrangements of Canada, North America and CF operations worldwide.
- **AF 2 - Air Support to Maritime Component.** Provide air support to the maritime component for the enforcement of Canada's sovereignty over its maritime approaches, for the collective maritime defence of North America and for CF operations worldwide.
- **AF 3 - Air Support to Land Component.** Provide air support to the land component for the enforcement of Canada's territorial sovereignty, the collective land defence of North America and for CF operations worldwide.
- **AF 4 - Air Mobility**. Provide routine, and when directed surge, air transport services in support of CF operations at home and worldwide.
- **AF 5 - Support to National Interests.** Provide on-demand search, rescue, emergency and utility airlift, jurisdictional, and air support services in concert with other government agencies and in support of the national well-being and interests within Canada and internationally as required.
- **AF 6 - Contingency Support.** Provide specialized air wing support services for the collective defence of North America and for CF operations worldwide.

The three support capabilities were:

- **SC 1 - Command and Control**. Operate a command structure which can manage and control all allocated and assigned formations, units and other elements in the execution of their respective missions alone or as part of a joint headquarters formation, and can participate in collective defence arrangements of North America or CF operations worldwide.
- **SC 2 - Force Generation**. Operate a personnel training, infrastructure, and equipment generation capability that yields a capable fighting force employing assigned resources in the execution of their mission elements in the defence of Canada's territorial sovereignty, the collective defence of North America and for CF operations worldwide.
- **SC 3 - Mandated Programs**. Execute a variety of cross-capability, long-term activities and short-term initiatives over the planning period as directed by the Government, NDHQ or as initiated by Air Command.

The AFCF was first developed in 1995, at approximately the same time as the AFCCRT was first established, and yet it appears that its use was restricted to the business planning process. There is no indication that the AFCF was in any way incorporated into the AFCCRT planning deliberations or any evidence that

it influenced the final design of the new Air Command Headquarters structure. Although there may be some debate on the specific terminology associated with some of the capabilities included in the AFCF, the construct of operational and support "capabilities" presented in the AFCF appears far more relevant to establishing an appropriate command and control structure for the air force than do the "core processes" identified by the AFCCRT.

Capability Advisory Groups

With the dissolution of the group structure in 1997, an informal approach to the governance of the Air Force's functional communities evolved in the form of a number of ad hoc, community/capability-based advisory groups. In line with the formalization of the governance structure at the Air Staff level, the development of authoritative terms of reference for these Capability Advisory Groups (CAGs) was undertaken at 1 Cdn Air Div HQ to formalize their activity, and to ensure that appropriate linkages and communication existed between all levels of command and control.[71]

As mandated by 1 Cdn Air Div Orders, the following eight CAGs were established:

- **Fighter Capability Advisory Group (FCAG)** – Related to the conduct and sustainment of fighter operations.
- **Maritime Air Advisory Group (MAAG)** – Related to the conduct and sustainment of long-range patrol and maritime helicopter operations.
- **Air Mobility Advisory Group (AMAG)** – Related to the conduct and sustainment of transport and search and rescue operations.
- **Tactical Aviation Advisory Group (TAvnAG)** – Related to the conduct and sustainment of tactical aviation operations.
- **Aerospace Control Advisory Group (ACAG)** – Related to the conduct and sustainment of aerospace control operations (to include space operations).
- **Training Advisory Group (TrgAG)** – Related to the conduct and delivery of training and development activities not forming part of other air force capabilities.
- **Air Reserve Advisory Group (ARAG)** – Related to Reserve issues not forming part of other air force capabilities.
- **Air Combat Support Advisory Group (ACSAG)** – Related to the provision of security, medical, airfield engineering and logistics support, and command, control and communications operations. Note: In 2003 the A3, 1 Cdn Air Division directed that the term Support Capability Advisory Group (Sp CAG) be used instead of ACSAG.[72]

The mandate of the CAGs at the time was to provide a recognized mechanism for community/capability-based leadership consultation and decision making, and to enhance the promulgation of direction in support of the Commander 1 Cdn Air Div. The CAGs supplemented and complemented existing staffing and associated processes by enabling focussed discussion and decision making by subject matter experts in each of the capability areas. The CAGs had, and still have, three main areas of interest: personnel, capability issues and directed issues.

It is noteworthy that, with the exception of the Sp CAG, this listing of CAGs replicates the former functional group structure and closely resembles the capabilities described in the AFCF. This suggests that there is an inherent "functional" bias in the day to day functioning of the Air Force, which is not reflected in the AFCCRT-developed headquarters structure. Therefore, in the absence of an effective functional organizational structure, matrix organizations and frameworks have been developed to advance functional issues within the headquarters.

Systemic Problems with Air Force Re-organization and Transformation

Throughout the 30 years covered by this section, there have been systemic problems that have impeded Air Force re-organization and transformation efforts. First of all, despite a series of strategic planning and change initiatives over the past 20 years, the Air Force has been unable to bring any of them to fruition in a coherent and effective way.[73] Rather, change, as we have seen, was ad hoc and in reaction to various pressures.

Many of these ad hoc change processes were symptomatic to the CF as a whole in this period. As General Ray Henault (a former Assistance Chief of the Air Staff, Deputy Chief of the Defence Staff and Chief of the Defence Staff) observed, the CF did not have a responsive lessons learned capability in the 1990s and this hampered the ability of the CF to improve its organization, doctrine and procedures.[74] This problem was also identified in 2004 by students at the Canadian Forces College when they were attempting to research recent Canadian Air Force operations. They found that information was hard to come by and that "[l]essons learned reports concerning operational level issues are clearly lacking."[75]

Furthermore, during the post-Cold War period, the CF C2 structure evolved at a rapid pace while that structure was overseeing ongoing high intensity operations. To add to these challenges, change was carried out in lean times for the CF as budget cuts in previous years had reduced CF capabilities, and no budget increases were planned to fund the many new operations that the government committed the CF to undertake in the post-Cold War world. General Henault described the CF change efforts in this era like "changing the tires on a moving car."[76]

The Canadian Air Force was at a particular disadvantage compared to the Army and the Navy in this era because, as Leversedge has argued, the Air Force's strategic planning process "has suffered from a chronic shortage of both resources and procedural rigour [and]…The current NDHQ construct and internal division of responsibilities creates further problems, which compound the existing Air Force process difficulties."[77] Throughout the period covered by this section, the Air Force was further handicapped because it was incapable of producing any meaningful doctrine to address the challenges it faced. In one notable effort to address the doctrinal problem, the Commander of Air Command, Lieutenant General Paul Manson, convened an Air Doctrine Symposium at Canadian Forces Base Trenton in January 1984. However, it achieved very little of a concrete nature, and the Chief of the Defence Staff, attending as an air force officer, criticized the participants' use of self-serving arguments for specific doctrine to justify new equipment acquisitions rather than deal with the Air Force's fundamental problems.[78] Up until 2005 with the creation of the Canadian Forces Aerospace Warfare Centre, the Air Force has relied on ad hoc methods and temporary working groups "to review and resolve doctrinal issues," with little success.[79] Finally, Leversedge notes that the most recent Air Force transformation efforts are handicapped by flaws both in the content and in the process used to create the latest transformation document, *Strategic Vectors*.[80]

While the Air Force was re-structuring itself in the post-Cold War era, largely in response to budgetary pressures and government policy directives, the nature of CF and Air Force operations was changing. For a number of reasons, not the least of which were the lack of an effective Air Force (and CF) lessons learned process and a rigorous doctrine development process, the magnitude of the change in the nature of operations was not obvious to those doing the re-structuring. Nevertheless, the changes occurred, and it is important to understand them because current CF transformation initiatives are predicated on the reality of CF and Air Force operations in the current "new world disorder."

The Air Reserve and the Total Force Concept

Throughout the period described above, the Air Reserve played a vital role as part of the CF air element and later the Canadian Air Force. From the 1970s on, the command and control of the Air Reserve underwent a number of significant changes as a result of the introduction of the "Total Force Concept." It was formally instituted by the Minister of National Defence in March 1974. National Defence Headquarters subsequently promulgated Directive D29, which included direction on the expansion of the Air Reserve including "twinning" of squadrons, the introduction of new aircraft, the formation of a new Air Reserve squadron, the creation of Air Reserve Augmentation Flights and changes to the command and control of the Air Reserve.[81] The Total Force concept recognizes that Canada's total military capability comprises both the full-time Regular military plus the part-time Reserves. The Total Force concept does not in itself justify a role or roles for any particular defence component,[82] but it does recognize that all components, whatever their structure or size, must be considered when developing defence capabilities.

Under the "twinning" concept, Air Reserve units were paired with Regular Force units, primarily to give them access to the equipment of Regular Force units. This pairing enhanced the Air Reserve's ability to augment Regular Force units and eliminated the need to purchase additional equipment for the Reserves.

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In Edmonton 418 Squadron shared Twin Otters with 440 Squadron and in Winnipeg 402 Squadron was twinned with the Air Navigation School flying the C47 Dakota. In May 1975, 420 Squadron was resurrected at Shearwater, subsequently moving to Summerside to share 880 Squadron's Trackers for coastal patrol duties. Another Total Force concept, the Air Reserve Augmentation Flight, was initiated in Moose Jaw in 1975 and then expanded to all Air Command bases.[83]

When Air Command was first established, control of the Air Reserve was exercised directly from Air Command Headquarters, through the office of the Deputy Chief of Staff Reserves and Cadets. In recognition of the increased emphasis on Reserves in the Total Force structure of Air Command, as described above, an Air Reserve Group was created in 1976, with headquarters at Winnipeg. Air Reserve Group Headquarters exercised administrative control of some 950 Air Reserve personnel; however, operational control of units was vested in the commanders of operational air groups to which Reserve squadrons were assigned.

To further enhance the operational capability of the Air Reserve, Air Command retired the venerable Otter aircraft, flown by a number of Reserve squadrons, in 1981 and introduced the Kiowa helicopter into the Reserve squadrons of 1 Wing in Montreal and 2 Wing in Toronto. After the retirement of the Otter, the two wings operated equipment compatible with the Regular Force squadrons, and gained an operationally active role in support of Canada's ground forces. On the support side, Nos. 1 and 2 Tactical Aviation Support Squadrons (TASS) were formed in 1987. These squadrons were composed of one third Regular and two thirds

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Reserve Force personnel. Their role was to provide aircraft maintenance and logistical support to the squadrons of 1 and 2 Wings; however, they also provided similar services to Regular Force units

and to various operations in Canada and Germany.

The new Canadian Defence policy promulgated in 1987 continued to emphasize the Total Force concept, with the Reserve viewed as part of the solution in closing the "commitments-capabilities gap" identified in the White Paper. At the time of the 1987 Defence Policy, the establishment of the Air Force comprised 23,050 Regular Force positions and 950 Reserve positions. In an effort to increase operational capability, while limiting the increase in personnel costs, most of the growth planned to redress the commitments-capabilities gap was planned to occur in the Reserves. However, with the post-Cold War changes to defence priorities, personnel reductions were seen as desirable and possible as a result of the "peace-dividend" and plans for growth were shelved.

In response to the 1994 White Paper, the Commander of Air Command sought to strengthen the Reserve contribution to the Total Force Air Force, and directed his staff to plan to increase the Air Reserve to 3,000 personnel by FY 1999/2000. As part of the increased emphasis on Total Force, the Commander also directed that Air Reserve and Regular Force personnel be fully integrated into Total Force units and that there be a single chain of command. This was to be accomplished through amalgamation of the Air Reserve Group Headquarters into the Air Command Headquarters and by converting "all Air Command units to Total Force units with regular and reserve personnel serving together in integrated establishments."[84]

In implementing this direction, three Reserve flying squadrons (Nos. 401, 411 and 418) were disbanded between 1994 and 1996, while No. 420 was "zero-manned" (remaining on the establishment but with no personnel or aircraft assigned to it). In 1996, Nos. 1 and 2 TASS and No. 2 Wing were also disbanded and 1 Wing was restructured as a Total Force wing. Of the six helicopter squadrons belonging to 1 Wing, two (Nos. 400 and 438) were designated "reserve heavy," and all squadrons received new Griffon helicopters to support army operations. Air Reserve Group Headquarters was disbanded in 1996 and control of the Air Reserve returned to Air Command Headquarters, with responsibility subsequently divided between the Air Staff in Ottawa and 1 Cdn Air Div HQ in Winnipeg.

By 1997 it had become evident that the development of the integrated "Total Force" Air Command establishments had been started, but had not been completed or fully implemented. 1 Cdn Air Div HQ also expressed concern with the establishments in those units that had been created, noting that, "Air Reserve positions, especially within the Air Reserve Augmentation Flight (ARAF) context, have been informally regulated and in many instances are seen primarily as 'office overload.' Frequently positions are changed to suit the availability of certain individuals or skill sets, rather than to a defined role or mission." [85]

To correct this deficiency, the Headquarters directed that a comprehensive establishment review be undertaken and that appropriate Total Force establishments be created. The integrated establishments were to provide the basis for Air Reserve growth plans and for the development and authorization of an Air Reserve occupational structure. The review was to be conducted by individual units and integrated across the Air Force, employing a bottom-up approach. The Chief of the Air Staff approved the Air Reserve establishment review in 1998, noting that the bottom-up development of the establishment was an important first step, but that it would be subject to Air Staff review as the overall strategic direction for the Air Force evolved.

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The mission and roles of the Air Reserves have been studied several times since 1995. These studies have formulated and validated numerous principles for the employment of Air Reservists and provided a number of recommendations for the optimal integration of the Air

Reserve into the Total Force structure. However, these recommendations have not been formally validated against the evolving Aerospace Capability Framework, nor have Total Force establishments been created within a comprehensive development plan. To address these issues, the Air Reserve Development Project was chartered in April 2002 to identify a force structure that would optimize the contribution of the Air Reserve within the Total Force structure of Air Command. This project is ongoing and it recognizes that the conduct of expeditionary operations must be an essential element of any Total Force structure.

Summary

Air Command was formed in 1975 with the objective of bringing all CF air element resources under a single commander to address the problem of the disjointed command and control of the CF air element, as well as the lack of a central focus for all air operations and doctrine. The organizing principle originally adopted by Air Command was similar to the one used by the RCAF and many other air forces and was based on a command structure organized by air force functions, (e.g., air defence, air transport, maritime air, etc.). Therefore, the new Command adopted an organizational structure comprised of a command headquarters, with subordinate functional air groups. This structure minimized headquarters resources, and facilitated the transfer of operational control of group forces to user commands. The major anomaly in this command structure was the base commander position which was designed to oversee administrative support to Air Force units at main operating bases, but was not consistent with the principle of functionality and was outside the operational chain of command.

From 1975 to 1989 Air Command enjoyed a period of relative stability, but change in the defence and security environment, beginning with détente and the end of the Cold War, necessitated a revised defence policy. Major reductions in Air Command's establishment, force structure and operating budget in the post-1990 timeframe, in anticipation of a post-Cold war "peace dividend," signalled an end to this stability. In an attempt to mitigate the impact of budgetary constraints and cuts in personnel and equipment due to the anticipated "peace dividend," Air Command undertook a number of reorganization initiatives. The first occurred in 1993, and centred on implementation of the "wing" concept throughout the Command. This was accomplished by superimposing a "wing" structure on all existing bases, and appointing (double-hatting) the base commander as wing commander as well. This reorganization established the base commander in the operational chain of command, but also introduced an additional level of command and control. The wing concept enhanced the control of resources at the static base, but provided little improvement in mounting and sustaining expeditionary operations.

In compliance with 1994 White Paper direction that headquarters be reduced by at least 33 percent, the MCCRT, which began in 1997, drove the most significant restructuring of the CF and the Air Force in the post-Cold War period. The AFCCRT, a team formed by the Air Force in response to the MCCRT, designed a "streamlined" command structure, which saw the disbandment of the four functional groups and the elimination of their headquarters, as well as Air Command Headquarters in Winnipeg. The new command structure was based on a strategic-level Air Staff component in NDHQ (with the Chief of the Air Staff [CAS] appointed Commander Air Command) and an operational-level headquarters – 1 Cdn Air Div Headquarters in Winnipeg. The wings and units were unaffected by this reorganization, but in the new headquarters construct there was little recognition of Air Force functions; therefore, compensatory capability frameworks and Capability Advisory Groups were established to address functional issues.

In the post-Cold War period, while the CF's resources (budget and its personnel strength) were cut by about 20 percent, the number of its personnel deployed on operations increased threefold. This organizational and personnel stress has had severe negative impacts on the CF in

general and the Air Force in particular. In the 1990s, when the CF was reduced by about 20 percent of its Regular Force military personnel, the Air Force was reduced by 48 percent. The cumulative effects of all these factors diminished the Air Force's capability to the point where it could no longer maintain the current tempo of operations let alone sustain the long-term health of the force.

During the almost 40 years covered by this chapter, there have been systemic problems that have impeded Air Force change efforts resulting in ad hoc responses to change requirements. Many of these ad hoc change processes were symptomatic to the CF as a whole in this period, and included the lack of an effective lessons learned capability, reduced CF capabilities, and high operational tempo. The sum of these problems, plus chronic problems with the Air Force change process, has hindered the Air Force's ability to deal effectively with recent challenges. For example, post-Cold War Air Force organizational structures have shown little evidence of addressing command and control issues created by the increased emphasis on expeditionary operations or of implementing the new CF force employment concepts. However, Air Command recognized deficiencies in providing appropriate support forces to sustain expeditionary operations, and changes to the posture of air force support capabilities were initiated. These included the initial development of the Contingency Capability and subsequently the development of the Air Force Support Concept. But progress in this area has been hampered by the dearth of appropriate doctrine and by the absence of any policy guidance on expeditionary operations.

While the Air Force's current (it was released in 2004) vision document, *Strategic Vectors*, identifies expeditionary capability as one of the components of its transformation goals, the strategy and the detailed plan for achieving this "expeditionary" vision have yet to be provided. This has led to a situation where a significant number of Air Force personnel who had been involved in recent expeditionary operations perceived that there was a lack of effective leadership in some parts of the Air Force.

Throughout the period described in this chapter, the lack of coherent Air Force doctrine above the tactical level, particularly doctrine related to command and control, has led to a series of ad hoc, expedient changes to the structure of Canada's air forces. In this era, without any overarching model of command and control, a detailed understanding of historical models of air force command and control, or the ability to consistently apply modern theories of command and control, the Canadian Air Force was burdened with disjointed, often dysfunctional, C2 arrangements whose legacy continues to plague the Canadian Air Force to this day.

Endnotes

1 This chapter is based on English and Westrop, *Canadian Air Force Leadership and Command*, Chapters 2-4.

2 A description of the relationship of major leadership functions to levels of conflict and command can be found in *Leadership in the CF*, 11-12.

3 W.A.B. Douglas, *The Creation of a National Air Force*, 372.

4 C.P. Stacey, *A Date with History*. Ottawa: Deneau, (1982), 257.

5 These issues are discussed in more detail in Major Anne Loesch, et al., "The Development of Air Force Operational Commanders," in Douglas L. Erlandson and Allan English, eds., *Air Force Command and Control* (Toronto: Canadian Forces College, 2002), 40-1.

6 English and Westrop, Canadian Air Force Leadership and Command, 24-30.

7 As explained in the Introduction, the usage of the terms "leadership" and "command" here reflects the inter-relationships and interconnectedness of these terms, as explained in *Leadership in the CF*, 10.

8 Douglas L. Bland, *Canada's National Defence, Vol. 2 Defence Organization* (Kingston, ON: Queen's University School of Policy Studies, 1998), 74.

9 Canada, Department of National Defence (DND), *White Paper on Defence* (Ottawa: Queen's Printer, 1964), 5-21.

10 *White Paper on Defence*, 19.

11 Marc Milner, *Canada's Navy: The First Century* (Toronto: University. of Toronto Press, 1999), 236-7; citation from *White Paper on Defence*, 19.

12 *White Paper on Defence*, 21.

13 Samuel Kostenuk and John Griffin, *RCAF Squadrons and Aircraft 1924-1968* (Toronto: Stevens, Hakkert and Co., 1977), 148.

14 Bland, *Canada's National Defence*, Vol. 2, 116.

15 Bland, *Canada's National Defence*, Vol. 2, 93-8.

16 Canada, DND, *Queen's Regulations and Orders for the Canadian Forces, Volume 1*, 3.20 – 3.23. Available at http://www.admfincs.forces.gc.ca/qr_o/vol1/intro_e.asp.

17 Canada, DND, *Organization Concept for the Canadian Forces* (Ottawa: Canadian Forces Headquarters, 1967), 9-10.

18 Ibid., 11.

19 Ibid., 12.

20 These issues are described in detail in English and Westrop, *Canadian Air Force Leadership and Command*, 36-40.

21 S.L. James, "The Formation of Air Command: A Struggle for Survival," unpublished MA thesis, Royal Military College of Canada, Kingston, ON, 1989, 59.

22 Bland, *Canada's National Defence*, Vol. 2, 121.

23 John Grodzinski, "Force Mobile Command: The Early Years," *Army Doctrine and Training Bulletin 3*, no. 1 (Spring 2000), 1. Available at http://www.army.forces.gc.ca/CAJ/default_e.asp?view=more&issueID=19

24 Grodzinski, "Force Mobile Command," 2.

25 "Double-hatted" refers to the organizational practice whereby one individual fills two distinct but related positions in an organization. One is usually a senior staff position, the other a command appointment.

26 Grodzinski, "Force Mobile Command," 2.

27 See Gosselin, "Unification and the Strong Service Idea," in English, et al., eds., *The Operational Art: Canadian Perspectives – Context and Concepts*, 129-200, for a detailed discussion of how the strong service idea contributed to the "disintegration" of the CF.

28 Leo Pettipas, "Tactical Air Power and Canadian Naval Aviation, 1946-1962," in William March and Robert Thompson, eds. *The Evolution of Air Power in Canada*, Vol. 2. (Winnipeg, MB: Air Command History and Heritage, 1998),122.

29 Bland, *Canada's National Defence*, Vol. 2, 123.

30 James, "The Formation of Air Command," 33.

31 Bland, *Canada's National Defence*, Vol. 2, 125.

32 Ibid., 126.

33 Ibid., 127.

34 Ibid., 125.

35 Larry Milberry, *Sixty Years: The RCAF and CF Air Command, 1924-84* (Toronto: CANAV Books, 1984), 340.

36 DND, *Defence in the 70's* (Ottawa: Queen's Printer, 1971), 35.

37 Milberry, *Sixty Years*, 391.

38 Canada, Canadian Forces, Air Command, *Out of the Sun: Aerospace Doctrine for the Canadian Forces* (Winnipeg, Kelman and Associates, 1997), 35-6.

39 K.R. Pennie, "The Impact of Unification on the Air Force," in William March and Robert Thompson, eds. *The Evolution of Air Power in Canada*, Vol. 1 (Winnipeg, MB: Air Command History and Heritage), 1997, 108.

40 James, "The Formation of Air Command," 35.

41 Pennie, "The Impact of Unification on the Air Force," 108-109.

42 James, "The Formation of Air Command," 73.

43 Ibid., 80.

44 Ibid., 82.

45 Ibid., 101.

46 Canada, Department of National Defence (DND), "The National Defence family," http://www.forces.gc.ca/site/about/family_e.asp (accessed May 4, 2005).

47 In addition to Regular Force personnel cuts, the Air Force was cut so that it had 69 percent fewer civilian employees, 56 percent fewer aircraft and 59 percent fewer flying hours than in 1989. DND, *The Aerospace Capability Framework*, 45, available at http://www.airforce.forces.gc.ca/site/vision/acf_e.asp. (accessed October 17, 2007).

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49 LGen Ken Pennie, Chief of Air Staff, testimony before the Standing Senate Committee on National Security and Defence, Proceedings of the Standing Senate Committee on National Security and Defence Issue 11 - Evidence, 7 February 2005. Available at http://www.parl.gc.ca/38/1/parlbus/commbus/senate/Com-e/defe-e/11eva-e.htm?Language=E&Parl=38&Ses=1&comm_id=76 (accessed October 17, 2007).

50 Stephen Thorne, "Military money too little, too late: Money in federal budget likely not enough for overstretched military," *Halifax Herald* (25 April 2005) http://www.herald.ns.ca/stories/2005/04/25/fCanada112.raw.html (accessed April 26, 2005).

51 Figure from DND, *Defence Policy Statement* (19 April 2005) http://www.forces.gc.ca/site/reports/dps/pdf/dps_e.pdf , 7, (accessed May 1, 2005).

52 Milberry, *Sixty Years*, 392.

53 Milberry, *Sixty Years*, 392.

54 Annex A to "Air Command Organization," 1901-3 (SSO O&E) dated 25 March 1987.

55 Annex B to "Air Command Organization," 1901-3 (SSO O&E) dated 25 March 1987.

56 Canada, Air Command, "Commemorative Booklet – The Formation of Wings in Air Command," (Winnipeg: Air Command Headquarters, 1993), 1.

57 Canada, Air Command, "Master Implementation Plan for the Wing Concept," (Winnipeg: Air Command Headquarters, 1993), p. 1-1.

58 Ibid., p. 1-2.

59 Ibid., p. 2-1.

60 In discussing the proposed change, the Commander, LGen David Huddleston stated that: "I view the change as critical to the revitalization of the air force's self image." David Huddleston, "Canada's Air Force – Moving Ahead" (Winnipeg: Air Command Headquarters, 1992), 5.

61 DND, *1994 White Paper on Defence* (Ottawa: DND, 1994), Chapter 7.

62 Canada, *Report of the Auditor General* (Ottawa, December 2000), para 32.46. For a more detailed analysis of the MCCRT see G.E. Sharpe and Allan English, *Principles for Change in the Post-Cold War Command and Control of the Canadian Forces*, 11-17.

63 Canada, Air Command, "Flight Plan 97 - Executive Summary" (Winnipeg: Air Command Headquarters, 1997), 3.

64 Whether or not 1 Canadian Air Division is actually an operational-level headquarters is open to debate. See Allan English, "The Operational Art," in English, et al., eds., *The Operational Art - Canadian Perspectives: Context and Concepts*, 6-7 for a discussion of this issue.

65 The continental staff system is organized into six principal functions: Personnel (G-1), Intelligence (G-2), Operations (G-3), Logistics (G-4), Plans (G-5) and Communications (G-6). DND, *Canadian Forces Doctrine Development*, A-AE-025-000/FP-001 (Ottawa: NDHQ, J7 DLLS 2, 2003), p.1-13.

66 For a discussion of differences in the use of the word "operational" in this context see English, "The Operational Art," 6-7.

67 CAGs are also referred to as to as "Air Warfare Communities."

68 The AFCF is also referred to as the "Air Force Capability Structure" in some publications.

69 "Air Force Level 1 Business Plan 2001" (Ottawa: Chief of the Air Staff, 2001), Annex A.

70 As originally promulgated in the "Air Command 1996-2001 Business Plan" (Winnipeg: Air Command Headquarters, April 1996), 3. Descriptions have been modified over time.

71 DND, *1 Canadian Air Division Orders*, Vol. 1, "Capability Advisory Groups – Terms of Reference," p. 1-624.

72 Source for the note is a communication from LCol Marty Playford to Col John Westrop (Retired), September 2006.

73 T.F.J. Leversedge, "Transforming Canada's Air Force: Creating a Strategic Planning Process," in Allan D. English, ed., *Air Campaigns in the New World Order*, Silver Dart Canadian Aerospace Studies Series, Vol. 2 (Winnipeg: Centre for Defence and Security Studies, 2005), 130-1. BGen Leversedge wrote this essay when he was a student on the National Security Studies Course.

74 General R.R. Henault, Brigadier-General (retired) Joe Sharpe and Allan English, "Operational-Level Leadership and Command in the CF – General Henault and the DCDS Group at the Beginning of the 'New World Order,'" in Allan English, ed., *Leadership and Command and the Operational Art: Canadian Perspectives* (Kingston, ON: Canadian Defence Academy Press, in press). General Henault served in a number of important positions in NDHQ during this period including ACAS, DCDS, and CDS.

75 Rachel Lea Heide, "Canadian Air Operations in the New World Order," in Allan D. English, ed., *Air Campaigns in the New World Order*, Silver Dart Canadian Aerospace Studies Series, Vol. 2 (Winnipeg: Centre for Defence and Security Studies, 2005), 79.

76 Allan English and Joe Sharpe, "Lessons Learned from the Perspective of a Chief of the Defence Staff," *Bravo Defence* vol. 5 (Summer 2005), 13. Available at http://www.vcds.forces.gc.ca/dgsp/pubs/bravo/summer05/lessonslearned_e.asp.

77 Leversedge, "Transforming Canada's Air Force," 148.

78 General G.C.E. Thériault, (the Chief of the Defence Staff at the time) cited in "Air Doctrine Symposium: Minutes of the Discussion Period," 1180-3 (SSO C&D) dated 22 February 1984, in Air Doctrine Symposium Summary of Proceedings, copy at CFC Library, 3.

79 Aerospace Doctrine Board: Terms of Reference and SOPs, copy at CFC Library, 1-2, 2-1; and Westrop, "Aerospace Doctrine Study."

80 Leversedge, "Transforming Canada's Air Force," 148-9.

81 DND, Director Air Reserve, "Air Reserve Development Strategy" (draft dated 16 Sep 2004), 10.

82 The components of the Canadian Forces are: (a) the Regular Force; (b) Reserve Force; and (c) when established, the Special Force. DND, *Queen's Regulations and Orders for the Canadian Forces, Volume 1*, art 2.0,1 available at: http://www.admfincs.forces.gc.ca/qr_o/vol1/intro_e.asp (accessed December 1, 2006).

83 DND, Air Reserve History, Post-Integration, http://www.airforce.forces.ca/air_reserve/history/post_integration_e.asp (accessed November 26, 2005).

84 DND, "Air Reserve Development Strategy," 11.

85 Ibid., 12.

Current Canadian Aerospace Command and Control Arrangements- Context and Issues

Chapter 4

Introduction

In today's military operations, a vital element of air power is an effective and efficient command and control capability. The aim of this chapter is to provide the context to understand current Canadian aerospace command and control arrangements and to discuss key issues related to these arrangements. These key issues include (1) the importance of the principle

of "unity of command" in aerospace operations; (2) the need to incorporate new C2 concepts into CF and aerospace doctrine; and (3) the desirability of basing changes to Canadian aerospace command and control organizations on comprehensive aerospace doctrine that reflects new concepts of command as well as the traditional principles of command.

The Canadian Forces' experiences of the 1990s and early 2000s, when resources were scarce and the air force was hard pressed to meet the requirements of the other Environments, left a legacy of distrust and a fear among some in the Canadian Army and Navy that air assets would not be available when they were required. Many of the officers in senior leadership positions within the Army and Navy today were gaining their front line operational experience during that era, and some of the attitudes they bring to the table during ongoing transformation activities are based on those experiences. Dealing with these attitudes is one of the more significant challenges faced by the leaders of today's Air Force in a transforming CF.

Air forces have faced similar challenges in the past and dealt with them with varying degrees of success. A key tenet from historical experience for the effective command and control of high value-low density assets like aircraft is that their command and control must be centralized under the principle of "unity of command."1 However, even today, this principle is not well understood in some quarters of the CF. For example, the Commander of 1 Canadian Air Division in a recent interview commented that the attitude of the leadership of the Army and the Navy was that the air force approach to command and control was "self-serving" and the air force was not a team player.[2]

One could argue that Canada's Air Force is constantly going to face challenging operational missions, scarce resources, and criticism and pressure from the other Environments to decentralize the command of aerospace forces. The climate of restructuring that the Canadian Forces is experiencing under recent transformation initiatives has placed significant pressure on the senior leadership of the air force to defend many fundamental aerospace command and control principles. For example, the "unity of command" principle had to be actively defended during the first round of transformation negotiations.[3] While this principle has been accepted by air forces as fundamental doctrine, this doctrine is not always understood or accepted by officers from non-air force backgrounds. Furthermore, due to problems with Canadian Air Force Professional Military Education in the past decade, many Canadian Air Force officers are also not aware of this principle.[4]

Before Air Force leaders can begin to educate the rest of the Canadian Forces about Air Force command and control doctrine and establish the confidence essential for successful joint operations, they must first master the subject themselves. It is only then that they can begin to articulate it in such a manner that their counterparts in the other Environments will begin to understand and appreciate the complexity of aerospace operations and start to develop the trust that is necessary to ensure the success of joint and combined operations. It follows that a thorough understanding of what constitutes the effective exercise of C2 within the air force is a requisite competency for all air force personnel.

The challenge then for the leadership in the air community is to continue to provide competent, combat capable air forces to meet the nation's requirements

and to do so in a manner that will enhance the overall operational effectiveness of the CF, while maintaining the autonomy necessary to ensure the appropriate use of the available air assets. Two factors make this challenge more difficult: the traditional technological focus of air forces and the changing strategic environment.

People, not equipment. For many in the air force the terms command and control have referred primarily to communications as well as communications equipment and networks. As a technology-based organization this is not unusual approach, but it is certainly a limiting one. While technology is clearly an important element of controlling air operations, the command function is far more a reflection of the human element of command. The human dimension in command is becoming a recognized aspect as demonstrated by the increasing utilization of the Pigeau-McCann model of command and control, as we have seen.

Changing Strategic Environment. One factor that complicates a thorough understanding of the command and control structure for the Air Force as well as the Army and Navy, is the rapidly changing strategic environment within which the Canadian Forces operates. The current focus of the CF is on counter-insurgency operations in Afghanistan; however, that particular focus is not the only operational contingency for which the CF must be prepared.

A number of the accepted command and control practices that were developed over the many years that NATO command and control organization evolved have proven less flexible in the theatres of operations where NATO has actually deployed troops since the end of the Cold War. Likewise CF C2 arrangements are in a state of flux under the current transformation initiatives.[5]

Command and Control Definitions

Command and control is a fluid subject in the modern strategic environment, and air force leaders must be open to change and be prepared to show flexibility and adaptability as required. Nonetheless, the traditional principles of command (including command and control terms and relationships) are important and must be understood. Even as new concepts emerge, there are many circumstances where the traditional approach will still be necessary; however, understanding and applying the traditional terms should never obscure the need for change. In late 2006, the Commander of 1 Canadian Air Division commented on the restrictive nature of NATO C2 definitions and terminology, while at the same time recognizing that at the tactical level, understanding what is implied in the terms is extremely important:

> I understand command and control, OPCON, OPCOM, etc., but the problem is that we don't have purity in it. We have these caveats all the time and therefore we don't argue about operational command and control, we argue over the caveats. .... While you do that, you are missing doing something else, which is delivering effects to get the job done. ... At the tactical level you still have to make it clear who is in control. You don't want some battalion commander to move an entire squadron of Hercs to Comox just because he feels good about having it in his back pocket.[6]

So, while it is clearly important to identify the authorities and responsibilities inherent in the specific levels of command assigned, it serves no useful purpose to dwell on the technicalities of what authority is delegated and what responsibility is retained at the tactical level. The objective is to identify and allocate the aerospace assets required to accomplish the mission.

Traditional Principles of Command

The *Canadian Forces Aerospace Doctrine* manual states that "experience has revealed that there exists certain fundamental principles in the Command and Control of forces which are formally articulated as the Principles of Command."[7] The principles of command as detailed in the manual are:[8]

- **Unity of Command.** A single, clearly identified commander must be appointed for each operation. The commander has the authority to plan and direct operations and will be held responsible for an operation's success or failure.

- **Span of Control.** Every person has a limited capacity and therefore the assigned resources and activities must be such that one person can exercise effective command or control of the formation or unit.

- **Chain of Command.** The structure of the C2 process is hierarchical and must be respected. Bypassing the chain of command is justified only in the most exceptional circumstances.

- **Delegation of Authority.** Commanders must be clear when delegating all or part of their authority.

- **Freedom of Action.** Once the task or mission has been established and the necessary orders have been given, subordinate commanders must be permitted maximum freedom of action to take initiative and exercise their skills and knowledge of the local situation in the planning and conduct of the operation.

- **Continuity of Command.** A clear and well understood succession of command is essential.

Traditional Command and Control Relationships

The *Canadian Forces Aerospace Doctrine* manual also specifies the traditional command and control relationships that have been used widely within NATO and other national and multinational operations based on the terms full, operational and tactical. While there is clearly a movement towards utilizing the terms "supporting" and "supported" commander, as described below, the accepted terminology is still a key component of understanding what command and control authorities exist, and of assigning and delegating those authorities.

According to the *Canadian Forces Aerospace Doctrine* manual command and control relationships, illustrated in Table 4-1, can be described by the following terms:[9]

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

- **Operational Command** (OPCOM) is the authority granted to a commander to assign missions or tasks to subordinate commanders, to deploy units, to reassign forces and to retain or delegate operational control (OPCON) and/or tactical control (TACON) as necessary. It does not include responsibility for logistics or administration. A commander assigned OPCOM may delegate that authority. While OPCOM allows a commander to assign separate employment to components of assigned units, it cannot be used to disrupt the basic organization of a unit to the extent that the unit cannot readily be given a new task or be redeployed. A commander will normally

exercise OPCOM through commanders of subordinate components of a task force.

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

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

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

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

Table 4-1 – Traditional Command and Control Relationships[10]

New Command and Control Relationships

The traditional command and control definitions and terms are important to understand and they continue to be widely used today. However, traditional approaches to command and control, developed as they were for the more predictable and static command relationships of the Cold War, have not been able to address the more volatile C2 relationships in chaotic contemporary operations. The Commander of 1 Canadian Air Division raised this issue in late 2006 and he strongly suggested that more thought be given to the use of the "supporting" and "supported" commander concept.[11] Similarly, a Canadian Army commander, serving in a NATO command position in the International Security Assistance Force (ISAF) headquarters in Afghanistan, suggested that he was essentially using the "supporting" and "supported" commander concept.[12]

Supporting/Supported Command

Based on the experience of operations at the beginning of the 21st century, four terms have emerged in Western, and Canadian, military command and control doctrine: *supporting command* and *commander* as well as *supported command* and *commander*. Formally used by the Canadian Forces since late 2004, the terms are used to clearly identify primary responsibility for all aspects of a task, and are particularly relevant to operations under command of an assigned Task Force Commander (TFC).

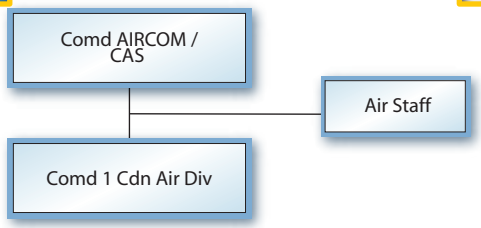

Figure 4-1 - Simplified Air Command Organization Chart

"Normally, the TFC will be a supported commander. A supporting commander provides the supported commander with forces or other support and develops a supporting plan."[13]

Due to the newness of these terms, various definitions of them are found in the military terminology of our principal coalition partners; however, accepted Canadian Department of National Defence definitions[14] are as follows:

- **Supported Command** – a command that receives forces or other support from another command and has primary responsibility for all aspects of a task assigned by the Chief of the Defence Staff;
- **Supported Commander** - a commander having primary responsibility for all aspects of a task assigned by a higher military authority and who received forces or other support from one or more supporting commanders;
- **Supporting Command** – a command that provides forces or other support to a supported command; and
- **Supporting Commander** – a commander who provides a supported commander with forces or other support and/or who develops a supporting plan.

The concept of supported/supporting command aligns with the Air Force doctrine of centralized control and decentralized execution. The command and control relationship described by supporting/supported command assists in all aspects of the operation, from pre-deployment planning through force employment and redeployment, for it clarifies from whom the commander's intent is drawn, (i.e., it will always be from the supported commander).

Canadian Aerospace Forces Command and Control Organization

This section discusses the Canadian Aerospace Forces C2 organizations down to the operational level, as of the fall of 2007.

Air Command Organization

As shown in Figure 4-1, the aerospace elements of the Canadian Forces are organized into a command known as Air Command (AIRCOM). The Chief of the Air Staff (CAS) is double-hatted as both CAS and the Commander of AIRCOM, with the powers of a commander of a command specified in the National Defence Act. Note that, as a result of recent CF transformation initiatives, the CAS is no longer involved in the operational planning process or force employment of aerospace forces in support of operations. These responsibilities have been assigned to the Canada Command (Canada COM) Combined Force Air Component Commander (CFACC). The role of AIRCOM[15] is to:

- provide air forces required for the conduct of air, surface, and subsurface operations;
- provide an air search and rescue capability; and
- provide support services to other services as ordered.

Chief of Air Staff Organization

Since it is no longer charged with force employment responsibilities, the Air Staff (shown in Figure 4-2 and under the CAS) is primarily focused upon institutional issues. The CAS is the principal source of expertise on the deployment, generation and employment of air power. In this regard, Director General Air Personnel (DG Air Pers) handles Air Force personnel issues, and Director General Air Force Development (DG Air FD) handles force development issues, primarily at the capability level. In addition, various specialist staff (such as Flight Safety) report directly to the CAS, through the Assistant Chief of the Air Staff (ACAS).

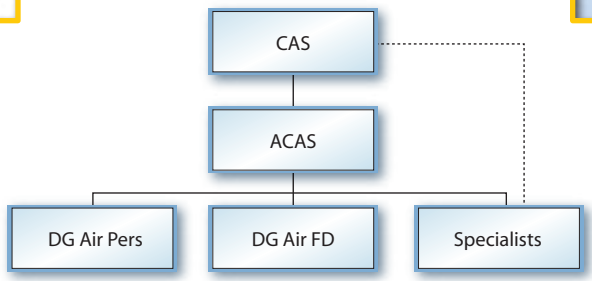

Figure 4-2 - Simplified Chief of the Air Staff Organization Chart

1 Canadian Air Division Headquarters Organization

The Comd 1 Cdn Air Div is also the Canada COM CFACC and the Commander Canadian NORAD Region (CANR). Most staff at the 1 Cdn Air Div HQ are also double- or triple-hatted. The Air Division Headquarters has been recently reorganized around three Deputy Commanders,

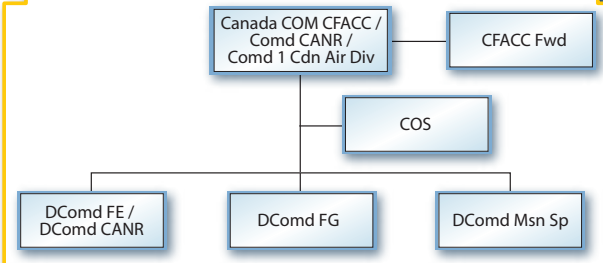

Figure 4-3 - Simplified 1 Canadian Air Division Organization Chart

each discharged with specific functions and each of whom understudy the commander and assume command when so appointed in the commander's absence. Key positions in 1 Canadian Air Division Headquarters, as illustrated in Figure 4-3, are described next. It is important to note that the Deputy Commander Force Employment (DComd FE) is also the Deputy Commander CANR and that both Deputy Commander Force Generation (DComd FG) and Deputy Commander Mission Support (DComd Msn Sp) have force generation responsibilities.

Canada Command Combined Force Air Component Commander. The Comd 1 Cdn Air Div is the CFACC for Canada COM. The Comd Canada COM has OPCOM, for force employment, of all aerospace forces (excluding those assigned to NORAD, Canadian Expeditionary Force Command [CEFCOM] and Canadian Special Operations Forces Command [CANSOFCOM]) and, in turn, has delegated OPCOM of these forces to the CFACC. The CFACC maintains situational awareness of aerospace force generation activities, force employment activities and asset availability for the Comd Canada COM.

Air assets assigned under OPCOM of Comd Canada COM for force employment include, but are not limited to:

- Immediate response aircraft (alert, standby aircraft) less NORAD and CANSOFCOM assigned aircraft.
- Aircraft tasked for routine domestic operations when assigned via an air tasking order (ATO).
- Aircraft and other aerospace assets[16] including base, wing, formation, or unit infrastructure, equipment, capabilities and personnel tasked in support of domestic or continental contingency operations when assigned by a strategic initiating directive, ATO, or warning/operation order.

Commander Canadian NORAD Region is responsible to provide aerospace surveillance, identification, control and warning for the defence of Canada and North America. Headquartered at 1 Cdn Air Div in Winnipeg, Manitoba, CANR executes a variety of tasks to defend Canadian airspace which include identifying and tracking all aircraft entering Canadian airspace; exercising operational command and control of all air defence forces in CANR; as well as operations in support of other government departments and agencies. 1 Cdn Air Div is responsible for providing CANR with combat-ready air forces to meet Canada's commitment to defend North America and maintain the sovereignty of North American airspace.

Commander 1 Canadian Air Division. The Comd 1 Cdn Air Div has OPCOM of all operational air assets and is responsible for force generation on behalf of the CAS. As the single operational-level air force headquarters in the CF, 1 Cdn Air Div has the responsibility for force generation to support Canada COM, CEFCOM and CANSOFCOM in pursuit of their mandates. The Comd 1 Cdn Air Div exercises command and control over a multitude of formations and units assigned to the Comd 1 Cdn Air Div / CANR in the following capacities:

- NORAD assigned assets in CANR;
- 1 Cdn Air Div assigned assets;
- Canada COM assigned air assets under OPCOM Comd Canada COM; and
- operational airworthiness authority for all CF air assets including the National Cadet Program air assets.

Deputy Commander Force Employment and Deputy Commander Canadian NORAD Region advises the Comd 1 Cdn Air Div on NORAD matters, leads all the force employment activities of CFACC/CANR including the combined air operations centre (CAOC).

Deputy Commander Force Generation is accountable to the Comd 1 Cdn Air Div for force generation functions, including air force training, intelligence, aerospace and force protection readiness, aviation, patrol and transport readiness and force structure.

Deputy Commander Mission Support is accountable to the Comd 1 Cdn Air Div for mission support functions, including personnel and Reserves, maintenance, Airfield Engineers, Logistics, and telecommunications and computer information services.

Chief of Staff (COS) ensures the effective and efficient staffing of all issues within 1 Cdn Air Div / CANR HQ – approximately 75% – 80% of those issues deal with force generation[17] – as well as those issues external to the HQ from outside entities such as CAS, Canada COM, CEFCOM, CANSOFCOM, Region Joint Task Forces (RJTF), wings and other CF elements requiring the Commander's and staff inputs.

Combined Force Air Component Commander Forward (CFACC Fwd) represents the CFACC's needs in Ottawa with the respective Commanders of Canada COM, CEFCOM and, as required, CANSOFCOM.

Summary

Historical experience has demonstrated that the most effective way to employ high value, low density resources like aerospace forces is through centralized command based on the principle of "unity of command." Unfortunately for the CF, this principle has sometimes been ignored, including during recent CF transformation efforts. In order to ensure that this key principle is understood and applied in practice, the Air Force must ensure that it is included in Air Force and CF professional military eductaion as well as in doctrine. This will be a challenge in today's changing strategic environment and with ongoing changes in the CF's command and control structure as a result of CF transformation efforts.

In this volatile strategic environment concepts of command and control are in a state of flux. While there is a need to understand the traditional principles of command (including command and control terms and relationships), there is also a requirement to adapt and modify them because of the complex and chaotic nature of contemporary operations. Concepts such as *supporting command* and *commander* as well as *supported command* and *commander*, as we have seen, are being increasingly used in recent operations. While these concepts are compatible with the Air Force doctrine of centralized control and decentralized execution, more work is required before they are clearly understood and reflected in CF and aerospace doctrine. Current Canadian Aerospace Forces command and control organizations, as described in this chapter, are constantly changing. The changes may be more effective if they were based on comprehensive aerospace C2 doctrine that reflects new concepts of command as well as the traditional principles of command.

Endnotes

1 This issue is discussed in DND, *Canadian Forces Aerospace Doctrine*, B-GA-400-000/FP-000, 50, and in more detail in English and Westrop, *Canadian Air Force Leadership and Command*, 112-14.

2 MGen Charlie Bouchard, Commander of 1 Canadian Air Division, interview by BGen Joe Sharpe (Retired), December 14, 2006.

3 Ibid.

4 Recent problems with Canadian Air Force PME are discussed in English and Westrop, *Canadian Air Force Leadership and Command*, 89-92.

5 MGen Charlie Bouchard, Commander of 1 Canadian Air Division, interview by BGen Joe Sharpe (Retired), December 14, 2006.

6 MGen Charlie Bouchard, Commander of 1 Canadian Air Division, interview by BGen Joe Sharpe (Retired), December 14, 2006.

7 DND, *Canadian Forces Aerospace Doctrine*, 50.

8 Ibid.

9 Ibid., 51-52.

10 Table from DND, *Canadian Forces Aerospace Doctrine*, B-GA-400-000/FP-000, 52.

11 MGen Charlie Bouchard, Commander of 1 Canadian Air Division, interview by BGen Joe Sharpe (Retired), December 14, 2006.

12 Discussion between BGen (retired) Joe Sharpe with BGen David Fraser, commander of the Multi-National Brigade (Regional Command South) in Afghanistan 28 February 2006 to November 2006, in April 2007.

13 *Canadian Forces Operations* (B-GJ-005-300/FP-000), dated 15 August 2005, p. 2-7.

14 Defence Terminology Bank, DND (Ottawa: Director General Information Management Policy, Standards and Architecture), http://terminology.mil.ca/term-eng.asp (accessed March 5, 2008).

15 Canadian Forces Organization Order - Message Text Format UNCLASSIFIED DGSP 9954 131413Z SEP 99

16 For air force assets and capabilities, other than aircraft, the CFACC shall identify to each Regional Joint Task Force Commander (RJTF Comd) those assets and capabilities that may be tasked directly by RJTF Comds, those that may be tasked on the approval of the appropriate tactical-level commander (normally the wing commander) and those that must be approved by CFACC.

17 MGen Charlie Bouchard, Commander of 1 Canadian Air Division, interview by BGen Joe Sharpe (Retired), December 14, 2006.

Principles of Command, Control, and Command and Control

Chapter 5

General

This chapter will enunciate principles that can assist military professionals in exercising command, in devising and implementing control structures that enable command, and in practicing command and control. These principles are based on the theory, history and context provided in the previous chapters.

Most traditional articulations of C2 principles only deal with principles that are applicable to control structures. However, the Pigeau-McCann theoretical framework tells us that we should articulate three categories of principles, (i.e., those for command, those for control, and those for C2). Therefore, this chapter will deal with all three categories of principles.

As noted in Chapter 4, new C2 concepts are needed to help the Air Force adapt to the challenges of current and future operations. This chapter provides some new C2 concepts that can be used to complement the traditional principles of command that are articulated in current CF aerospace doctrine.

Principles of Command

The principles of command, control, and command and control described below are based on the theories presented in Chapter 1 of this publication.

Command is defined in Chapter 1 as "*the creative expression of human will necessary to accomplish the mission.*" The function of command is "to invent novel solutions to mission problems, to provide conditions for starting, changing and terminating control, and to be the source of diligent purposefulness." In military organizations command is based on legitimate authority, and therefore, what Pigeau and McCann call ***effective command***, which is defined as "*the creative and purposeful exercise of legitimate authority to accomplish the mission legally, professionally and ethically.*"

From a practical perspective, to be effective, commanders should be within the balanced command envelope. Individuals with high levels of competency, authority and responsibility should ideally be placed in command positions requiring these attributes and people with lower levels of competency, authority and responsibility should be assigned correspondingly less demanding command positions. Each of the three command dimensions are summarized in turn.

Competency

From an organizational perspective, armed forces generally do a good job in ensuring that personnel with command potential have the necessary *physical* and *intellectual* competencies. However, armed forces are much less successful in ensuring that potential commanders have the required *emotional* and *interpersonal* competencies. In order to ensure that potential commanders have all four competencies in the degree required for a particular command position, organizations must ensure that the training, education and experience that individuals receive in their careers provide them with these competencies in the desired degree. Recently, due to the increased demands of contemporary operations, the CF has increased physical and educational requirements for its members, thereby addressing aspects of the *physical* and *intellectual* competencies. However, structured and coherent programs to address *emotional* and *interpersonal* competencies are lacking. Armed forces usually rely on a combination of education and experience to develop the four competencies in their personnel.

However, the balance between education and experience in this development has often been controversial. Historically, it

has been difficult for senior CF Air Force commanders to get high level command experience, as we have seen, both during the Second World War and after the disbandment of the functional air groups in 1997. Therefore, from a doctrinal point of view, when considering the organization, roles and functions of aerospace forces, the opportunity for command experience, especially at the senior officer level, should be an important consideration. However, experience is not a substitute for education, and, from a doctrinal perspective, career plans should take into consideration the need for higher levels of professional education as Air Force personnel progress to higher rank levels. Ideally, experience should be acquired in parallel with education so that personnel can benefit from both in developing their leader competencies.

Authority

The second dimension of command, authority, is the degree to which a commander is empowered to act, the scope of this power and the resources available for enacting their will. *Legal authority is the power to act as assigned by a formal agency outside the military, typically a government.* It explicitly gives commanders resources and personnel for accomplishing the mission. Legal authority, which is made explicit through legal documentation, in the case of Canada through the *National Defence Act* and the *Queen's Regulations and Orders*, is the one dimension of authority that armed forces understand well. While it is not always handled optimally, for example command relationships are sometimes poorly defined or the commander does not receive adequate resources or personnel to accomplish a mission, this dimension of command is frequently addressed in lessons learned or after action reports. *Personal authority*, on the other hand, *is that authority given informally to an individual by peers and subordinates.* Unlike legal authority, personal authority is held tacitly. It is earned over time through reputation, experience, strength of character and personal example. Personal authority cannot be formally designated, and it cannot be enshrined in rules and regulations. While individual commanders may be aware that they should do everything they can to increase their personal authority, there is little in the way of formal CF training or education that helps potential commanders optimize their personal authority.[1] Therefore, from a doctrinal point of view, air force professional development should include opportunities for personnel to acquire a thorough conceptual understanding of CF and Air Force leadership and command doctrine at progressively more sophisticated levels as they progress to higher rank levels.

Responsibility

The third dimension of command, responsibility, addresses the degree to which an individual accepts the legal and moral liability commensurate with command. There are two components to responsibility, one externally imposed, and the other internally generated. The first, called *extrinsic responsibility, involves the obligation for public accountability*. When a military commander is given legal authority, there is a formal expectation by superiors that they can be held accountable for resources assigned and decisions taken. Extrinsic responsibility taps a person's willingness to be held accountable for resources, and is generally handled through formal checks and balances. *Intrinsic responsibility*, the second component of responsibility, *is the degree of self-generated obligation that one feels towards the military mission*. It is a function of the resolve and motivation that an individual brings to a problem – the amount of ownership taken and the amount of commitment expressed. Intrinsic responsibility is associated with the concepts of honour, loyalty and duty, those timeless qualities linked to military ethos. Of all the components in the dimensions of command, intrinsic responsibility is the most fundamental. Without it, very little would be accomplished. Most commanders understand the need for intrinsic responsibility, but little in CF or Air Force professional development addresses the nature of intrinsic responsibility or how it can be fostered.[2] Therefore, from a doctrinal point of view, air force professional development should include not just opportunities

to examine the legal aspects of extrinsic responsibility, as is the case currently, but also opportunities to examine in detail the moral and psychological dimensions of intrinsic responsibility.

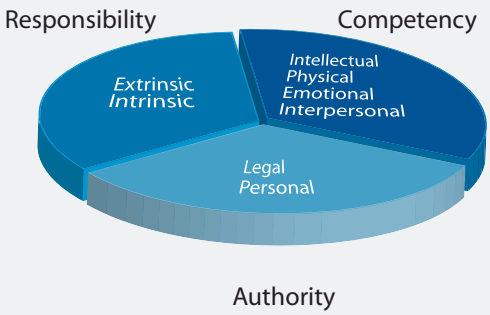

Figure 5-1 – A Balanced Command Situations

The Balance between Authority and Responsibility

Evaluations of command challenges have shown that one of the biggest problems with late 20th and early 21st century command in the CF is the imbalance between authority and responsibility.[3] A simplified illustration of a balanced command situation is shown in Figure 5-1.

An imbalance in the command situation can develop when a commander's legal authority is decreased, intentionally or unintentionally, without an appropriate decrease in responsibility. For example, when the authority to approve sick leave for a member is removed from the commanding officer and transferred to the medical organization, the commanding officer's authority is reduced, as illustrated in Figure 5-2 below. However, the commander remains fully responsible for the morale and welfare of the organization they command. Conversely, the medical organization, while assuming the authority to determine whether or not a member is granted sick leave, is not responsible for the unit's ability to field an effectively manned organization.

From a doctrinal perspective, therefore, all command arrangements should be carefully scrutinized to ensure that there is a balance between authority and responsibility. If an imbalance exists, steps should be taken to put these two dimensions of command back into balance. Practical steps to achieve balance might include increasing commanding officers' authority to match their responsibility or reducing the authority of central staffs so that they do not impinge on or take authority away from the commanders, who bear much of the responsibility for the effectiveness of their units and the success of the missions that they lead.

Mission Command

The CF leadership philosophy of mission command reflects the army approach to mission command, as we have seen in Chapter 1. While, in many circumstances, mission command is the preferred leadership style for CF commanders, this is not always the case. First of all, mission command may be practised differently by air forces and navies, as described in Chapter 2. Secondly, not all subordinates are capable of responding to a mission command philosophy, as described in Chapter 1. Finally, the 21st century security environment may mean that the 19th century philosophy of mission command is not necessarily the best command philosophy for today or the future, particularly at command levels above the tactical level. For example, Gosselin tells us that, in the new security environment, mission command has essentially "disappeared as a command philosophy in the CF."[4] Therefore, commanders of CF aerospace forces require flexibility in their approaches to command.

Flexibility in Approaches to Command

While it is almost always preferable to use command styles that tap into subordinates' initiative and that leave them the maximum flexibility, within commander's

intent, to complete a mission, there are circumstances, as we have seen, where more rigid approaches to command will be required. For example, when missions have enormous political consequences, such as the release of nuclear weapons or shooting down civilian aircraft, "command-by-direction" may be required. Furthermore, highly complex operations involving large numbers of aircraft may require detailed plans, which limit subordinates' initiative, to be executed effectively. Therefore, aerospace commanders should be able to exercise command using any of, or a combination of, "command-by-direction," "command-by-plan," or "command-by-influence" depending on the circumstances.

Due to the requirement for flexibility in approaches to command, Gosselin argues that the CF needs to create a "Canadian command framework developed for Canadian national requirements, using contemporary command principles, and with the management of risk as the key factor influencing the development of control structures and processes."[5] Doctrinal issues related to these control structures and processes will be discussed next.

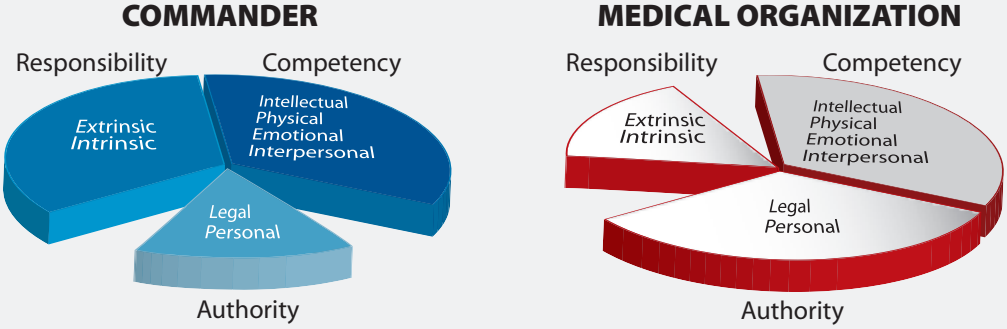

Figure 5-2 – Examples of Unbalanced Command Situations

Principles of Control

Control is defined here as "*those structures and processes devised by command to enable it and to manage risk*. The function of control is to enable the creative expression of will and to manage the mission problem in order to minimize the risk of not achieving a satisfactory solution."[6]

The concrete nature of structures and processes has led to them being the focus of most C2 doctrine to date. In fact most of the so-called "principles of C2" are no more than principles devised to help in the design of structures and processes for control.

First, from a doctrinal point of view, structures and processes should exist to support command. They should facilitate (or at least not hinder) the potential for creative acts of will. They should facilitate (or at least not hinder) the expression of competencies (physical, intellectual, emotional and interpersonal). They should clarify pathways for legal authority; they should encourage (not impede) the opportunity to establish personal authority. And finally, they should encourage the willing acceptance of responsibility while at the same time increasing motivation in military members. From an organizational perspective, any control system that forces its members off the balanced command

envelope will, over time, compromise organizational effectiveness.

The second criteria for guiding the application of control is whether it promotes the management of risk. Pigeau and McCann define risk as anything that jeopardizes the attainment of the mission. This includes uncertainties due to personnel (including the adversary), uncertainties in the environment (e.g., weather, terrain, etc), equipment failures, miscommunication, and the unbridled expression of creativity, since such expression may lead to chaos. Imposing an elaborate control structure and process is one way to reduce risk; however, this type of control would come at the expense of inhibiting command creativity – creativity that, inevitably, is needed for solving new problems.

A tension exists, therefore, between the two reasons for creating control: to facilitate creative command and to control command creativity. Getting the balance right is a perennial challenge for most organizations. Pigeau and McCann suggest that, as a general principle, militaries should give priority to facilitating creative command, and that mechanisms for controlling command creativity should then be used wisely and with restraint.

As stated at the beginning of this chapter, what *Canadian Forces Aerospace Doctrine* calls "Principles of Command," are, based on the analysis presented here, actually principles that largely are applicable to control structures.[7] The following additional principles of control have been derived from the historical experience and theories presented in the previous chapters. They should be respected when devising control processes and structures for aerospace forces.

- **Centralized Command Structures and Processes.** Aerospace forces are high value, low density resources; therefore, like all similar resources, command structures and processes should facilitate command at the highest practicable level. To ensure optimal effectiveness, aerospace forces should be grouped together and not dispersed among subordinate formations. The principle of centralized command structures and processes allows the effort of aerospace forces to be concentrated at the time and place where they will have the greatest effects.

- **Functional Grouping.** For force generation purposes, the most efficient way to organize aerospace forces is by functional group, (e.g., fighter, maritime patrol, air transport).

- **Adaptable C2 Organizations.** There is no "one size fits all" C2 organization. Therefore, C2 organizations should be designed to fit not only current circumstances, but they should also be capable of being adapted to fit changing circumstances. It should be noted that decentralized C2 organizations, while requiring more effort and resources to develop, are more adaptable. A detailed discussion of issues related to the adaptability of different types of command and control organizations is in Chapter 1.

- **Human Requirements of Command.** Historically, air forces have focussed on technology and the technical dimensions of command and neglected its human dimension. Too often they have acquired equipment without considering whether, as a control structure, the new equipment would facilitate command and help commanders manage risk. For example, with many new systems' specifications more bandwidth and higher data flows are assumed to be desirable; however, too much data, if not managed properly, might overwhelm a commander and degrade the commander's effectiveness. Therefore, when acquiring or modifying equipment, the human requirements of command should be pre-eminent and they should drive the technical specifications.

- **Unintended Consequences.** At the end of the 20th century and the beginning of the 21st century, the ad hoc methods used to create many CF C2 arrangements resulted in a number of unintended consequences that adversely affected the effectiveness of commanders. For example, the concentration of numerous control functions, like policy creation and policy

decisions, in central staffs created an imbalance between authority and responsibility and forced some unit COs off the BCE, through no fault of their own. Therefore, all control structures and processes should be examined for unintended consequences, particularly those caused by second and third order effects.[8]

Principles of C2

Command and control is defined here as *the establishment of common intent to achieve coordinated action*. In order to achieve coordinated action commanders must express their *intent*, which is the set of connotations associated with a specific aim or purpose. Correctly interpreting an aim, purpose or objective—that is, correctly inferring intent—is a fundamental concept in military thought. The smooth functioning of a military organization, particularly during operations, depends upon its members correctly inferring not only the commander's intent but also one another's intent, especially in unanticipated situations for which plans may not have been prepared.

Intent

Commander's intent consists of two components *explicit intent* and *implicit intent*. In the past military organizations have devoted a great deal of effort into communicating explicit intent through the use of orders, plans, doctrine, briefings, questions and backbriefs, which can be transmitted orally or in writing. But, as we have seen in Chapter 1, most intent is not published or vocalized, and is, therefore, implicit intent, which is derived from personal expectations, experience due to military training, tradition and ethos, and from deep cultural values. Implicit intent usually takes a long time to establish and is built up over months or even years of interaction, both formal and informal, between commanders and their subordinates.

From a doctrinal perspective, commanders should understand that the publicly communicated explicit intent forms only a very small part of commander's intent. Implicit intent forms the vast majority of commander's intent and it takes a great deal of time and effort to establish. In the CF, a great deal of effort is expended on training, education and the publication of written material that is intended to communicate the organization's expectations and traditions and to shape organization's ethos and subordinates' behaviours. Therefore, the "military expectations" portion of the intent pyramid is addressed formally by the CF. Commanders should also be cognizant of the fact that everything that they do, including their personal behaviour, will affect the "personal expectations" portion of the pyramid. Any incongruities in behaviour, for example "bending the rules," will have an effect on the creation of implicit intent. This is not to suggest that commanders should slavishly follow all rules because, as we have seen, no organization works entirely according to explicit rules and that a "work to rule" will stop most organizations from functioning effectively. However, commanders should explain carefully deviations from rules or interpretations of rules that could be misconstrued so that subordinates will understand their intent. The "cultural expectations" portion of the pyramid is probably the least understood part of the intent pyramid. Commanders can best be prepared to deal with the uncertainties of this aspect of implicit intent through education and self-development to gain a better understanding of factors like societal values, culture (to include national, group and military), and other factors that form the motivation for group behaviour. Acquiring this type of knowledge is particularly important when working with other militaries, other branches of the military, other government departments, non-governmental organizations and the many different groups one might encounter in coalition operations.

Common Intent

For the concept of intent to be useful—that is, for it to contribute to coordinated action—it must be shared between one or more individuals. Common intent consists of (1) the explicit intent that is shared between a commander and subordinates immediately prior to or during an operation, plus (2) the (much larger) operationally-relevant shared implicit intent that has been developed over the months, and even years, prior to the operation. The definition of C2 used here emphasizes the critical importance of establishing common intent among military members that is necessary for achieving coordinated action. In an ideal world, commanders would command groups where they could inculcate a large amount of implicit intent. These groups would then be able to operate with a minimum of explicit intent and would, consequently, be able to function smoothly during operations, especially in unanticipated situations for which plans may not have been prepared. However, as we have seen, there are many obstacles to achieving implicit intent, such as lack of time to work together and cultural differences. Therefore, the section that follows summarizes those issues that commanders should consider when determining how to balance explicit and implicit intent. Throughout this discussion, it should be kept in mind that the establishment of common intent in C2 is not an end in itself but a means to an end, (i.e., to coordinate action in military operations).

Balancing Explicit and Implicit Intent

The two most important mechanisms for sharing explicit and implicit intent are (1) dialogue for sharing explicit intent, and (2) socialization for sharing implicit intent, as we have seen. Both mechanisms have advantages and disadvantages, and commanders should carefully evaluate which mechanisms will work best in different circumstances.

Some of the factors that commanders should consider in their evaluation of the balance between explicit and implicit intent are:

- **Language** – the degree to which subordinates share a common language; the steps that can be taken to overcome language differences.
- **Training** – the degree to which subordinates have trained together; actions that can be taken to implement common training.
- **Doctrine** – the degree to which subordinates have common or similar doctrine; actions that can be taken to overcome doctrinal differences (e.g., assigning different roles to different subordinates or units based on doctrinal differences).
- **Military Systems** – the degree to which subordinates have common or similar military systems (including military experiences, equipment, procedures, etc); actions that can be taken to create shared experiences or harmonize differences (e.g., new procedures that take differences into account or considering equipment differences when assigning roles).
- **Culture** – the degree to which subordinates share cultural values, norms, practices; actions that can be taken to promote cultural understanding and tolerance of differences.
- **Subordinates' abilities** – the types of reasoning ability that exists among subordinates for making decisions when neither the time nor the opportunity is available to obtain advice from the commander; assign tasks based on reasoning ability so that subordinates with the highest reasoning ability are given the most complex tasks.
- **Subordinates' motivation and commitment** – the level of motivation and commitment to achieve mission objectives that exists among subordinates; actions that can be taken to

increase motivation and commitment to achieve mission objectives; assign tasks based on levels of motivation and commitment.

- **Command style** – the degree to which a particular command and/or leadership style facilitates the type of intent that is being inculcated at any particular time; commanders should understand the utility of command and/or leadership styles in given situations and have the flexibility to change style according to the circumstances.

- **Complexity and risks of the mission** – a complex mission, or one with high risks and with little margin of error, will require more explicit direction.

Once commanders have completed their evaluation, they should decide which factors are most critical to mission success and allocate resources (including time) accordingly.

Conclusion

The principles of command, control, and command and control presented in this chapter are not intended to be prescriptive or to be used mechanically like a checklist. These principles are intended to be used by commanders at all levels to help them better understand and analyze the challenges they face. The principles, and the theories described in Chapter 1, are also presented to give commanders a common vocabulary and common analytical framework to use when discussing issues in the domains of command, control, and command and control. This common basis is designed to facilitate the solution of problems in these domains.

For those who are sceptical that principles and theories can be useful in these domains, recall that Canadian military professionals are required to understand and eventually master "a sophisticated body of theoretical and practical knowledge and skills" that is the foundation of the profession of arms in this country.[9] Among the skills and theories in this body of knowledge are those related to the effective exercise of command.

It is recognized that the theories and principles of command, control, and command and control presented here are part of an emerging and rapidly developing field of expertise. However, the state of knowledge in this field has now reached a point where these theories and principles can be of practical benefit to practitioners of the profession of arms. Therefore, like the practitioners of other professions (such as medicine, engineering and law) whose professional practice continues to evolve and change based on new experience and theoretical knowledge, military professionals involved in the command and control of Canadian aerospace forces are encouraged to apply the theories and principles presented in this publication in their practice. Finally, military professionals are also encouraged to contribute to the improvement and evolution of these theories and principles so that future editions of this manual will be based on a growing body of knowledge shaped by both theory and practice.

Endnotes

1 See for example Allan English, "Survey of Current Leader Development in the Air Force," report written for Defence Research and Development Canada, dated 17 March 2004.

2 See for example English, "Survey of Current Leader Development in the Air Force."

3 See for example C. McCann, R. Pigeau and A. English, "Analysing Command Challenges Using the Command and Control Framework: Pilot Study Results," Defence Research and Development Canada Technical Report, # TR-2003-034, 1 February 2003.

4 Major-General Daniel P. Gosselin, "The Loss of Mission Command for Canadian Expeditionary Operations: A Casualty of Modern Conflict?" in Allan English, ed., *Leadership and Command and the Operational Art: Canadian Perspectives* (Kingston, ON: Canadian Defence Academy Press, 2006), 193-228. Quote from 223.

5 Gosselin, "The Loss of Mission Command for Canadian Expeditionary Operations," in Allan English, ed., *Leadership and Command and the Operational Art*, 223.

6 Pigeau and McCann, "Re-conceptualizing Command and Control," 56. Emphasis added.

7 DND, Canadian Forces Aerospace Doctrine, B-GA-400-000/FP-000, 50.

8 See Allan English, *Understanding Military Culture: A Canadian Perspective*, 82-4 for an example of unintended consequences caused by second and third order effects. A detailed discussion of these issues is at William F. Bell, "The Impact of Policies on Organizational Values and Culture," paper presented at the Joint Services Conference on Professional Ethics (January 1999) at http://www.usafa.af.mil/jscope/JSCOPE99/Bell99.html (accessed December 27, 2006).

9 DND, *Duty with Honour*, 1, 11, 17.

Abbreviations

1 CAD	1 Canadian Air Division
1 CAG	1 Canadian Air Group
1 Cdn Air Div	1 Canadian Air Division
10 TAG	10 Tactical Air Group
3D	defence, diplomacy and development
ACAG	Aerospace Control Advisory Group
ACAS	Assistant Chief of the Air Staff
ACC	air component commander
ACSAG	Air Combat Support Advisory Group
ADC	Air Defence Command
ADG	Air Defence Group
AFCCRT	Air Force Command and Control Reengineering Team
AFCF	Air Force Capability Framework
AIRCOM	Air Command
AMAG	Air Mobility Advisory Group
AOC	air operations centre
AOC MAC	Air Officer Commanding Maritime Air Command
ARAF	air reserve augmentation flight
ARAG	Air Reserve Advisory Group
ARG	Air Reserve Group
ATC	Air Transport Command
ATG	Air Transport Group
ATO	air tasking order
BCATP	British Commonwealth Air Training Plan
BCE	balanced command envelope
BComd	base commander
C2	command and control
C2I	command, control and intelligence
C2IS	command and control information systems
C4ISR	command, control, communications, computers, intelligence, surveillance and reconnaissance
CAG	capability advisory group
Canada COM	Canada Command
CANR	Canadian NORAD Region
CANSOFCOM	Canadian Special Operations Forces Command
CAOC	combined air operations centre
CAR	competency, authority and responsibility
CAS	Chief of the Air Staff

CCompt	Command Comptroller
CDS	Chief of the Defence Staff
CEFCOM	Canadian Expeditionary Force Command
CF	Canadian Forces
CFACC	Combined Force Air Component Commander
CFACC Fwd	Combined Force Air Component Commander Forward
CFC	Canadian Forces College
CFHQ	Canadian Forces Headquarters
CFMWC	Canadian Forces Maritime Warfare Centre
CFOO	Canadian Forces Organization Order
CIBG	Canadian Infantry Brigade Group
CINC or C-in-C	Commander-in-Chief
CLFCSC	Canadian Land Forces Command and Staff College
CO	commanding officer
Comd	Commander
COS	chief of staff
COS OPS	Chief of Staff Operations
COS Pers	Chief of Staff Personnel
COS SUP	Chief of Staff Support
COS T&R	Chief of Staff Training and Reserves
DComd FG	Deputy Commander Force Generation
DComd Msn Sp	Deputy Commander Mission Support
DGAF	Director General Air Forces
DG Air FD	Director General Air Force Development
DG Air Pers	Director General Air Personnel
DND	Department of National Defence
DRDC	Defence Research and Development Canada
EBAO	effects-based approach to operations
EBO	effects based operations
FCAG	Fighter Capability Advisory Group
FOAC	Flag Officer Atlantic Coast
G1	personnel
G2	intelligence
G3	operations
G4	logistics
HMCS	Her Majesty's Canadian Ship
HQ	headquarters

ISAF	International Security Assistance Force
JIMP	joint, interagency, multinational, and public
MAAG	Maritime Air Advisory Group
MAG	Maritime Air Group
MARCOM	Maritime Command
MCCRT	Management Command and Control Re-engineering Team
MND	Minister of National Defence
MOBCOM	Mobile Command
NATO	North Atlantic Treaty Organization
NCW	network-centric warfare
NDHQ	National Defence Headquarters
NEOps	network enabled operations
NORAD	North American Air Defence Command
OIF	Operation IRAQI FREEDOM
OODA	observe, orient, decide, act
OPCOM	operational command
OPCON	operational control
PME	professional military education
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
RCN	Royal Canadian Navy
RDO	rapid decisive operations
RFC	Royal Flying Corps
RJTF	regional joint task force
RJTF	regional joint task force commander
RN	Royal Navy
ROE	rules of engagement
SAR	search and rescue
SOP	standard operating procedure
Sp CAG	Support Capability Advisory Group
Sqn	squadron
SSO	senior staff officer
TACOM	tactical command
TACON	tactical control

TASS	Tactical Aviation Support Squadron
TAvnAG	Tactical Aviation Advisory Group
TFC	task force commander
TrgAG	Training Advisory Group
USAF	United States Air Force
USMC	United States Marine Corps
VCDS	Vice Chief of the Defence Staff
W Adm O	Wing Administration Officer
W Compt	Wing Comptroller
W Log O	Wing Logistics Officer
W Ops O	Wing Operations Officer
WComd	Wing Commander

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