AIR SYMPOSIUM 2002

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AIR FORCE COMMAND AND CONTROL

Edited by
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CANADIAN FORCES COLLEGE

Air Force Command and Control

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and Allan English, PhD

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FOREWORD

The Canadian Forces College Air Symposium provides an opportunity for members of the College, selected academics, and members of the Canadian air force community to gather and share their thoughts on a subject of interest to the air force. It also provides a unique opportunity for the air students of the Command and Staff Course to present the results of research that they have conducted throughout the academic year to members of the air force community and to hear the views of noted academics and others on the subject. The 2002 Air Symposium was conducted on 27 and 28 March 2002 and focused on Air Force Command and Control.

The Air Symposium would not be possible without the enthusiastic support of many dedicated individuals. On behalf of the Canadian Forces College, I would like to thank Colonel Richard Reynolds (USAF Retired) and Brigadier-General (Retired) Joe Sharpe for their participation in the 2002 Air Symposium and for their scholarly contribution to these proceedings. I also wish to commend the Command and Staff Course syndicates for their patience and hard work that provided the focus for the symposium and culminated in the three quality essays contained in these proceedings. As well, I would like to thank Captain Paul Johnston for his thought-provoking essay reflecting on Canadian aerospace doctrine. Lastly, I would like to extend a special thank you to Dr Allan English for his assistance organizing the Symposium as well as his contribution to these proceedings as both an author and an editor.

As with previous Air Symposia, the Canadian Forces College and the Command and Staff Course Air Programme were again fortunate to receive funding and promotional support from the Chief of the Air Staff. We were also honoured to have Lieutenant-General Lloyd Campbell, Chief of the Air Staff, participate in the symposium and offer his thoughts on Air Force Command and Control during his closing remarks.

Finally, I would like to extend a special thank you to those members of the air force community who were able to attend the 2002 Air Symposium. Your participation contributed immensely to the overall success of the symposium and was greatly appreciated.

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July 2002

Liars, Fools and Zealots – The Origins of 21st Century Command and Control

Colonel Richard T. Reynolds (USAF Retired) and Colonel Edward C. Mann III (USAF Retired)

INTRODUCTION

Airpower, now perhaps more appropriately referred to as aerospace power, is undoubtedly the most controversial addition to warfare. Airpower's promises, failures and successes continue to provide the material for huge debates on warfighting between its advocates and opponents. Over time, these debates forged a great rift between airmen and their more traditional surface warrior brethren. Surface warriors tend to see airpower as a potentially powerful adjunct to their type of warfare, so long as it is controlled and properly directed by a skilled army or navy commander. Airmen see airpower as a route to a totally new type of warfare, sometimes to the complete exclusion of surface forces.

There is, perhaps, no more famous zealot of this genre than the oft-maligned Italian, Giulio Douhet. Douhet's personal experiences and study of operations in the First World War led him to conclude that surface forces would be irrelevant in the next war. Airpower, directly attacking the civilian populace of the adversary nation (a concept we find horrific today), would end the conflict before surface forces could marshal and move to contact. Of course, Douhet's claims did not go unchallenged by surface warriors who denounced his vision as untried and dangerous to the security of any nation undertaking the radical military reform he proposed.

In America, Billy Mitchell took a similar but slightly less radical approach to advocate airpower. Mitchell argued for independent air operations, but in coordination with, rather than in lieu of, surface operations. He did not question the value of direct air support for surface forces, but he did insist that airpower could also exert a strategic effect when used, en masse, behind enemy lines. He also argued that the structure of naval forces would have to change – in Mitchell's view battleships, the queens of naval warfare, had become defenseless in the face of airpower. Nevertheless, his arguments for an independent air force equivalent in organizational structure to the army and navy met the same kind of resistance from surface warriors as Douhet's more radical approach. Mitchell first tried to reason with his surface brethren, then tried to prove his point through tests like the famous bombing of captured First World War German battleships. The US Department of the Navy put such heavy restrictions on the bombing tests that Mitchell's chances of success were severely limited, and it appeared he would fail. In the end, however, ignoring certain of the restrictions, his pilots sent the German battleship *Ostfriesland* to the bottom in a matter of minutes. The US Navy downplayed this success and continued to

base fleet operations on the battleship with carrier aviation in a supporting role, a decision that would prove deficient in the early days of the Second World War. The *Ostfriesland* sinking and Mitchell's ensuing actions ended in his court martial for insubordination.

The debates, though much subdued after Mitchell's court martial conviction, continued in America for over two decades – into the first days of the Second World War. Initial setbacks, caused at least partially by deficient organization and application of airpower by ground commanders, resulted in a complete reorganization of US Army airpower. This reorganization was codified in US Army Field Manual 100-20 dated 21 July 1943 which states boldly that airpower and surface power are "CO-EQUAL AND INTERPENDENT" and "NEITHER IS THE AUXILIARY OF THE other." US Army Field Manual FM 100-20 also clearly articulates a vision of airpower as a cohesive whole – not close air support or strategic attack, but both and everything in between working together under one unifying air commander.

Thus, we arrive at the main thesis of this presentation. Equipment and weapons systems are important, as are strategy and doctrine. But, as United States Secretary of Defense, Donald Rumsfeld, said at the National Defense University about the proposed transformation of US armed forces, the most important decision is not what to buy or how to organize and operate. The most important decision is choosing those who will manage and command it all. The proposed transformation of US military forces is more about how we think than what we buy, what strategies we pursue, or what specific actions we take. We will look briefly at the various conflicts in which airpower played a part in the 20th and 21st centuries and discuss the weapons and personalities that changed the shape of war.

THE FORCES OF CHANGE

One problem facing airpower zealots from the very beginning was the inability to produce combat results equal to their visions. Though approaching from different angles both Douhet and Mitchell, for example, saw airpower as capable of producing quick, decisive results through strategic- and/or operational-level attack. But the small and ineffective airborne weapons of the First World War were incapable of producing either widely spread or precise damage. Bombs of 50 or 100 pounds dropped with no guidance but the human eye proved to be more irritating than decisive. Even so, General Billy Mitchell, by massing a large force of aircraft and using them to attack strategic- and operational-level targets, was able to contribute significantly to the American breakout at St. Mihiel in 1918, which he saw as a modest signal of great promise in strategic and operational attack. Ground commanders, on the other hand, largely missed the point. In a manner that has become familiar to airpower advocates over the years, senior ground commanders argued that the true impact of airpower in that action was achieved through battlefield observation and direct support of engaged troops. All other air operations were discounted as irrelevant.

Following the First World War, Douhet, Mitchell and other airpower advocates saw airpower as the key to breaking the deadly stalemates opposing armies had faced during the "Great War." By the time the Second World War rolled around, the concept of strategic bombardment had become almost a cult in Great Britain and the US. There were many ways of viewing the potential, but the basic concept was the same: if the home front could be sufficiently disrupted through some form of strategic bombardment either the will or the ability to support warfare at and beyond the targeted nation's borders would collapse. Unfortunately for airpower advocates, hundreds of bombers had to be massed and thousands of bombs had to be dropped to achieve a sufficient number of hits on critical components of a single target complex, such as a factory or military facility, to achieve a shutdown or significant reduction in capability. Though much improved from First World War standards, airborne weapons were still simply too imprecise to economically achieve required levels of destruction. Although airpower is fairly judged to have had a decisive impact on the final outcome of the Second World War, its promise continued to be hotly debated.

It was hardly recognized at the time, but the biggest breakthrough for modern airpower came during America's Vietnam War. Late in that war, precision-guided weapons, mostly laser-seekers, were employed for the first time and targets that had resisted attack by dozens of bombers dropping hundreds of "dumb" bombs were suddenly vulnerable to one or, at worst, a handful of these nearly-magical, guided weapons. The severely flawed strategies of that war masked the relevance of this very significant breakthrough. US ground commanders came away more convinced than ever that airpower's singular usefulness was in direct support of engaged ground troops.

Sadly, a large number of America's senior airmen began to buy into this argument. Force application planning in the USAF was divided between the "strategic nuclear" war planners and "tactical conventional" planners. A common view among the tactical air commanders was that their role was to "build a hose and point it where the ground commander decided." That is, they would provide sorties to be controlled by the ground commander in direct support of engaged ground forces. This "land force-centric" bias would eventually make it difficult for either strategic or tactical planners to conceive a strategic attack with conventional (i.e., non-nuclear) weapons.

This was the existing state of affairs in the USAF in 1990 when Saddam Hussein attacked and attempted to annex Kuwait. Within the tactical planning system that had responsibility for planning Operation Desert Storm, a strategic attack with conventional weapons was extremely unlikely to emerge. However, a small number of airpower zealots who held a clear vision of what they believed airpower could do at the strategic level, intervened, and, ultimately, a conventional strategic attack opened 38 days of air operations that paved the way for a 100-hour romp by coalition ground forces. The seminal shift to airpower as a primary means of force projection can be directly attributed to the work of these zealots, led by Colonel John A. Warden III. Colonel Warden introduced the

revolution” created expectations of perfection in the minds of both the public and the civilian leadership. Because of this, senior commanders are, in many cases, personally vetting every target to ensure collateral damage considerations are taken into account before weapons release.

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vastly improve situational awareness for operators and for autonomous attack systems alike. All of these enhancements to major air platforms become even more significant when combined with steadily increasing standoff launch ranges for the weapons they employ or direct.

Manufacturers of weapons and weapons dispensers, working with the military services, are pushing the limits of aerodynamics, special materials and small engine design to produce weapons that can be launched tens to hundreds of miles from their intended targets. The wizardry of modern electronics allows these weapons to continue on to their targets autonomously. Most use GPS and/or INS to navigate to a specifically designated individual target, then some form of imaging terminal guidance (IR, acoustic, millimeter-wave, optical or other) to direct the warhead to its designated aim point. Others are even more autonomous, navigating to a target area and looking for pre-designated types of targets, such as armored vehicles, artillery pieces, or surface-to-air missile launchers or even missile bodies on transporters. Most achieve a circular error probable (CEP) of less than 10 meters. The next generation will be even better – with GPS refinement and further seeker improvements, developers are predicting CEPs of as little as eight millimeters in some cases. Such improvements greatly increase the effectiveness of a given size warhead while, at the same time, reducing the incidence of undesired collateral damage. Where possible, such as with electrical targets, non-lethal warheads are being developed, which even further reduce danger to nearby humans. With such weapons onboard, even a small fighter like the F-16 becomes a potent strategic bomber. The following are just a few examples to demonstrate our point.

The joint direct attack munition (JDAM) allows standoff ranges up to approximately 30 km (average about 25 km) with a wide range of warheads and submunitions. Actually a guidance modification kit, the JDAM turns standard 1,000- and 2,000-pound freefall bombs and cluster bomb units into precision guided, fire and forget standoff weapons with accuracy to 13 meter CEP using integrated GPS/INS navigation and 30 meter CEP in INS-only mode. JDAM has been used successfully hundreds of times in tests and actual combat, with better than advertised CEPs.

In large buys JDAM is running slightly over 20,000 US dollars per unit. Coming into inventory now, the Joint Standoff Weapon (JSOW) delivers similar performance with greater standoff ranges (up to approximately 100 km). JSOW will be produced initially in three versions: AGM-154A, which carries a thousand pound cluster bomb dispenser; AGM-154B, carrying sensor-fused anti-armor bomblets; and, AGM-154C, which will carry a Mk-82 500 pound warhead. Design criteria for the JSOW allow integration of other warhead or dispenser combinations, as desired. JSOW uses integrated GPS/INS for mid-course guidance and either IR imaging or data-link with the launching aircraft for precision terminal guidance.

On the battlefield an almost magical family of fully autonomous submunitions is revolutionizing direct air attack of surface forces. These weapons are

becoming ever more sophisticated and discriminating. For instance, Skeet, a sensor-fused bomblet designed for anti-armor use, is able to seek warm vehicular traffic on a battlefield using individual IR targeting sensors. Once dispensed, each Skeet seeks the characteristic heat plume of vehicular traffic and targets whatever it finds. An F-16 can carry up to four CBU-97 or CBU-105 (wind corrected) dispensers with 40 Skeet submunitions per dispenser for a total of 160 submunitions. In the latest version with improved IR-seeking and wind-corrected dispensing, a single F-16 could reasonably be expected to destroy or disable a dozen or more vehicles per pass when employed against armor in standard battlefield formations. If the battlefield is not permissive, Skeet can also be employed using JDAM or JSOW from standoff ranges similar to those given previously for these systems.

The Brilliant Anti-Tank (BAT) submunition goes several steps further. Using a combined IR, millimeter-wave and acoustic seeker, BAT can be programmed to seek out a particular target type. All that is required is that a characteristic signature of the particular target type, in any or all of the three seeker modes, be available in the pre-mission database. Once released, each individual BAT seeks targets of the type(s) designated. Spinning like a gyro-copter, BAT has approximately nine minutes to seek targets and is able to data-link with other BAT submunitions so that if one spots a cluster of targets the others are made aware. Each BAT then designates a specific target and data-links that information to avoid multiple hits on a single target. BAT is larger than Skeet, so fewer submunitions are loaded in each dispenser, but being more efficient they should provide improved results per payload.

As sophisticated as BAT is, the Low Cost Autonomous Attack Submunition (LOCAAS) is even more impressive. In late development, but looking very promising, LOCAAS uses a combined laser and radar seeker/designator (LADAR) that allows it to search for specific targets in the same manner as BAT.

However, the LOCAAS, once released from its carrier/dispenser, is able to search a large area (50 sq km – up to 30 minutes search time) autonomously for virtually any type of target in its pre-mission database. LOCAAS, which is expected to cost approximately 30,000 US dollars per unit in production, is designed to provide a relatively low-cost, low-risk-to-operator means of attacking current and next-generation surface-to-air missile systems. However, due to its unique warhead design, it is capable of attacking a wide range of target sets. The warhead is capable of forming itself to provide a stretching rod for enhanced hard armor penetration, an aerostable slug that can be fired from the warhead (also capable of penetrating armor but from greater standoff ranges), or a fragmentation warhead for soft target kills.

There are, of course, a number of other highly sophisticated systems either available now or in development, but these should suffice to make the point. The long-standing promise of airpower to find, target and destroy nearly any and everything on a battlefield or in a nation's industrial or political base is now much more readily fulfilled. The ability of airpower to dominate surface force

operations, so richly demonstrated in Desert Storm, is growing more evident every day. While we have focused upon lethal systems herein, there is also a wide range of non-lethal systems coming available for dealing with specific situations where damage-limitation is a concern.

CONCLUSION

Technology is driving significant changes in 21st century command and control. Senior commanders can "see" and react in real time to changing battlefield situations. Information is plentiful and inexpensive. Kill capability is orders of magnitude less costly than it was twenty or even ten years ago and becoming cheaper as weapons grow more lethal and accurate. In the midst of these technological accomplishments senior military leaders are faced with serious questions on command and control methodology and execution. Of greatest import is whom they pick to lead and how they choose to employ our arsenals of the air. On this depends the security of all free men and women.

C² Evolution from an Air Force Perspective

Brigadier-General (Retired) G.E. (Joe) Sharpe

INTRODUCTION

"Command is a key capability that enables all the other capabilities of air forces."

This statement, taken from the lead in to your Air Symposium, makes a very strong assertion. If you believe it, as I do, it contends that without a viable command capability you cannot effectively employ the combat potential that has been so very carefully generated. No matter the quantity or the quality of the technology that has been built into the equipment or the level of training of individual members, without a robust command ability that is capable of performing the mission, there is no real combatant power.

For this reason among others, I was very pleased to hear the focus of the Air Symposium this year was to be command and control. The air force unquestionably needs to pay attention to this subject and it will certainly benefit from the awareness your work today and tomorrow will bring to the issues.

I am also fortunate to be presenting my views after you have heard from the syndicates that are dealing with two difficult issues – The Human Dimension of Command, and Command Experience. Both go to the heart of the challenges facing the air force today and both are problematic in the Canadian Forces of 2002. Both will become even more so if we do not begin to acknowledge the nature of the human in the command equation in the years to come.

As a last point in my introduction I will acknowledge the presence of Carol McCann in the audience today. I know that you are familiar with the work of Carol and her colleague Ross Pigeau and by the references I have heard, you recognize the importance and utility of what they are developing. For many of us "more experienced" types, our first reaction to them quite frankly, was to ask, *what could psychologists possibly have to add to the subject of Command and Control in the air force?* My generation has traditionally considered command and control quite independent of the individual in the loop, except for the human interface with the kit in terms of buttons and knobs. Thankfully that era is fast passing. The first indication for me of the need for a new reality was when we started having individual officers turn down opportunities to command. It doesn't matter how good your equipment is if you cannot find people willing to command it. If we are going to be capable of commanding in the future, we need to start listening to non-traditional sources, and what better place to start than psychologists?

BACKGROUND

My perspective on issues surrounding command and control is a function of the air force I lived in for nearly 36 years. An air force that faced significant

change over that period of time. Let me talk about some of that change and our attitude towards it for just a moment. We in the uniformed community are amongst the least willing to embrace change, and most of the air commanders I have worked with in the last ten years lamented that fact. Resistance to change is not necessarily a bad thing in all cases – some change has the potential to seriously undermine our combatant capability, and there are many good and valid reasons for caution, based on the gravity of our mandate and our obligation to the country. However, not all change threatens our ability to protect the country, and change associated with our approach to command and control is one of those areas where we do need to examine our attitude. For our air force to remain vibrant, healthy and above all, combat capable, it must learn to identify and embrace change where it can enhance our combatant capability.

The pre-unification air force I joined in 1965 was still emerging from the Second World War and Korea and adjusting to the realities of the Cold War. The Korean War had concluded twelve years earlier and the Second World War only eight years before that. For you today that would be like looking back to the Gulf and Falklands Wars in 1990 and 1983 respectively. At this end of the evolutionary chain, the air force I retired from last year had just enjoyed great success in the Kosovo air campaign as well as major positive attention during several domestic crises. When I talk about some of the command and control lessons we learned from the Gulf War, I need to recognize that the Gulf War is to today's new entrants like Korea was to me when I joined, and the majority of them will have never heard of the Falklands or the US invasion of Grenada. Many of the serving members of the air force that I met in those first years had formed their ideas during conflicts that I was only going to read about in history books, and while new ideas were considered risky, they understood what happened if the leadership screwed up when you went to war. I mention this not to point out how very old some of us are, but to situate where the leaders came from that influenced not only me but many of the people still in command.

This leadership was subjected to an extreme change in command and control shortly after I joined. Imagine their shock when a defence minister imposed an entirely new and foreign structure on the organisation – a structure that shifted the foundation of the military from a solid command orientation to a supposedly more efficient management approach – an approach that required military leaders and departmental managers to be integrated into a single entity. There are those who believe we have been wrestling with the dichotomy of leadership versus management ever since. This is one view of the result of that integration that was expressed in a letter this year to the Minister of National Defence by a civilian professor that had attended National Defence College and subsequently stayed on to examine the professional development of general officers in the Canadian Forces (CF):

> The present structure and procedures of the DND [Department of National Defence] do not provide adequate levels of accountability for the military or the civilian side.… The present configuration of DND was intended to provide the Canadian people with the best of the military ethos and the public service ethic.… We have received neither and damaged both. Instead we have created an enabling environment for the ethically challenged. … DND… has become characterized by the pathologies of both cultures rather than the redeeming characteristics of each.[1]

Regardless of other concerns, the impact integration has had on command and control remains of considerable interest today.

DISCUSSION

Key Questions

Before talking about some of the problems associated with command, I would like to raise a few specific questions about air force command that first came to mind when I heard about this symposium. Your symposium presumes that the quality of command you develop is more important than the quality of the kit you buy or in fact, the skill you possess in using it. Having spent a great many of my air force and joint staff years associated with the business of acquiring kit, *I wonder if we invest sufficient energy in developing our ability to command when compared to our ability to acquire and operate equipment?* This is a serious question for all environments, but especially so for the air force.

In the air force the majority of force development activity that takes place is associated with the acquisition of new equipment or the modernization of existing fleets. This leads to a supposition that if we buy sufficient quantities of modern combat capable equipment and have enough people to maintain and operate it, we will be combat capable. The flying associated with *ab initio* training as well as the routine flying required to maintain operational readiness consumes a very large share of the air force resources and wears out equipment very quickly. As a result of the resource pressure generated by these activities, the air force often manages the force as if they were the only elements of air combatant capability. The question this leads to is: *Do we have viable means in the air force to develop more of our combatant capability, including command capability, without extensive flying operations?* Like many of you, I have wrestled with the means to develop command experience but minimize unessential flying over the years, but *I wonder if today we have yet to find the right balance?*

Similarly, we are concerned about the research and development aspect of staying ahead of the power curve when it comes to technology – *but are you spending enough of your time thinking about research and development in the command and control field?* I cannot answer that question with certainty, but I do know that the army, and to a lesser extent, the navy, are more concerned with advancing their knowledge in this area than the air force. Indeed, the Canadian army is currently conducting some serious work in the field and the air force needs to look in the same direction. In a force with the size and mandate of the Canadian Forces, it is simply not logical to have multiple approaches to command and control – anymore than it is logical to have multiple command and control systems.

Command and Control Definitions

I believe many air force personnel fail to realize the fundamental role command plays in the employment of combatant capability. Your army compatriots do, and they tend to spend much more time thinking about it. When I use the term command I refer to an action best captured by the definition of command that Ross Pigeau and Carol McCann use. According to the theory of command and control they advocate, command is defined, as "the uniquely human activity of creatively expressing will" to accomplish the mission.[2] If you accept this more comprehensive definition as opposed to the traditional but circular one that defines a command as the order of a commander, then it is clear that command encompasses many aspects we normally include in the term leadership. You will also realize, looking at the new definition of command and control, that everyone involved in an operation has a share of the action. Again, a much more realistic concept than the traditional definition.

To some, command is simply a result of positional authority associated with a formal appointment. Leadership, on the other hand, is something that we all believe we possess and we see it as our responsibility to exercise. The two are seen as related but different. In other words, all officers are leaders but not all leaders are commanders. Approaching the issue of command from Ross and Carol's theory, this distinction is unnecessary, and indeed, in the real world it leads to an under appreciation of the complexity of command. While some positions do carry a legal aspect of authority, that is but one facet of the total authority needed to carry out a successfull command.

The command and leadership challenges facing the military in the future demand this broader understanding of the nature of command. While it is not my purpose here to delve deeply into the command and control theory work that Ross Pigeau and Carol McCann are involved in, I will venture to use some of it to frame my thoughts about some developing trends in the Canadian Forces that impact command and control and threaten the effectiveness of this key capability. I find the concept of balanced command particularly helpful in explaining some of the leadership problems we have encountered in the Canadian Forces in recent years, and in the difficulties we have had in putting an effective command and control capability in place when we needed it. The army has been the most visible area where these failures have shown up, but they do not have a monopoly on the problems.

Personal Observations

The main reason that I have been so attracted to the new approach to command and control that is being developed is the framework it provides for understanding some of the serious mistakes we have made in the last ten years. During the last few years I spent in uniform, and to an extent since I have taken it off, I have had the opportunity to gain a perspective of how the Canadian Forces are doing in the area of command through the eyes of some of our more junior members. As an air force officer examining largely army command situations, I believe the perceptions I have gained from this experience to be more or less unique. Two specific investigations that I have been involved with since 1999 have been initiated as a direct result of a failure of command within the CF. A third activity was a Special Review Group (SRG) initiated by the previous Chief of the Defence Staff (CDS). General Baril asked me along with a small group of other people to specifically examine the quality of leadership during a CF peacekeeping deployment in the early 1990s. My experience with the SRG and the way our advice was dealt with has contributed considerably to my sense of unease in how the organization is dealing with command issues. At first glance it might appear that these are "army problems" and of little concern to the air force, but I assure you, they are not limited to the army.

To be clear here, I am not taking shots at the quality of leadership in the CF – that would be too superficial an explanation for some of the problems that have surfaced. What the media and external critics often call a leadership failure should never be confused with a failure of our leaders. Just the opposite is true in most cases. I have seen a number of situations in recent years where failure has occurred because a leader is unable to exercise his or her responsibility, most likely because the system has prevented the right action from being taken. In other words, the process through which command is exercised has broken down, not the leader.

What I have detected as an emerging and serious challenge to effective leadership and effective command and control is centred within the defence bureaucracy and our unique Canadian approach to the relationship between the operational military and the military and civilian components of that bureaucracy. In the last year, I have talked to many commanding officers in the field and what I am hearing from them confirms my concern. I would like to share some of the perspective I have gained from those experiences with you here.

In our recent book, *Principles for Change in the Post-Cold War Command and Control of the Canadian Forces*, my colleague, Dr Allan English, included a particularly good summary of the transition the Canadian Forces went through after unification and integration:

> The period 1946-64 has been called 'the Command Era' by Douglas Bland. The RCN, RCAF and Canadian Army were commanded and administered by the three Service Chiefs and their efforts were co-ordinated, with varying degrees of success, by the Chairman of the Chiefs of Staff. This organization, Bland argues, was 'militarily efficient' but seen as 'inefficient in the eyes of accountants.' Nevertheless, at that time it was generally accepted 'that military leaders' and 'military norms and values' defined the organizational culture of DND. The period from 1964 to the present is described by Bland as the 'Management Era.' in which the military culture of the CF was replaced by a more civilian, business-oriented culture based on 'concepts of functional unity' and management theories. In this new organization, the chain of command has been replaced by centralized functional entities that 'operate in long parallel lines

> from NDHQ to practically the lowest levels of DND and the CF.' This organizational structure has advantages, but it has also had a detrimental impact on the chain of command.[3]

The lessons of unification and integration have been well debated in the last 35 years, and I am not raising that discussion this morning. However, we are still living with a certain command and control legacy from these political directions. The effect referred to by General G.C.E. Theriault, a former CDS, is creating serious difficulties today in the application of command and control in the field. General Theriault refers to "an increasingly unwieldy, bureaucratic structure and culture … led to a serious **blurring of statutory responsibility and accountability** [emphasis added]… and … thwarted the evolution of a necessary, disciplined, unified military staff system."[4] Similarly, a central part of the Pigeau-McCann command and control model touches on the same issue of responsibility and accountability. They state that:

> A commander, however, is not simply a person. A commander is also a position – a position **with known duties and functions that exists within a larger military and national bureaucracy.** Sooner or later this position must, of course, be filled by a person with the appropriate skills and competencies for realising the potential of the position, but it is not sufficient to define 'commander' solely in terms of the qualities and traits of people who have, in the past, filled the position itself.[5]

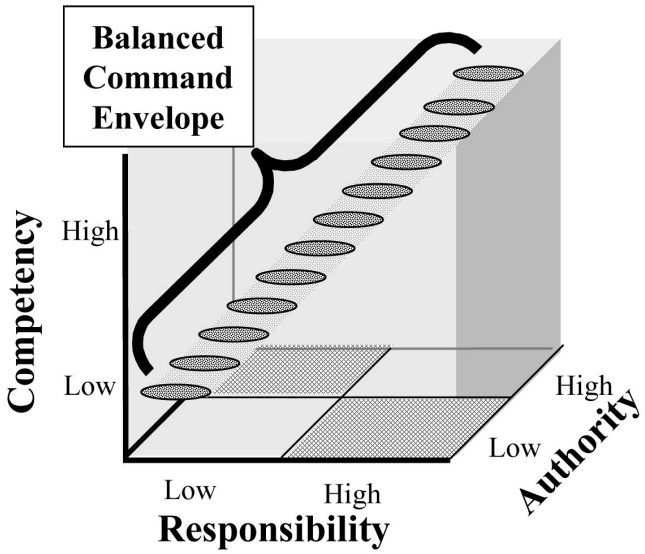
A very important feature of the modern concept of command begins to emerge here. A commander exists within the larger military, national and international bureaucracy, and that bureaucracy has an increasingly capable means of looking over his or her shoulder, and a decreasing restraint in using it. The result is that the bureaucracy in many ways shares the leadership function with the commander in the field, whether we like it or not. It is in the nature of this sharing that problems develop, especially if neither the commander nor the bureaucracy is aware of the complexity of the arrangement.

What General Theriault referred to as a blurring began to accelerate in NDHQ with the end of the Cold War and reached crisis proportions after the Somalia Inquiry. Driven by dramatically reduced budgets, the increased tempo of operations, public scrutiny and the overriding fear the bureaucracy has of making a mistake, the concept of command authority began to shift. We euphemistically refer to NDHQ as a risk adverse organisation. Unfortunately, the result of risk aversion is to hasten an unhealthy shift in balance between authority and responsibility.

To better explain my concern, let me again borrow from Pigeau and McCann. According to their theory, command capability is defined by a combination of competency, authority and responsibility. To be effective, command demands a balance be established and maintained in these three areas. When any one of them is unbalanced, bad things happen. After probing some of the things that have gone wrong in the Canadian Forces over the last ten years, I am convinced that not only can their theory explain past problems – i.e., serve a lessons-learned function – but it can predict problems as the organization takes decisions or makes changes that create imbalances in these areas.

Ross and Carol illustrate the concept of command as a three-dimensional space. There is an axis for competency, one for authority and one for responsibility. Command capability is defined by *a combination of competency, authority and responsibility.* Their work involves a far more complex model than I need to use to illustrate my observations, but it has a quality that strikes me as authentic based on both personal experience and intuition.

The Balanced Command Envelope



In an ideal world, as a commander one will find an acceptable balance amongst these three areas – and of course this balance will change with the theatre and the situation. In terms of competency, fitness, intellect, experience and education will have equipped the commander mentally and physically for the job at hand. The proper authorities will have assigned sufficient legal authority and the commander will enjoy sufficient personal authority with his or her peers and subordinates to carry out the mission. And lastly, the commander will be willing to accept the legal and moral responsibility and associated accountability for the actions that are taken.

In our less than ideal world, things do not always happen that way. Infrequently people will end up in positions where they are expected to possess certain competencies – physical, intellectual, emotional or interpersonal, and yet for some reason they have not acquired them. As an example, in the air

force, a physical and to a certain extent mental competency that we are able to measure with some accuracy is flying ability. If that competency, measured by the ability to hit an initial point with precision, or the ability to get a bomb on the target, is extrapolated to presume intellectual competency, then we have set up a commander for failure. Physical competency is extremely important and it does not preclude intellectual competency, but it does not guarantee it. It doesn't matter what level of authority you have been given or how smart you are – if the experience, training and education you are working with are insufficient to prepare you for the task, major problems will develop with the exercise of your command. This is a good reason not to place young majors in command of large field formations. Generals don't get any smarter as they get older, but they do gain experience. The same rationale applies as to why it wouldn't be a good idea to put a 55 year old general in charge of a reconnaissance platoon or a four-plane strike formation. In this case, lack of physical competency could well override the advantage of experience.

During Post Traumatic Stress Disorder (PTSD) investigations for the Ombudsman, we came across numerous situations where commanders lacked sufficient intellectual and interpersonal competency to effectively deal with psychological or stress injuries. For example, one company commander disclosed to us that he was certain that he could read a couple of pages out of a psychological textbook and convince any psychiatrist that he had PTSD. In reality, of course, there is an extremely lengthy set of criteria laid out that must be met to result in a diagnosis, but no one had bothered to teach the commander. As a direct result, a number of his subordinates were afraid to come forward for fear of experiencing his contempt and this turned what was a treatable condition into career ending problems.

Similarly, I was recently asked to look at a crisis in a medical unit in eastern Canada. What we found was a minor problem with interpersonal relations that had been allowed to deteriorate into an irresolvable crisis that placed the health and welfare of scores of people at serous risk. The reason – the local commander was placed into a position as a commanding officer with virtually no leadership training or command experience, but a great deal of technical skill. Unfortunately, when he needed a bit of interpersonal competency to intervene and salvage the situation, he did not have it and the opportunity to prevent a serious crisis passed. Fixing it now will require far greater effort, with considerable potential for embarrassment to DND – but with any luck lives will not be lost as a direct result. I hesitate to generalize, but I sense that with increasing frequency, technically or professionally well-qualified personnel are being given command positions with little qualification other than their professional skill. As an example, recently, several senior CF professional officers were promoted from major directly to colonel to fill positions with no change in their *military* qualifications.

A frequent side effect of circumstances where one aspect of competency is lacking is unwillingness on the part of the authority that has placed the individual in such a position to accept responsibility for the results. As you will

notice from the diagram, responsibility and authority are two closely related but potentially independent areas.

Leadership situations where either the legal or personal authority of the leader does not match that required for the situation can be very frustrating. Legal authority without personal authority results in a situation that can be likened to a work to rule campaign in the civilian sector. Orders are followed, but if subordinates doubt the commander's personal authority to command, little gets done. On the other hand, if a leader possesses great personal authority, subordinates will follow directions even when they clearly exceed the leader's legal authority. Unfortunately, in the real world both of these situations can have serious consequences.

During the Croatia Board of Inquiry we came across several situations where the commanders in the field pushed if not exceeded the legal authority that they possessed at a given time. They had earned a great deal of personal authority based on observed competency, and their subordinates followed their direction – fortunately as it turned out. In one of the more obvious examples, a company commander faced with the choice of retreat or stand, led his men in what was effectively a firefight with the Croatian military. As a result of his leadership, the Croatians suffered more than 35 dead and wounded. The Canadians escaped with a few minor injuries. More importantly, a message was sent to the Croatians concerning the UN mandate that undoubtedly saved many Serbian lives in the area. When the bureaucracy in Ottawa subsequently reviewed this officer's actions, they were found deficient. Not because of his operational expertise and near brilliant execution, but because he had allowed alcohol to be consumed in theatre. Of even more serious concern to our legal friends in Ottawa was the fact that this officer had also discharged a firearm without proper authority.

In another situation involving disciplinary action after a serious injury was inflicted in a fight between two soldiers, a commanding officer looked at all the factors involved and came up with a decision that satisfied everyone in theatre – including the injured soldier, whom I interviewed. Specifics are not important, but in essence a victim of bullying had finally retaliated during the last week in Croatia and gained the upper hand. The CO determined that the bully had been punished sufficiently by being injured and any disciplinary action that could be taken against the other soldier would only prolong the stay in theatre of him and a number of witnesses. Accordingly, he did nothing. This decision was seen by the soldiers on the ground to be fair and effective. A distinguished Canadian law professor, who reviewed the details of the incident with me during the Special Review Group, described this action as a brilliant application of justice. Conversely, when the legal bureaucracy at NDHQ reviewed the decision, the CO was found to be incompetent and every effort was made to punish him for this decision.

Unfortunately, both of these officers, and several others in the chain of command, had their actions and decisions closely analysed by the legal bureaucracy at NDHQ in the months and years following Operation Harmony. In the con-

text of the post-Somalia inquiry environment, many of their decisions were assessed using a strict interpretation of the rules and regulations, and the overriding concern about how it would be perceived in the media.

The perceived failure in leadership during the Somalia deployment has allowed the rise of a new lawyer class of warrior within the halls of NDHQ, and this group was outraged that rules had been violated and no one had been punished for it. Their thesis is that the commander on the ground must share his authority with the legal community, as experience has proven that some commanders will do the wrong thing if not checked. As I discovered from my legal advisor during the Croatia Board, sharing the authority does not mean sharing the accountability. No matter what the consequences of the legal advice, the CO remains solely accountable for his actions. But, make no mistake about it, as far as the legal bureaucracy in the Department is concerned, the authority of a commanding officer is now considerably constrained by the legal advisor. Any commanding officer that decides to follow a course of action not approved by his legal advisor will suffer serous consequences either before or after the fact.

The depth of this legal indignation was brought home to me soon after my retirement from the Canadian Forces. Shortly after I had taken off my uniform I received a phone call at home one day from a very distraught major. It seems that despite the findings of the SRG that had been called to specifically examine leadership issues during the Croatia deployment, and despite the failure of numerous efforts to find culpable blame during several legal reviews, the bureaucracy had decided that this officer was not fit to be a member of the Canadian Forces. Our SRG had commended his leadership during the deployment in question, but the legal bureaucracy did not accept our decision. Accordingly, with the legal avenues exhausted, an administrative review had been called. This review, conducted entirely within the NDHQ bureaucracy and without involving the army chain of command, concluded that the major should be immediately released as unfit for further service. He was notified that this would take place within ten days, and that he had the right to submit written arguments as to why he should be retained in service.

Without going into great detail, this decision was never implemented, but not because the legal bureaucracy saw the light. Rather it was because a broad coalition of serving and retired military and civilians entered the fray and got the CDS's attention. I personally discussed this incident with the CDS just before his retirement and while I appreciate the dilemma that legal advice can place you in on occasion, I still do not understand the inability to distinguish between advice and direction that seems to have developed within NDHQ. According to most definitions, advice consists of somebody's opinion about what another person should do. Direction on the other hand is an instruction to do something. Why do we confuse these two very different things?

The lawyers are not to blame for this phenomenon. If commanders are willing to cede their authority to specialists, then the specialists will accept it. Personally I do not hold them to be in error for doing this, nor does this mean

that they do not have the intellectual competency to handle some of these situations. While specialists are technically very competent, most of them do not benefit from command experience at junior rank levels. Therefore, they have not had the opportunity to make command mistakes and learn from them, nor do they have the benefit of interacting with subordinates in increasingly more difficult leadership situations.

I see much of the current inability of the military chain of command to deal with the PTSD issue as related to this issue of authority. In this case, the leadership has abdicated much of the authority to deal with our injured members to the medical specialists. As a result, the position of the CF in dealing with many of these less well understood issues is probably technically correct, but morally way off base. A leading medical authority in the CF has told me that until something is proven scientifically beyond a doubt, it cannot be assumed to be valid. The fact that we have hundreds of soldiers suffering from "something" is not evidence of cause, and until cause is clear, the military should assume no responsibility. This is not the moral obligation accepted by leaders, but it is technically and legally correct. Are CF leaders willing to cede this authority to the medical bureaucracy?

As an example, in interviewing the current Director General Health Services, she reported to me that during a recent CO's seminar with all the new army commanding officers, the question was asked of the COs, who was responsible for injured soldiers? Only 20%, one in every five, said that they were. The remainder were split between saying the medical organization was responsible and not being sure but positive that it wasn't them. I contend that this willingness to pass off the authority to deal with injured members to someone else is a very destructive tendency.

The medical organization, like the legal one, will accept this authority, and indeed they have. What we now see is a medical bureaucracy responding whenever questions are raised about how the CF takes care of its people. The spokesman who addresses the media with the greatest frequency about things like the Gulf War Syndrome or PTSD is the Director of Medical Policy. Even in the eyes of the soldiers, it is becoming increasingly obvious that the medical folks are responsible for their care, and the medical bureaucracy is becoming less willing to accept input from non-specialists on how they should be dealing with our people.

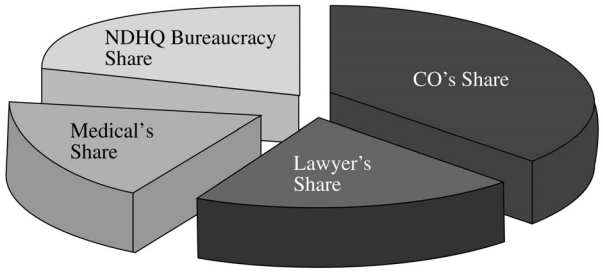
While most of my experiences in the last several years have been dealing with the legal and medical bureaucracy, there are others that concern me equally. I will use one very quick example that deals with the National Investigative Service (NIS) and the Provost Marshal if I may. The NIS has been ceded authority as a result of concerns about abuse by the chain of command dealing with military police investigations. Back when the Croatia Board of Inquiry (BOI) was just recovering from a serious "foot wound" caused by the decision to appoint an army officer with some peripheral interest in the issue as its first president, the NIS announced in a public press conference that they had evidence that sev-

eral members of one platoon had tried to poison their platoon warrant officer. The implication was clear – the medical problems this fellow was facing were caused by the attempts of his own subordinates to poison him. As it turned out subsequent investigation disproved this theory, but it wasn't announced until well after the BOI was over.

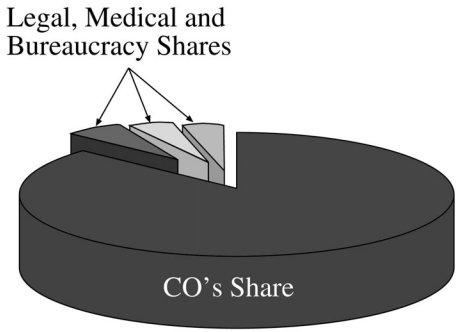
During the SRG we were able to review the evidence the NIS used to reach their conclusion. While there was probably insufficient evidence to lay charges in the civilian court system (only one or two people admitted to being involved in any kind of activity that could be interpreted as trying to harm the warrant officer), the damage done to the reputation of the entire platoon justified in my mind taking some action to clear the names of approximately 30 accused soldiers. The Provost Marshal strongly disagreed and went so far as to complain to the Military Police Complaints Commission (MPCC) that I had overstepped my mandate and done great harm to her reputation. Apparently her reputation was far more important than the reputation of 30 soldiers wrongly accused publicly of trying to harm their superior. Not surprisingly, the MPCC agreed, and to date nothing has been done to clear these individuals. While I do not question the Provost Marshal's understanding of the correct way to proceed from a purely policing perspective, she entirely missed the military significance of the original accusation. In this case, the Provost Marshal had been given the authority to conduct investigations of this type, but without the responsibility for the welfare of the troops affected. In essence, the Provost Marshal is not a line commander, and lacks the competency, as defined in the Pigeau-McCann model, to understand the significance of this decision.

The problem with all of this is that while the bureaucracy is willingly to accept a share of the authority, it cannot be held accountable. Only the commander is accountable. Indeed, suggestions that the bureaucracy can be held accountable are frequently met with disbelief, and rightly so. The challenge for the commander in the field is how does he handle the full accountability when an ever-increasing piece of the authority pie is being shared with the bureaucracy?

Command Authority Pie



Command Accountability Pie



These simple pie charts cannot begin to capture the complexity of the situations that evolve. However, I suspect they begin to explain some of the attitudes towards command that may be developing. Personally, I was shocked a few years ago when I heard from within the air force that officers were turning down opportunities to command. That has also now happened within the army. When we think of the impact on effectiveness of command of the imbalance between authority and responsibility, especially when competency is high, we can begin to understand this and some of the other problems we have been having. More significantly, we can begin to predict the type of problems we may be inviting for the future.

SUMMARY

In summary, the CF and the air force have enjoyed some notable successes in the last ten years with respect to command and control. The Gulf War was successfully prosecuted despite the absence of solid joint command and control doctrine. Domestic operations, such as the Winnipeg Flood in 1997, were conducted in a sound and effective manner and progress was made with respect to joint command and control. As we speak, other air assets are successfully participating with US forces in the "war against terror" in Afghanistan. However, none of these successes came without difficulty, and certainly do not mean that we can stop seeking a better way to do business.

We know that without a robust and effective command capability a military has no authentic combatant power. To ensure that our combatant capability remains effective despite pressures from technology, shifting relationships with the political hierarchy and increased public scrutiny, we must learn to understand and embrace change where it is able to enhance our capability. A major challenge to effective command in the Canadian Forces today is the increasing imbalance between authority and responsibility – or the trend towards sharing authority but leaving full accountability in the hands of the commander. Those in command must understand the nature of this balance and recognize the need to retain authority along with accountability.

The first positive step in that direction is to better discriminate between advice and direction. The second is to remember that your primary responsibility once the mission is secured, is to take care of your people. Colin Powell's statement that once your people quit coming to you with their problems, you have a failure of leadership, has never been truer than it is today.

The command and control lessons we learned as a result of our struggles at the beginning of the Gulf War helped kick start some serious efforts at improving the organizational structure for command. The domestic natural disaster responses helped refine and mature them. The more contemporary operations such as the Kosovo air campaign have reinforced the approach. Now, if we really believe that *command is a key capability that enables all the other capabilities of air forces* then I suggest we need to make the same progress in dealing with the human dimension of command.

NOTES

1. Dr Claudia Wright, University of Winnipeg, Winnipeg, Manitoba in a letter written to the Minister of National Defence and shared with the author.
2. Ross Pigeau and Carol McCann, "What is a Commander?" in Bernd Horn and Stephen J. Harris, eds., *Generalship and the Art of the Admiral: Perspectives on Canadian Senior Military Leadership* (St Catharines, ON: Vanwell Publishing, 2001), p. 101.
3. G.E. (Joe) Sharpe and Allan D. English, *Principles for Change in the Post-Cold War Command and Control of the Canadian Forces* (Kingston, ON: Canadian Forces Leadership Institute, 2002), p. 20.
4. Sharpe and English, *Principles for Change*, pp. 20-1.
5. Pigeau and McCann, "What is a Commander?" p. 82.

AIR FORCE OPERATIONAL COMMANDERS OF THE FUTURE: THE HUMAN DIMENSION

Syndicate 5: Lieutenant-Colonel Harry Kowal (Chair), Lieutenant-Colonel André Brassard, Major Andrew Artus, Major Christopher Blodgett, Major Steve Charpentier, Major Daniel Chicoyne, Major Gaétan Goyette and Major Robin Parker

"There is no more delicate matter to take in hand, more dangerous to conduct, or more doubtful in its success, than to take the lead in the introduction of a new order of things."

- Machiavelli, 1531

INTRODUCTION

Although the Canadian Forces (CF) has experienced significant change over the past years, senior leaders routinely forecast yet another period of unprecedented change. With the recent Force Structure Exercise (FSX)1 continuing to shape the future for Canadian aerospace power generation, the air force community is embracing the responsibility to ensure an appropriate level of preparedness when called to the task. In fact, the Chief of the Air Staff (CAS) Planning Guidance directs that "the Air Force must only assign resources to those air power capabilities that meet the future departmental requirements and are essential and relevant to supporting the Defence planning scenarios."[2] In keeping with this guidance, there have been a number of studies generated on Command and Control (C^2). More often than not, however, emphasis is placed on control and not enough emphasis is placed on command.

This paper is an analysis of the human dimension of command specifically aimed at identifying the competencies and skills required for air force officers to command at the operational level. Key strategic documents serve as guidelines to set the stage for anticipating the future operating environment. Other influential elements such as advances in Information Technology (IT) and a clear appreciation for change are also taken into account. As English points out, "[t]he emphasis now being placed on the human elements in command does not ignore technology, but stresses that technology must be responsive to human needs."[3] While it is essential to define core competencies and skills associated with command at the operational level, it is equally important to verify that a valid officer development plan is in place to address the needs of air force commanders in 2020 and beyond.

A LOOK TO THE FUTURE

To assess the core competencies and skills required of future air force operational commanders, it is necessary to have an appreciation for the environment in which tomorrow's challenges will be met. While it is impossible to predict

the future, a number of forward-looking documents such as *Strategy 2020* and *Strategic Capability Planning* (SCP) for the CF are helping define the vision. There are also many influences continuously shaping the future, not the least of which is the ongoing Revolution in Military Affairs (RMA) and the associated advances in IT. Finally, the one factor guaranteed to impact any preparation for the future is change.

Strategy 2020[4] was published in 1999 as a framework for Defence planning and decision making to help guide the Department of National Defence (DND) and the CF into the next century. At the outset, it was recognized that, "while Canada faces no direct conventional military threat, the world is becoming increasingly complex and unpredictable."[5] How true this statement has become since the terrorist attacks on the World Trade Centre and the Pentagon on 11 September 2001. The world has proven, once again, its unpredictability and, therefore, the CF must strive to maintain its responsiveness in order to meet the challenges presented by any new threat. Fundamentally, the goal of the *Strategy 2020* is still valid: "to provide Canada with modern, task tailored, and globally deployable combat-capable forces that can respond quickly to crises at home or abroad, in joint or combined operations."[6] In fact, the CF has recently established the Joint Operations Group "to provide a rapidly deployable, operational-level command and control capability for the CF in order to meet domestic and international commitments."[7] Joint and combined operations have become standard operating procedures when conducting combat operations and, therefore, air force operational commanders must possess the capability to perform in this environment.

The SCP[8] builds on these themes to provide guidance for the design of the future CF force structure based on the ideas, concerns, and factors not only outlined in Strategy 2020 but also the 1994 *White Paper* and the *Strategic Overview*. Through careful analysis, the SCP has developed a future CF Concept of Operations (CONOPS), which assumes an unstable environment with rogue nations and dangerous non-state actors, as well as asymmetric and technologically advanced threats. Specifically, the CONOPS assumes that CF personnel will frequently encounter combat operations when deployed abroad under United Nations (UN) auspices. The CONOPS also introduces the Canadian Joint Task List (CJTL), which identifies specific capabilities the CF will require at the military strategic, operational and tactical levels of war. The CJTL indicates that at the operational level the CF must have a moderate capability in Command, Information and Intelligence, Sustainment, and Coordination with Other Government Initiatives.[9] While the SCP assumes that, when deployed internationally, the CF will normally operate as part of a larger coalition effort with operational command normally provided by someone else, the moderate operational-level command capability called for by the CJTL is aimed at domestic operations, and presumably for other low-intensity international operations where a large coalition is not present. It is concluded, therefore, that in addition to joint and combined operational skills, CF officers will also require the necessary competencies to command at the operational level.

"A Revolution in Military Affairs can be described as a major change in the nature of warfare brought about by the innovative application of new technologies which, combined with dramatic changes in military doctrine and operational and organizational concepts, fundamentally alters the character and conduct of military operations."[10] Dubois[11] contends that today's RMA is being fuelled by a true revolution in IT. Society has benefited from IT in many ways. It has proved to be an excellent tool enabling people to work more effectively and productively. Advances in communications technology, including the cellular phone, the internet and satellite capabilities have loosened the shackles of the office. The military has also taken advantage of the enabling properties of IT. At the operational level, the commander of today has available significantly more information than only a few years ago. For example, the rate of data transfer during the 1991 Gulf War compared to the 1999 Kosovo conflict increased by a factor of 10,000.[12] With continuing advances in IT, operational-level commanders of the future stand to face an even higher rate of information transfer. As discussed by Bossé and Bertrand though, the limiting factor of data management is the human ability to process information.[13] Understanding these limitations will undoubtedly become critical to effective command. Hence, advances in IT have the potential to provide quick access to an enormous amount of information and it is in the best interests of future operational-level commanders to embrace this technology; although, it is equally important to recognized the limitations.

Indeed, advances in IT can be the catalyst to many changes. In fact, the only constant in the 21st century appears to be change, itself.[14] As Lieutenant-General (Retired) David Kinsman the previous Chief of the Air Staff stated, "A critical area in which I sense the leadership transformation is not yet complete is that of change, the manner in which it is sought out, the manner in which it is embraced and the manner in which it is communicated."[15] To meet the needs of the CF Vision 2020 on officership, operational-level commanders of the future must possess the competences and skills necessary to achieve success in the face of the inevitability of change.[16]

Success at the operational level dictates that "… operational art draws from the mind and personality of the commander."[17] An effective commander must be proficient in the joint and combined operating environments, be readily adaptable to new technologies, doctrines and structures and be well equipped to keep pace with the revolutionary changes associated with the RMA. Officers who fail to excel in these capacities will quickly be found lacking the professional competencies necessary for command at the operational level.

COMMAND

An appreciation of the C^2 relationship is essential to a fundamental understanding of command. In the western world, and in particular within the NATO alliance, the essence of C^2 is based on the principle attributed to General Patton during the Second World War. "Never tell people how to do things. Tell them what to do and they will surprise you with their ingenuity."[18] This type of

approach promotes the idea that commanders should tell their subordinates what to achieve and why, rather than what to do and how. This principle is still guiding the formulation of command doctrine today.[19]

In the air force environment, this overall C^2 principle is rooted doctrinally in the precept that, "centralized control and decentralized execution of air forces are critical to force effectiveness."[20] Doctrinally, airpower is controlled at the highest level to ensure that it remains focused on the broad operational and strategic objectives. According to USAF doctrine, "centralized control provides advantageous synergies, establishes effective priorities, capitalizes on unique strategic and operational flexibilities, ensures unity of purpose, and minimizes the potential for conflicting objectives. Decentralized execution achieves effective spans of control, responsiveness, and tactical flexibility."[21] The lessons of the Vietnam conflict, where command was not unified, were quickly learned and successfully applied during the Gulf War and, as a result, coalition airpower was instrumental to the overall success of the campaign.[22] The successes of the Gulf War air campaign serve to reinforce the principle of centralized control and decentralized execution.

Control of airpower during a joint campaign is centralized under the Joint Force Air Component Commander (JFACC), who is a senior airman appointed by the Joint Force Commander (JFC). The JFC will normally delegate operational control (OPCON) of all assigned and attached air assets to the JFACC. The JFACC is, therefore, responsible for the planning, coordination, allocation, and tasking of all joint air operations.[23] To be effective, the JFACC must be able to synthesize an enormous amount of information and provide clear direction as to what must be accomplished. This is carried out through a centralized directing organization referred to as the Joint Air Operations Center (JAOC) or Combined Air Operations Center (CAOC).[24] The daily product of the JAOC/CAOC is the Air Tasking Order (ATO), through which the JFACC tasks subordinate commanders. The ATO is key to the air battle, since it provides the appropriate details necessary for tactical and operational guidance of air assets.[25] The ATO is therefore the primary tool by which the JFACC is able to achieve the required centralized control of air force assets.

Decentralized execution of airpower is essential to the dynamic environment of the air battle because it generates "… the tempo of operations required to cope with the uncertainty, disorder, and fluidity of combat."[26] Although advances in IT are bringing the battlespace closer to the commander, decentralized execution is crucial to overcoming the commander's inability to have a comprehensive understanding of the battlespace from a distance. The JFACC must use command competencies and skills to provide the guidance necessary for a particular mission, while refraining from reaching down and bypassing the chain of command so as not to lose the moral drive of subordinate commanders. Decentralization of execution provides subordinate commanders the authority and flexibility to make decisions critical to the success of assigned missions.[27] In order to enhance the effectiveness of tactical-level decision-making, the JFACC provides subordinate commanders with his objectives and guidance through the Air Operations Directive (AOD).[28] The AOD, therefore, is the primary tool the JFACC employs to guide decentralized execution in the accomplishment of objectives.

The concept of basing command on the tenet of centralized control and decentralized execution is to intelligently unify the overall effect of airpower toward a common objective.[29] Successes in the employment of airpower since the Gulf War exemplify the impact that effective operational-level commanders can have in the theatre of joint and combined operations. Understanding these principles is essential to the leaders of the air force so that they may enhance the competencies and skills necessary to command successfully at the operational level in joint and combined operations.

From a Canadian context, command is defined as "the authority vested in an individual of the armed forces for the direction, coordination, and control of military forces."[30] In other words, it is the authority over resources to achieve a stated goal or mission. The key element in the definition of command is the concept of authority, which involves the right and power to carry out actions. Pigeau and McCann[31] contend that there are two types of authority: "[o]ne…is a function of military rank and is bestowed by law"[32] and the other is a function of the individual and relates to personal characteristics. It is the second type of authority, termed personal authority, which involves the human side of command. "Personal authority is a function of individual integrity and is bestowed by other members in the military community (not necessarily one's superiors)."[33] In simple terms, it is a blend of leadership and experience. "Personal authority gained through leadership engenders mutual trust, promotes organizational cohesiveness, motivates creativity, increases individual effort and accelerates team building. Without personal authority there can be no effective Command."[34]

The contemporary approach to understanding and appreciating personal authority is to analyse the successes and failures of previous operational commanders with the intent of imitating those qualities that contribute to success at the operational level. Unfortunately, the list of command competencies and skills articulated by the many successful commanders throughout history are collectively far too numerous for any single commander to grasp, let alone master. In fact Bland states that "[s]uccessful command…is never assured by what has gone before. Traditions and examples help officers situate the present, but command can fail for many reasons."[35] Furthermore, the future operational environment is continuously evolving and, although history does provide a reflection of the past with many lessons to be learned, it is more desirable to identify fundamentals of command so that challenges at the operational level in 2020 and beyond can be met. In his study of the human in command, English[36] highlights two interesting perspectives that have emerged and that may provide the key to understanding personal authority: Czerwinski[37] discusses the fundamentals of command in terms of command styles, which he develops for the information age; Pigeau and McCann,[38] on the other hand, present core competencies and skills that are required for successful commanders. The relationship

between the two perspectives provides an interesting insight to developing the essence of personal authority.

Czerwinski proposes that "the function of command is carried out by direction, by plan or by influence."[39] He also proposes that these three styles of command are not mutually exclusive and that they are often employed in combination.[40] Command-by-direction is a very dynamic form of command, which involves the commander issuing appropriate directives as the battle evolves. In 18th century battles, for example, commanders would establish themselves on the high ground to gain a vantage point from which they could direct their troops on the battlefield. Command-by-direction is the oldest style of command, but was essentially abandoned in the late 19th century because the geography of the battlefield prevented commanders from exercising effective command over their resources. Interestingly enough, this style of command may rematerialize with the progressive digitization of the battlefield that is providing the commanders with unprecedented capabilities to communicate directly with their troops. Command-by-direction, however, is counterproductive to the basic tenet of centralized control and decentralized execution. Hence, the operational-level commander must be cautious when employing this command style even though technology might make its use possible.

Command-by-plan has progressively evolved in the air force to the point of becoming a standard operating procedure. As the name suggests, command-by-plan entails centralized planning aimed at instilling some order to the chaos of war. In modern warfare, it normally implies the application of established doctrine to a specific conflict and results in plans that are disseminated to subordinate commanders. In terms of command styles, it is less dynamic than command-by-direction and opponents sometimes qualify it as "fighting the war through checklists."[41] Although command-by-plan seems to fit quite nicely in environments where friendly forces have good control of the situation and are able to dictate the progress of events, it is not very receptive to change and can lead the application of airpower astray.

Finally, the third style of command, command-by-influence, consists of providing subordinate commanders with the outline and goal of a military effort and relying on their expertise and initiative to accomplish the task. Command-by-influence has traditionally not been well embraced in the military because it requires a solid foundation of knowledgeable individuals in which the commander can place trust to exercise correct judgement based on good situational awareness. Having said that, the Germans made very effective use of command-by-influence during the Second World War through mission-type orders also known as auftragstaktik.[42]

When examining the styles of command pertinent to the air battle at the operational-level, especially in the theatre of joint and combined operations, there may be tendency to characterize the command style as command-by-plan. This perception may be influenced by the use of the ATO; however, the reality is that the flexibility inherent in modern air battles comes about from a mixture

of command-by-plan and command-by-influence. Canada's participation in the air campaign during the 1999 Kosovo conflict illustrates this point well. Throughout the campaign, the ATO dictated the targets that were to be engaged and strike packages were issued that included target information as well as the effects desired as a result of the mission. A strike lead would then be assigned the responsibility to orchestrate the tactical battle based on the information provided in the strike packages as well as other requirements such as the rules of engagement, any preferences of coalition nations and the strengths and weaknesses of the resources available. In addition, the orders issued by the JFACC to the subordinate commanders always included the commander's intent. Hence, even though the strikes packages were representative of command-by-plan, command-by-influence exercised through the information shared with subordinate commanders was key to providing the flexibility to enable objectives to be achieved tactically within the commander's intent. For example, CF-18 pilots sent on bombing missions armed with precision-guided missiles were expected to exercise judgement over the release of their weapons in keeping with the commander's intent. The destruction of a specific target might have been important to the operational commander; however, the pilot still had the responsibility to ensure that collateral damage was minimized. This combination of command-by-plan and command-by-influence fits well into the basic tenet of centralized control and decentralized execution. The pilots knew the desired effect of the strikes as well as the commander's intent, but the details of the execution of the missions were left to them to sort out. Hence, for success at the operational level, commanders must be competent in exercising the appropriate mix of command-by-plan and command-by-influence. In fact, striking the proper balance between command styles is essential to achieving personal authority.

Pigeau and McCann have also analyzed the human dimension of command. Based on an empirical study of the Canadian culture of command, they determined that there are "four general classes of competencies: physical, intellectual, emotional and interpersonal."[43] Physical competency "is mandatory for any operational task, from conducting a ground reconnaissance, to loading a weapon, to flying an aircraft."[44] Pigeau and McCann state, however, that physical competency is not all about physical strength; it also encompasses "sophisticated sensory motor skills, good health, agility, and endurance."[45] They do recognize the impact that technology has made "extending physical competency in humans – e.g., weapons, night vision goggles, G-suits, etc…"[46] but they are adamant that "militaries still place great importance on personal physical fitness."[47]

Intellectual competency, on the other hand, "is critical for planning missions, monitoring the situation, for reasoning, making inferences, visualizing the problem space, assessing risk and making judgements."[48] Since each situation is unique, the commander's intellect must also exercise creative flexibility and a willingness to be adaptive and to learn.[49] The continued uncertainty of war and Operations Other Than War (OOTW) truly place a demand on commanders to exercise intellectual competency in all situations.

The third class of competency is emotional competency and it is associated with resilience, hardness and the ability to cope under stress.[50] Pigeau and McCann contend that, "[c]ommand demands a degree of emotional "toughness" to accept the potentially dire consequences of operational decisions. The ability to keep an overall emotional balance and perspective on the situation is critical, as is the ability to maintain a sense of humour."[51]

Finally, interpersonal competency has been deemed an essential requirement in any military organization because it deals with the interrelationship between the commander and subordinates, peers, superiors, the media and other government organizations.[52] This command competency is perhaps the most influential in developing personal authority. To achieve interpersonal competency, operational commanders must develop "… trust, respect and effective teamwork…[by being]…articulate, perceptive, empathetic, and socially cognizant of the environment around them."[53]

Pigeau and McCann's four classes of command competencies relate well with each of the command styles presented by Czerwinski. Employing any given command style effectively requires a different balance of command competencies and their associated set of skills. In other words, one or more of the command competencies influences each of the command styles differently or by a varying amount. Moreover, all of the command competencies are necessary when striking a balance of command styles and, therefore, all are critical in realizing personal authority. The following table is an illustration of our assessment of the relationship between the four classes of competencies defined by Pigeau and McCann and the three command styles developed by Czerwinski.

Command Styles	Command Competencies			
	Physical	Intellectual	Emotional	Interpersonal
Command-By-Direction	+			+
Command-By-Influence	+		+	+
Command-By-Plan	+	+		

\+ = more influence on command style

As illustrated in the table above, all three of Czerwinski's command styles are influenced directly by the physical competency of the commander. Regardless of the command style, the commander needs to possess a physical competency and the associated skills in order to get the job done. Understandably, physical competency also has a direct influence on the ability of the commander to exercise the remaining three competencies and, therefore, provides a foundation for the others to develop.

Command-by-direction can been seen as also being influenced by an interpersonal competency; however, command-by-direction is not a preferred command style at the operational level given that air forces are employed under the tenet of centralized control and decentralized execution. Command-by-plan and command-by-influence, on the other hand, are quite relevant to command at the operational-level and, therefore, must be supported by command competencies.

Exemplified by the ATO, command of airpower at the operational level in joint and combined operations is exercised, in part, by plan. Since there is a strong link between intellectual competency and command-by-plan, emphasis on intellectual competency is essential. While this is true, however, the air plan cannot be successfully accomplished without flexibility to adapt to changing environments and a comprehensive understanding of the commander's intent as provided by the AOD. Therefore, command-by-influence is also a required command style for effective command at the operational level in joint and combined operations. Since, command-by-influence is strongly affected by emotional and interpersonal command competencies, emphasis on the emotional and interpersonal competencies is also essential. It is concluded, therefore, that all four command competencies are required for effective command at the operational level.

OFFICER DEVELOPMENT

To achieve personal authority, the commander of the future will need to demonstrate and exercise all command competencies; hence, it is essential that a professional development plan afford opportunities to grow and harness proficiency in the four competencies. In addition, the development of the skills associated with the competencies must be evolutionary, progressive and timely to ensure that the commander has the skill sets necessary to exercise effective command at the operational level. As Pigeau and McCann state, "[d]evelopment of the relevant characteristics at the appropriate stages can be accomplished in three mutually supporting ways: through training, experience and professional education."[54] A balanced and appropriate combination of all three is instrumental to an effective development programme.

The air force supports early developmental training through the Basic Aerospace Operations Course (BAOC), the Advance Aerospace Operations Course (AAOC), and the Aerospace Systems Course (ASC). Education in joint and combined operations for senior officers is currently provided by the three Canadian Forces College courses in Toronto: the Command and Staff Course (CSC) for majors, the Advanced Military Studies Course (AMSC) for lieutenant-colonels and colonels and the National Security Studies Course (NSSC) for colonels. Although the CSC and AMSC offer doctrinal education with reference to the operations planning process and air power, they are not sufficiently comprehensive to prepare senior air force officers to command at the operational level in both a joint and combined context. They seem to be more focussed on familiarity than on competency. The CF, therefore, is lacking rigorous operational-command development for senior air officers. A similar problem exists in

the US. As General Montgomery Meigs emphasized in 2001 as the Commander of US Army Europe and 7th Army,

> [W]e must foster a better understanding of the uncertainty inherent in operations and the processes by which they can best deal with that uncertainty. Our professional education must engender better decision making by furnishing the intellectual tools that bolster leaders against stress, friction, and fog, and against the pressures of their fears and those of their political masters. We must encourage the practice of thinking in terms of joint and combined decision making. In this regard we need a very sophisticated course of hands-on case studies in how decisions are enabled and made, not just the study of staff duties and political science in a military context.[55]

What is missing is the connection between senior officer development and the four command competencies required at the operational level. The physical competency has been established as a baseline for the other competencies to thrive and, therefore, requires appropriate attention in the development of operational commanders. While it is true that fitness and health is sufficiently emphasized throughout officer development, it is only appropriate that an officer development plan include education in the other areas highlighted by Pigeau and McCann such as endurance and advances in technology because operational-level commanders need to know their physical limits. For example, learning the fundamentals of nutrition and sleep deprivation could significantly enhance the effectiveness of operational-level commanders.

To develop intellectual competency, officers must not only pursue academic upgrading, but also gain command experience so that their intellect is continuously challenged and exercised. While a dedicated course on command at the operational level would provide officers with the appropriate education, effective officer development requires practical operational-level command exposure and experience. Colonel Dwight Davies who was the National Support Element Commander in Aviano during the first seven weeks of the Kosovo conflict emphasized the need for practical air force command experience.[56] In order to fill this experience gap, Colonel Davies recommends that senior air force officers, who are destined for command at the operational level in joint or combined operations, be employed on staff in NATO Headquarters, Supreme Headquarters Allied Powers Europe (SHAPE), or on exercises like Maple Flag and Blue Flag. Such experience not only affords experiential training with regard to assigned tasks, but also great insight by simply observing those in higher positions of authority in action. One can learn what to do as well as what not to do.

The emphasis on the emotional competency is the commander's ability to cope with stress. Although stress management courses already exist, they are typically mandatory only before and after deployment. Stress management courses should be integral to officer development so that coping skills can be learned. Case studies and operational exercises are also excellent venues to enhance the operational-level commander's emotional competency. In fact, participation in practical exercises could serve as a test of emotional competency by virtue of the commander being employed in a highly stressful environment under simulated and controlled conditions.

Interpersonal competency cannot be achieved by study alone; it must be developed through experience. Important aspects of interpersonal competencies include being fair, upholding high moral and ethical values, and employing the leadership style appropriate to a given situation. It depends strongly on the commander's people skills and is directly related to personal authority. Various courses are available to provide officers with a basic understanding of the dynamics involved when interacting with people; however, effective development of interpersonal competency is truly gained through experience and guidance.

While it may appear simple to talk of core competency development in terms of courses, exchange postings and operational exercises, it is the actual selection of operational commanders that remains a vital aspect of the development process. Commanding officers of units, squadrons and wings within 1 Canadian Air Division (1 CAD) are selected by the Air Personnel Appointments Board (APAB) and approved by the Chief of the Air Staff (CAS). The APAB essentially marks the first step in the selection process for operational commanders and does so on the basis of the following criteria: leadership, judgement, communication, courage, war fighting attitude, knowledge and experience, ethics and values, and resource management.[57]

It can be argued that individuals should be responsible to seek out their own professional development opportunities to ensure selection for command; however, this is not the best approach. The process needs to be more formal to ensure the right personnel are receiving the right education and that the few operational-command training opportunities are used wisely. Joint headquarters operations exercises, such as Blue Flag, should target potential command candidates rather than personnel who can be spared at the time. To this end, a system of mentorship could be implemented. Senior air force officers could serve as mentors of those individuals identified as having the potential to command at the operational level. The mentoring process could be developed to enhance the professional development process of air force operational commanders of the future.

CONCLUSION

This study of the human dimension of command identifies key competencies and skills required for air force officers to command at the operational level. Based on strategic guidance, the future operating environment is expected to continue to be unstable with rogue nations and dangerous non-state actors, as well as asymmetric and technologically advanced threats. Needless to say, effective operational-level commanders must be proficient in joint and combined operations, be readily adaptable to new technologies, doctrines and structures and be well equipped to keep pace with the revolutionary changes associated with the RMA. In addition, effective operational-level commanders must have

a clear appreciation for the C^2 principle of centralized control and decentralized execution, which is critical to the successful projection of airpower.

The command portion of C^2 is directly related to the authority vested in the commander, which is both a function of law and the individual. In effect, the human side of command gives rise to personal authority without which effective command cannot be achieved. Two perspectives on the human dimension of command help the understanding of personal authority. Pigeau and McCann present four classes of command competencies that relate well with each of the three command styles developed by Czerwinski. A distinct combination of command competencies is required to employ a given command style effectively; however, all four competencies are essential to realizing personal authority. The four classes of command competencies are physical; intellectual; emotional; and interpersonal.

An appropriate balance of training, education and experience is paramount to an effective officer professional development programme. In the air force, training is provided early in officer development while education is intended for later. The operational-level education provided by the Canadian Forces College, however, is directed toward familiarization. Rigorous operational command development for senior air officers is still lacking. The CF is also lacking the connection between senior officer development and the four competencies required for command at the operational level. Development of the physical competency needs to be enhanced to include areas highlighted by Pigeau and McCann such as endurance and advances in technology. Intellectual competency development demands opportunities for academic upgrading as well as command experience that challenges and hones the commander's intellect. The emotional competency is related to the commander's ability to cope with stress and must be developed through stress management courses, case studies and operational exercises. Finally, interpersonal competency can only be developed effectively through experience and guidance.

The final aspect of officer development is the selection process of operational commanders. While the APAB screens candidates based on set criteria, the inclusion of a formal mentoring programme would assist individuals with the potential to command at the operational level. An effective mentoring programme would ensure officers gain the appropriate balance of training, education and experience essential to the development of command competencies that are required of air force operational commanders of the future.

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THE DEVELOPMENT OF AIR FORCE OPERATIONAL COMMANDERS

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"In the art of war, experience counts more than any amount of abstract truths"

Clausewitz, *On War*[1]

INTRODUCTION

Does the Canadian Forces (CF) groom air force officers to ensure that those destined to be operational-level commanders are provided with the requisite skills to satisfy the demands of this position? How can a commander be prepared to lead the air force in peacetime, ready his forces and ultimately lead them to victory in war? Command is the most important skill of the military commander, yet it is the most difficult to develop and master. The art of command requires years of practice across a spectrum of military situations in order to develop proficiency and expertise.

There are too few real-world opportunities for Canadian air commanders to develop and maintain operational-level expertise, but there remains a vital requirement for that expertise. Internationally, Canada tends to commit only tactical units to a coalition effort, but air force officers must nevertheless be able to integrate into a Combined Air Operations Centre (CAOC), an operational-level command element. The emphasis on homeland defence after the 11 September terrorist attacks has also increased the scale and scope of air defence operations within the Canadian NORAD Region (CANR), Canada's sovereign theatre of operations. There also remains an ever-present responsibility for senior commanders to control air forces in the conduct of major domestic operations such as disaster relief and humanitarian assistance. Despite the lack of opportunity to practice the operational art, the requirement to command in large-scale crises at a moment's notice looms every day. Therefore, it is imperative that air force commanders develop the requisite skill sets for operational command by other means: focusing on experience, training and education in order to better prepare to meet the requirements of command at the operational level.

This paper will begin with a discussion of the required competencies of the operational-level commander, followed by a presentation of the theoretical aspects of preparation for operational-level command in terms of experience, training and education. This will be followed by a synopsis of the limited opportunities for CF air force officers to employ forces, which jeopardizes the institution's capacity to produce competent operational-level commanders and

staffs. It will subsequently identify how the CF trains and educates commanders for the operational level of command. To evaluate potential alternatives, a comparison will be made of how the Royal Air Force (RAF), Royal Australian Air Force (RAAF) and United States Air Force (USAF) develop operational commanders. Perceived gaps in experience, training and education will be addressed in the final section by offering recommendations on how the CF air force can improve its strategy to ensure the deliberate development of competent operational-level commanders.

opment throughout one's career. Professional development consists of three elements: experience, training and education.[9] These elements are complementary and all must be in place to ensure that the leader is adequately prepared to exercise command at the operational level.

Experience is probably the most essential ingredient in the process of creating a successful military leader. Experience, good or bad, matures the officer, and prepares him/her for leadership at the higher levels. There are few viable alternatives to experience either in peacetime leadership and management, or command in war. Experience validates the knowledge and skills acquired through education and training. The individual can internalize the lessons learned from training and education and create a personal knowledge base that will be useful for later assumption of command at higher levels of the military hierarchy.[10] However, achieving the right types of experience presents continuing challenges for the individual, as well as for the organization. The fact is that very few officers will have what is considered to be the perfect experience for assuming command at the operational level. On the other hand, it is not necessarily a disadvantage if leaders follow different paths to reach the same point in their career. Personal experience tends to be narrow in focus; hence, limited in perspective,[11] and the higher one advances in the military organization, the broader is the perspective that is needed to satisfy the requirements of the position. This points to the fact that experience has to be complemented by other ingredients in the making of a military commander, namely training and education.

In practice, training simulates experience that is compressed in time and space,[12] and it is designed to respond to technical questions or provide answers to specific problems. Although most training will take place at the tactical level, staff exercises and simulations can offer an opportunity to train leaders and staffs at the operational level. Given the distinctions among the three domains of learning (psychomotor/doing, cognitive/thinking, and affective/feeling), training is normally concentrated on the psychomotor domain.[13] This means that training is focused on skills, techniques and questions with concrete or exact answers. The fact that training is based on experience means that it has to reflect past wars, operations and exercises as well as existing plans and procedures. Hence, training does not necessarily prepare one to fight future conflicts. Here is where the third aspect of the making of a military commander comes in to play.

Education, or more precisely, professional military education, should prepare the officer to identify and define the challenges in a complex and uncertain environment and to find and analyze alternative solutions to the challenges. The main purpose of education is to develop the ability to think critically, to challenge existing ideas and concepts, to separate facts from opinions, to evaluate proof, to evaluate strengths and weaknesses of a possible solution, and to define the essentials of a subject.[14]

Professional military education aimed at the operational level must provide the student with a thorough understanding of the nature of war, military theo-

ry, air power theory and the dynamic relationship between these aspects. It is also essential that education prepare the leader to operate in the zone between the political and military level in order to understand the interaction between politics, diplomacy, and war. More specifically, the commander should have an understanding about how political objectives will affect military action at all levels of war. Education demands some time for maturing, and it is too late to start thinking operationally the day one assumes operational command. This points to the fact that professional military education should be part of a career-long process of learning.

In short, experience, training and education are all part of the ongoing professional development process that prepares the individual for decision-making at higher levels of the organization, and that helps the organization to identify the people best qualified or suited for higher ranks and responsibilities.

EMPLOYMENT OPPORTUNITIES AT THE OPERATIONAL LEVEL OF WAR

"The Air Component Commander should always be an experienced air commander who is thoroughly knowledgeable in the operational art of air warfare and the employment of aerospace power."[15] According to Newell, "the operational level becomes understandable only after mastery of war [and major operations] from the tactical level."[16] Although tactical experience is essential, this in itself will not guarantee success at the operational level. To effectively prepare air force officers to assume operational-level command, a careful career progression must be charted to provide a continuity of relevant operational-level experience from major to major-general. The broad abilities required of an operational commander – to plan, execute and coordinate joint theatre-level operations – must be developed coherently through deliberate exposure to the force-employment of air assets. Force-employment refers to "the process of exercising command and control of forces tasked to carry out operations".[17] Though the title "Commander" is prevalent throughout the CF air force chain of command, there are remarkably few opportunities to actually employ forces. Air force commanders indeed exercise full command of their assigned personnel, but they rarely exercise operational command or operational control – they are almost exclusively in the business of generating forces to be employed by other commanders. This can be said of squadron commanders, wing commanders and, to a certain extent, the Commander 1 Canadian Air Division Commander (Comd 1 CAD). Viewed narrowly, Comd 1 CAD only force-employs counter-drug operations, routine airlift, search and rescue (excluding British Columbia, the Yukon and the Atlantic provinces) and airshows. Even in his capacity as Commander Canadian NORAD Region (CANR), he normally force-employs only four air sovereignty alert fighters. Maritime helicopters, maritime patrol aircraft and coastal search and rescue assets are force-employed by the east or west coast Maritime Commander, and all international and domestic contingency operations are force-employed by the Deputy Chief of Defence Staff (DCDS). All other flying is force generation. This is not to say that operational-level command abilities are not required within Canada's air force – they surely are. In times of tension or war, Commander CANR will exercise operational control of the considerable land, sea and air forces assigned to the CANR theatre of operations. Senior air officers are also liable at any time to be Air Component Commanders for major domestic operations such as a major air disaster (MAJAID), a west coast earthquake (Op Paladin), the Manitoba flood (Op Assistance), and summits like the G-8 and Summit of the Americas. They could also conceivably act as the Joint Force Air Component Commander (JFACC), or the Joint Task Force Commander (JTFC) for the DCDS, NATO or UN-led operations.[18]

At issue is how competencies are currently developed to meet the tasks of operational- or theatre-level force-employment in Canada's air force. Below the rank of colonel, there are virtually no opportunities to employ forces and there are few opportunities at the rank of colonel. Furthermore, as seen in the table below, of the eleven current air force brigadier-general positions, none are commands. Only two are deputy command positions (D/Comd Continental United States NORAD Region and 1 CAD A3) and only one other is involved directly with operations (COS NDHQ Air Staff).[19] When all 19 air force generals are considered (Table 1), the synopsis is similar:

a. only five are directly involved with operations;
b. three of these are involved in NORAD operations only; and
c. only two routinely force-employ 1 CAD assets.

This dearth of formal in-house experience results in an extremely small pool of officers from which to select ready operational-level commanders.

AIRFORCE GENERAL OFFICER ASSIGNMENTS (as of Mar 02)	
GENERAL	**BRIGADIER-GENERAL (11)**
CDS	A3 (also acts as DComd 1 CAD) **
LIEUTENANT-GENERAL (3)	DComd CONUS NORAD Region *
VCDS	V-Dir Cheyenne mountain Op Ctr *
CAS	A1/Air Reserve Advisor
DCINC NORAD	A4
MAJOR-GENERAL (4)	DG Air Force Development
ACAS	DG Air Personnel
Comd 1 CAD **	DG Joint Force Development
NORAD J3 *	DG Reserves and Cadets
Chief Review Service	DG Military Careers
	DG log J4

* Involved in NORAD operations only
** Routinely force employs 1 CAD assets

Table 1: Force-employment opportunities for air force general officers

The experience of air force colonels straddles both the tactical and operational levels. The wing commanders are generally tactically oriented, while the operational staff officers acquire valuable experience acting on behalf of the

Commander. In any case, the level of force-employment experience amongst colonels is decidedly thin.

Of the 13 wings, each commanded by a colonel, very few have forces that would be employed as a wing. The following table depicts, by wing, the limited force-employment opportunities for respective Wing Commanders.

WING	FORCE - GENERATED UNITS
5 Wg Goose Bay **9 Wg Gander**	One helicopter unit each, force-generated for the Search and Rescue Region (SRR) Commander.
16 Wg Borden **22 Wg North Bay**	No air assets to force-employ.
15 Wg Moose Jaw	Training base with no mandate or capability to be employed.
17 Wg Winnipeg	Single operational CC-130 unit and a training unit.
19 Wg Comox	One Maritime Patrol Aircraft (MPA) unit force-generated for employment by the Maritime Commander. One SAR unit generated for the SRR Comd.
12 Wg Shearwater	Three Maritime helicopter units force-generated for the respective Maritime Commanders and force-employed as air detachments of no more than two aircraft.
14 Wg Greenwood	One MPA unit force-generated for employment by the Maritime Commander.
8 Wg Trenton	Generates forces to be employed by Comd 1 CAD.
1 Wg Kingston **3e Escadre Bagotville** **4 Wg Cold Lake**	Enough aircraft to be employed as a wing, although these would most likely be force-employed by a higher agency.[20]

Table 2: Force-employment opportunities for Wing Commanders

Quite clearly, Canadian Wing Commanders do not acquire relevant operational-level experience by mere virtue of their command appointments.[21] The problem, then, is to identify which opportunities provide a brigadier-general or colonel the requisite operational-level experience to be an Air Component Commander or Joint Force Commander.

Arguably, the colonel positions that provide the most relevant routine exposure to force-employment are the five Directors (and their staffs) working directly for the 1 CAD A3, which include Maritime Air Component Commanders Atlantic and Pacific (MAC[A], MAC[P]), CANR Director of Operations, Director Force Employment, and Director Combat Support Operations. Other highly relevant positions are the Director Air Force Employment (DAirFE) at NDHQ, and the D/Comd Alaska NORAD Region (ANR). These billets not only require an understanding of the operations planning process, but they also further develop this understanding and are a valuable bridge of operational experience between the tactical and operational levels. Future commanders of 1 CAD/CANR, JFACCs and JTFCs should be drawn from this pool of officers.

A concerted effort must be made to purposely develop officers for the operational level of command. Ideally, the command succession process should adopt deliberate career planning, training benchmarks and qualification requirements to ensure that a suitable number of colonels and generals are prepared to command a MAJAID recovery or Canada-led UN mission or any other contingency. This will ensure the right people acquire the right experience, training and professional education to meet Canada's defence missions. Command succession would naturally benefit from having the largest possible pool of operationally focused officers from which to choose. Given the lack of operational/joint experience opportunities, an analysis of the institution's training and education capabilities is required to determine if this gap is somewhat covered by another means.

CF TRAINING AND EDUCATION FOR THE OPERATIONAL LEVEL OF COMMAND

The following section provides an overview and analysis of the professional development provided to CF air force officers related to the competencies and skills required to meet the challenges of employment at the operational level of command. Within the area of the operational level of command, CF education focuses on joint operations; whereas, experience (albeit limited) is more environmentally focussed. Within the air force, the Basic and Advanced Aerospace Operations Courses lay the foundation for an understanding of air force operations and doctrine and introduce the concepts related to joint operations. Although a basic knowledge is attained at this level, actual preparation for the operational level of command is provided in two courses delivered by the Canadian Forces College; namely the Command and Staff Course (CSC) and the Advanced Military Studies Course (AMSC).

Senior majors (and naval equivalents) attend the CSC, the aim of which is to develop senior officers (key majors, lieutenant-colonels and colonels) for tactical-level command and operational-level staff appointments and for component or joint operations in national or combined forces.[22] The aim of the AMSC is to prepare colonels and lieutenant-colonels (and naval equivalents) for command and staff appointments at the operational level within national and international headquarters and organizations.[23] According to Colonel Romses, Director of Senior Appointments, "… unlike five years ago when most generals/flag officers had little or no professional development courses (i.e. National Defence College, AMSC/National Security Studies Course, War College, Royal College of Defence Studies etc) they virtually all now have AMSC or an equivalent course…"[24] Although the AMSC curriculum provides for a cursory discussion of the capabilities of individual service components, the thrust of the course is the development of joint and combined versus component-specific campaign plans at the operational level.[25]

While these courses provide a framework for the acquisition of operational-level experience, they alone will not provide air force officers with the experience needed to function at the operational level either as staff or in a command role in an Air Component or a Joint Headquarters. These courses provide the military education related to the doctrinal aspects of the operational level of war, but not the training. Again, training refers to that which simulates experience compressed in time and space. Colonel A.J.R. Boyer supported this assessment when he compared the benefits of his recent AMSC attendance to the exigencies of his command of the CF-18 detachment in Aviano in 1998, and his term as shift battle staff director for the Vincenza CAOC. He stated that even if he had attended the AMSC before these assignments, it would not have fully prepared him. Based on his experiences in these roles, Colonel Boyer believes that "we do not adequately use or train the skill sets required to deliver airpower at the operational level."[26] This view is echoed by Colonel C.J. Henneberry, MAC(P) who stresses that although we are provided an excellent doctrinal education on the operational level of war, we are seriously lacking the training.[27] He believes that battlestaff training should be provided throughout the air force officer's career, as officers must be prepared to fill key positions all the way up to and including air component commander. It is understood that Canada would most likely not be the lead nation in international operations; however, air force officers should be trained for employment on very short notice as staff in a CAOC. The Battle Staff course, which has recently been redeveloped by 1 CAD, is a two-day course that focuses on providing participants with the basic skills needed to use the communication systems within the Air Operations Centre (AOC).[28] Although this training may be essential for employment within the 1 CAD AOC, it does not necessarily prepare personnel for employment in a CAOC. In its new form, the course must be supplemented by exercises and additional CAOC position-specific training to ensure that trained personnel are fully employable as active staff officers within a CAOC. Significant progress has been made in providing out-service training on the operations planning process to our officers; however, factors such as the number of available billets and course serials limit the number of officers being trained in the functions of the CAOC.

Although the CSC and the AMSC offer excellent doctrinal education on the operations planning process and air power, they alone will not adequately prepare senior officers to meet the challenges of employment at the operational level of command. Given the identified gap in the provision of training, a comparison with our allies is worthwhile.

COMPARISONS WITH OTHER COUNTRIES

Having completed an overview of the CF approach to preparing air force officers for employment at the operational level of command, a comparison with Great Britain, Australia and the United States might offer potential solutions to our challenge.

Within the RAF, the training, experience and education for the operational level of command is similar, although more extensive, than that of the Canadian air force. Given their larger size and more comprehensive involvement in operations, the senior officers of the RAF have had many more opportunities to gain valuable experience at the operational level of war. Examples of these opportunities include the Falklands war, Desert Storm and the Kosovo conflict where the RAF played key roles. More specifically, in the Gulf war an RAF officer was in the position of Chief of Staff (COS) in the Joint Force Air Component Commander Headquarters (JFAC HQ). This is not surprising since, other than the USAF, the RAF provided the most substantial contribution of assets.

The RAF training and education programmes are also more complete than the equivalent programmes in Canada. The RAF has courses that are equivalent to Canada's Advanced Aerospace Operations Course (AAOC), Command and Staff Course, and the National Security Studies Course (NSSC).[29] The RAF also offers a number of more specialized courses for RAF officers on an as required basis.[30] Some of these are similar to what is offered in Canada but they also include a number of war-fighting courses, for which there is no Canadian equivalent. For example, the Air Battle Combat Support Course is a two-week course that trains officers earmarked for employment in the support positions of the JFAC HQ A-Staff. Another example is the Air Battle Staff Course, which is a four-week course that prepares officers for air battle-staff appointments at the operational level of war.

Overall, the RAF provides its officers with significant training and experience opportunities at the operational level of war. The RAF Air Warfare Centre (AWC) focuses much of that training. The AWC is a large organization, split between several bases, which is comprised of five functional departments. The operational division is responsible for operational support as well as the administration and instruction of all air warfare courses.[31] The mission of the RAF AWC is to "contribute to the military capability of Strike Command by developing and implementing operational and tactical doctrine and providing essential and timely integrated mission support to Royal Air Force operational units in peace and in war."[32]

The RAAF is an organization more comparable in size to the Canadian air force and may therefore offer a much better comparison. The RAAF has also modelled its air force on the RAF. Therefore, like Canada, it has a system of education and training that is quite similar to the RAF. However, as with Canada, its smaller size and more limited resources do not provide for the same opportunities to gain experience at the operational level.

Like the CF, the RAAF does not provide formal Joint Force Air Component Commander (JFACC) or Joint Air Operations Centre (JAOC) training. However, the Australian Defence Force has instituted an operational-level construct that offers a number of opportunities for RAAF officers to function at the operational level of war and practice the operational art. This construct includes a Headquarters Australian Theatre commanded by a two-star general and an associated Air Component Commander also at the two-star level that is supported by a Joint Air Operations Centre (JAOC).[33] This construct is also duplicated as a Joint Task Force with its associated JFACC and JAOC.

"The RAAF made considerable headway in the arena of doctrine development and air power education in the early 1990s"[34] with the establishment of the Aerospace Centre. While this was an important step, the RAAF now believes it requires an institution such as the RAF AWC to provide formal links between doctrine development, training, education and operational capability.

Given its similarities, both in size and in doctrine, the RAAF could be used as a good benchmark for Canada. Their system of training and educating senior air force officers to prepare them for operational-level command positions should be studied with care.

As befits the military of a superpower, the US Armed Forces have a comprehensive suite of programmes that prepare officers to eventually assume duties as a Joint Force Commander or service component commander. The Air University, at Maxwell Air Force Base, offers most of the operational-level education available to Air Force officers. Three major institutions of Air University are Air Command and Staff College (ACSC), Air War College (AWC), and the College of Aerospace Doctrine, Research and Education (CADRE). The ACSC is roughly equivalent to the Canadian Forces College (CFC),[35] while AWC emphasizes "the effective employment of aerospace forces in joint and combined combat operations"[36] for senior officers, and is roughly an air-component only equivalent of AMSC and NSSC combined. CADRE offers three courses that prepare general officers to assume the most senior positions in joint and combined warfighting organizations.[37]

To complement the knowledge gained on the above courses, two USAF institutions offer practical training in the form of wargaming simulation, exercises, and hands-on equipment training. The USAF Command and Control Training Innovation Group runs a Command and Control Warrior School that provides hands-on training in Air Tasking Order and Airspace Control Order production, and battle management system operation.[38] The second institution, CADRE's Air Force Wargaming Institute, provides wargaming and exercise support to a wide variety of customers, including the above-mentioned AWC and ACSC courses, as well as the CFC.[39] The exercises and wargames range from simple tactical scenarios to theatre-level campaigns.

From a joint perspective, the Joint Forces Staff College in Norfolk offers multiservice operational warfighting education in the form of a Joint and Combined Staff Officer Course, a Joint Planning Orientation Course, and a Joint and Combined Warfighting School. On the practical side, the Joint Warfighting Center conducts joint training, including theatre commander training and joint task force commander training, as well as NATO and Partnership for Peace training.

It is apparent from this brief overview that both the doctrinal and practical aspects of education covering the operational level of command are considered essential in providing the base from which an officer can then gain experience. To focus the education and training and to provide vital mentorship, the common denominator is the creation of an "air warfare college."

FILLING THE GAP

A number of gaps have been identified in the preparation of our future air force commanders for employment at the operational level of warfare. Specifically, there are too few opportunities for Canadian air commanders to develop and maintain operational-level expertise. Not only is actual experience limited, but the training opportunities, that could be designed to compensate for the lack of experience, are also too few in number. Although the combination of education, training and exercises that are currently available provide the foundation necessary to understand the operational level of warfare, it does not fully prepare air force officers for employment at that level. Lack of exposure to the broader spectrum of air force activities and functions and limited opportunities to learn and develop skills required at the operational level represent major challenges to the professional development of future operational-level commanders. To improve the current professional development approach, four specific areas should be further examined and exploited: postings and exchanges, individual training, simulated and live exercises, and mentoring.

The posting of air force officers to specific positions within the organization and to out-of-country positions has always been an effective means of acquiring desired knowledge and skills. Posting opportunities should further be enhanced by identifying and securing exchange positions considered as relevant training opportunities for the operational level of warfare. Given the limited number of colonel positions that provide exposure to force employment, selection of personnel to fill these positions should be based on their potential to be future operational-level commanders. In this way, a pool of senior air force officers with experience in, and an understanding of the functions at the operational level of war, would be available for the challenges at higher levels within the organization.

As was discussed previously, the air force offers a number of excellent courses that provide a good understanding of the operational level in doctrinal terms. However, there is a lack of training that specifically addresses certain aspects that are critical to employment at the operational level. The air force should urgently pursue the development of short courses in air campaign planning, air tasking order development and production, and joint targeting under the mentorship of an air warfare centre. Although the Battle Staff Course has recently been revamped to ensure that personnel can use the tools within the 1 CAD AOC, this training is not necessarily transferable to a CAOC. Hence, in preparation for employment at the operational level, opportunities to send senior majors/junior lieutenant-colonels to the USAF Joint Air Operations Center (JAOC) courses and general officers to the USAF Joint Force Air Component Commander (JFACC) courses should be increased. These courses are ideally suited to prepare operational commanders and staff for the planning and execution of air operations.

Experience gained through exercises is one of the most relevant ways of potentially providing our senior officers the requisite skills to succeed at the

operational level of command. Historically, Canada has run exercises such as JOINT MAPLE FLAG and CANADIAN JOINT EXERCISE FALCON (CANJEX FALCON), which trained up to the brigadier-general level to operate as component commanders.[39] Given that these were completely run by Canada, they provided the unique opportunity to train air force personnel in all areas of the CAOC. However, the last CANJEX FALCON was conducted in 1998, and the next one will not occur before 2003.[41] Although these exercises were very expensive and manpower intensive, they served to fill the experience gap at the operational level of war. Given the small size of Canada's air force and its limited resources, one may question our ability to conduct training exercises on the scale needed for true experience at the operational level. Fortunately command post exercises can assist in overcoming these limitations. One of the best opportunities to develop operational-level experience is by specifically appointing colonels to be air component commanders for small-scale operations, command post exercises (CPX) such as Ex BLUE FLAG, or field training exercises (FTX) such as Ex MARCOT. Specifically, CPX BLUE FLAG is a USAF wargame conducted to sharpen the war-fighting skills of commanders, their staff, and coalition forces, by giving them hands-on experience through simulation before they have to make decisions in an actual war.[42] The most recent BLUE FLAG, which was conducted over a 10-day period in February 2001, involved more than 750 people from various countries working together as a coalition. Colonel Cleland, Wing Comd 4 Wing Cold Lake, who worked at the operational level in Vincenza as the Canadian Senior National Representative and as a Battlestaff Director in the Balkans Combined Air Operations Centre stated that "… the experience of participating in exercises like MAPLE FLAG, BLUE FLAG in the USA, and MARCOT 98 in Halifax prepared me reasonably well for what awaited me in Vincenza…"[43] These experiences should be maximized, formalized, and evaluated through exposure to simulation and wargaming, and courses such as the AMSC. There are many opportunities to use wargame simulation and gaming to develop the skills necessary to operate within a CAOC, including command and decision-making. New developments in the fields of computers, distributed networking and simulation technologies have become the focal point of several US research initiatives aimed at creating fully integrated, distributed mission training environments. The experience gained from these exercises should be considered a vital component of the air force officer's formal training.

The employment and exploitation of a mentoring program as a means of guiding professional development and counselling of senior officers is an approach that has not formally been used across the Canadian air force. A program of formal mentoring can assist in the developmental process and in assignment and selection. The institutionalization of this approach would ensure that senior officers with significant potential are identified early, counselled adequately and given the training and employment opportunities discussed to ensure their readiness at the right time. "While there are potential downsides to a formal mentoring program, including perceptions of favoritism or cronyism and some diversions of energy from the immediate task, the consensus is that mentoring programs pay their way."[44]

CONCLUSION

In order to succeed at the operational level of command, CF air force officers must primarily develop their intellectual competency, and decision-making skills related to their primary tasks of planning, executing and coordinating joint theatre-level campaigns. Furthermore, as officers advance in their military career, the requirement to respond to unpredictable situations demands extensive analytical skills. For the general officer, these skill sets are primarily developed through exposure to a myriad of experiences and through professional education.

Canada's air force is tactically sound; however, mastery of the tactical level does not itself guarantee success at the operational level. Although much progress has been made in the areas of education, the primary gap in the development of the air force operational-level commander is the fact that there are few opportunities to practice, hence develop, the skills expected at that level. If they do have experience at the operational level of command, it is often by happenstance. The primary limitations are that: there are very few positions from major to brigadier-general established at the operational level; there are no command positions at the brigadier-general rank within the air force; 1 CAD is more of a force generator than a force employer; there is no preferred career path for air operations officers; there are limited training opportunities across all rank levels at the operational level of war; and the air force does not routinely conduct exercises to develop the necessary abilities for the operational level of war. These issues must be addressed to ensure that our future operational-level commanders succeed in meeting the challenges at this level across the spectrum of conflict.

One vital component of officer professional development is a formalized mentoring system. In order to ensure that our operational-level commanders are ready for the challenges, a system must be in place that identifies them and provides them with the opportunities in terms of experience, training and education at the right time in their career. These opportunities, which will develop the tools required for success, include employment at the operational level throughout one's career. Given the limited opportunities to force-employ, senior officers must be carefully selected to make optimal use of these and ultimately create a pool of proficient operational-level commanders for future command. Battle staff training and exercises with allied air forces should complement these employment opportunities in preparation for meeting the requirements within a CAOC. Furthermore, the pursuit of wargame simulation and gaming opportunities is encouraged to develop command and decision-making skills within the CAOC environment.

A multi-pronged approach to the development of the successful operational-level commander is required. Although great strides have been made in this area, future emphasis should be placed on experience and training for employment with coalition forces at the operational level of war.

NOTES

1. Digital Attic: Warfare, http://www.pvv.ntnu.no/~madsb/home/war/artofwar/theorypractice.php3, retrieved 04 Feb 02.
2. Canada, Department of National Defence, "Command", B-GL-300-003/FP-000, (Ottawa: DND, 1996), pp. 1-5.
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4. Ibid., p. 84.
5. United Kingdom Ministry of Defence, *Army Doctrine Publication – Command*, Chief of the General Staff, Apr 95, pp. 3-9.
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35. With curriculum emphasis being "the application of air and space power at the operational level of war." Air University Fact Sheet, http://www.au.af.mil/au/facts.html, 25 Feb 02.
36. Air University Fact Sheet, http://www.au.af.mil/au/facts.html, 25 Feb 02.
37. The three courses are the Joint Flag Officer Warfighting Course, the Combined Force Air Component Commander (CFACC) Course, and the Joint Force Air Component Commanders Course. The current 1 CAD A3, BGen Watt, is a recent graduate of the CFACC course.
38. Additionally, the hands-on portion of CADRE's CFACC course is conducted by C2WS.
39. The CFC conducts [U.S.] Air Force Command Exercise System (ACES) Pegasus-Canada during the CSC.
40. Telephone interview Colonel Henneberry, Comd MAC(P), 1 Mar 02.
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THE RELEVANCE OF THE CONCEPTS OF OPERATIONAL LEVEL OF WAR AND OPERATIONAL-LEVEL COMMAND FOR AEROSPACE FORCES IN THE 21ST CENTURY

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INTRODUCTION

Relatively few theorists of warfare have studied the relevance and applicability of the concepts of the operational level of war and operational-level command to air forces. To date, Canadian study of this subject has been virtually non-existent. In the United States (US), some have described the difficulties that the US Air Force (USAF) has experienced in creating and sustaining a credible body of airpower doctrine and in its need for an "established and institutionalized process for the development and transmission of basic and operational-level doctrine."[1] Others have pointed out that, traditionally, experts have disagreed as to whether "the proper focus for the application of airpower"[2] should be at the strategic, operational or tactical level. In the past decade, following the Gulf War, some authors have criticized what they perceive to be a neglect of air force considerations in joint doctrine and the doctrinal gap that exists between the USAF and the other US service elements (Army, Navy and Marine Corps).[3] In their view this has had negative repercussions on the conduct of war at the operational level. Yet, in spite of the sometimes-troubled historical record, there are clear signs that with the evolving political and military strategic picture and aerospace dominance of the battlespace in recent warfare, the concept of an operational level of war, and therefore operational-level command, is even more relevant for aerospace forces in the 21st century.

The aim of this paper is to establish the validity of this assertion, using a three-fold approach. Firstly, to situate the discussion in the proper context, some fundamental operational concepts will be reviewed and the important US doctrinal debate of the past decade will be summarized. Secondly, the paper will look at Canadian aerospace doctrine and address some important issues that affect it, particularly those that have a negative impact on the air force's ability to both function at the operational level of war and exercise operational-level command. Finally, having considered Canadian and US doctrine, the recent evolution and the future of aerospace power will be examined, with a view to determining the implications for the relevance of the operational level of war to air forces of the 21st century.

It is noteworthy that this paper has a broad and distinct aerospace focus, rather than one that is limited to the traditional view of airpower. This denotes a deliberate decision on the part of the authors, which stems from their shared vision of the future of airpower:

> The future of airpower is tied to the advance of technology. Advances in space-related technologies, including potential space-based offensive and defensive capabilities, offer new possibilities and suggest that it may become necessary to replace the concept of airpower with the broader concept of aerospace power.[4]

In the present context, aerospace can be seen as "the total expanse of air and space above the earth's surface"[5] and aerospace power as "the capability to use platforms for military purposes operating in, or passing through, the aerospace."[6]

FUNDAMENTAL CONCEPTS AND CONTEXT

To situate this paper in the proper context, this section will provide a brief review of some fundamental concepts and a summary of the important debate regarding the perceived doctrinal gap between the USAF and other US service elements.

Operational Level of War and Operational Level of Command

The operational level of war is defined by the Canadian Forces aerospace doctrine, *Out of the Sun*, as "the level of war at which campaigns and major operations are planned, conducted and sustained to accomplish strategic objectives within theatres or areas of operations."[7] The operational level of command ensures the optimal use of available military assets and is best defined by its main purpose, to "concentrate [such assets] on attaining strategic objectives."[8] Moreover, the *Canadian Forces Operations Manual* states that "operational art" is "the skill of employing military forces to attain strategic objectives in a theatre of war or theatre of operations through the design, organization and conduct of campaigns and major operations."[9] Although the operational level of war normally encompasses a joint[10] perspective, it is worth noting that even major single-service operations require a solid foundation in operational art.

Campaign Preparation and Execution

The preparation of a campaign has to be distinguished from its execution. The preparation of a military campaign can be a long-term process that involves the gathering of required information and the analysis and assessment of the best approach for the engagement of friendly troops. The execution of a military campaign requires quick adaptation to enemy courses of action and to the outcome of major developments at the tactical level. In campaign planning and execution, aerospace assets constitute a highly complex, yet very powerful entity. Due to the complex nature of aerospace assets, air campaigns require thorough preparation. However, during the execution of the air campaigns, aerospace assets are highly adaptable to situational changes and provide substantial or even decisive capabilities.

Characterization of Aerospace Assets

Aerospace assets are scarce resources that require substantial operational and logistical support in order to be engaged successfully. Low quantity and high value aerospace assets contribute to the unique role of aerospace forces within the outlined context of operational planning and command. Centralized command and decentralized execution ensures the best use of aerospace assets and at the same time links the command of aerospace assets to the operational level. Operational planning necessitates a thorough analysis for the initial deployment of aerospace assets in order to ensure their successful engagement throughout the campaign. In short, aerospace assets are vital means for the successful execution of a campaign across the spectrum of military conflict.

Maneuver Warfare and Power Warfare

Within the theory of warfare, the terms maneuver warfare and power warfare have been defined as antagonistic principles. While maneuver warfare "attains superior posture against the enemy,"[11] power warfare "destroys the enemy."[12] Traditionally, the maneuver warfare approach has been well accepted and applied by both land and maritime forces, but not as much so by air forces. For land forces, the approach derives from Helmuth von Moltke, who established a co-ordinated approach for the turning and flanking movements of land forces within a military campaign.[13] The naval approach to war utilizes maneuver warfare to a broad extend. The maneuvering of fleets could be called a classic approach for the engagement of naval assets.

Historically, air forces have generally been looked upon as protagonists of power warfare. Indeed, the devastating firepower of aerospace assets has often enabled them to cause substantial attrition within the enemy's forces. Based upon this historic approach, air forces have been used so far in assistance of other services. The impact of aerospace assets, however, is intended to have theatre-wide effect and their engagement is thus co-ordinated at the operational level of war. Notwithstanding the traditional view, the ability of aerospace assets to "move rapidly through their medium to concentrate military power at any given point to achieve a given effect"[14] indicates that they can also be applied in maneuver warfare. This is because they contain two major elements of maneuver warfare: the ability for rapid movement and for concentration at a decisive point.

The US Doctrinal Debate

As already mentioned, in the aftermath of the Gulf War, authors like Carl R. Pivarsky and Rebecca Grant criticized a perceived neglect of air force considerations in joint doctrine and the existence of a doctrinal gap between the USAF

and the other US service elements (Army, Navy and Marine Corps).[15] In 1997, following an examination of USAF doctrinal issues, Grant wrote that:

> In the wake of Operation Desert Storm, debates over joint doctrine revealed that the airman's view of warfare could spark doctrinal conflicts with other service components – even more so if aerospace doctrine is not clearly articulated… It became clear that neglect of doctrine can translate to less than optimal use of airpower and cloud the debate over future forces.[16]

Furthermore, she also noted that, as compared to the other services, USAF doctrine had traditionally received less attention from the senior leadership and was less integrated with its service's education, training and requirement processes.[17]

US Army operational doctrine, on the other hand, was deemed to have received steadfast support from its senior leadership and to be closely linked with the professional development of its officers. This doctrine "concentrates on the corps and maneuver warfare at the operational level, where commanders translate strategic goals into military objectives."[18] This concept of "maneuver warfare" implied not only mobility, but also the use of armour, infantry and attack helicopters to gain positional advantage over the enemy.

Until the Persian Gulf War of 1991, the US Navy focused its doctrinal efforts on naval strategy and tactics, in relative isolation from the other services. This changed markedly with Operation Desert Storm, and the Navy began to emphasize two dominant operational concepts – battlespace dominance and forward presence. Battlespace dominance refers to the "establishment of a zone of superiority from which naval forces project power."[19] The forward presence concept provides that "[w]hen a conflict occurs, naval forces may be first on the scene and remain behind after other land-based forces depart."[20] The US Marine Corps shares the US Navy doctrinal approach while also promoting "its own concepts of maneuver operations ashore."[21]

In contrast to the other services, "[d]uring most of the 1990s, Air Force doctrine stood apart in its sparse organization and lack of attention to the operational level of warfare."[22] This may have been caused in part by the previous fragmentation of that service into different cultures and missions,[23] and also by how air forces are generally employed:

> The Air Force's apathy about operational doctrine may have stemmed from the fact that tactical doctrine guides squadron and wing employment of airpower. Seldom are Air Force officers required to master principles of operational-level doctrine to carry out their day-to-day force-employment responsibilities.[24]

Grant's assessment of the situation in 1997 was that these differences in service culture, force employment and training had contributed to create a significant gap between USAF doctrine and the doctrine of the other services. Furthermore, because the US Navy and USAF did not play a very active role in the joint doctrine dialogue of the early 1990s, the US Army ended up exerting heavy influence on the country's joint doctrine:

> Joint doctrine today carries forward a land-centric focus because it is still largely based on dominant surface maneuver. Key air concepts – and some naval concepts – receive short shrift. Differences between land and air components generally are resolved in favor of the land commander. Most of all, it is striking how closely joint doctrine runs parallel to the Army doctrine of maneuver, fires, and force protection. As a result, major conflicts in the joint-doctrine process most often erupt over differences between air and ground views of operational strategy, command, and organization.[25]

Regrettably, it has not been possible for the authors to determine whether Pivarsky and Grant have changed their assessment of the USAF's doctrinal situation and influence on US joint doctrine, since 1997. That being said, the publication dates of the USAF's Air Force Doctrine Document (AFDD) series,[26] as well as the ample and rich information available on the web site of the Air Force Doctrine Center (AFDC),[27] suggest that the USAF has given much more importance to doctrinal issues since the mid-1990s. It is also noteworthy that the AFDD series clearly and unequivocally addresses key concepts like the operational level of war, joint operations, and maneuver.[28]

Key Lessons

The employment of aerospace assets in a campaign is a complex process that requires thorough planning. However, these assets are highly adaptable to situational changes and can provide substantial or even decisive capabilities. The historic approach for the engagement of air force assets was based upon their devastating firepower rather than on a coherent operational-level doctrinal approach for air campaigns. Yet, despite the traditional view that air forces were protagonists of power warfare, it appears that aerospace assets can also be successfully applied to maneuver warfare.

In the mid-1990s, despite its status as the world's best funded and most powerful air force, the USAF – which in the past fifty years has come to replace the Royal Air Force as the main operational model for the Canadian air force – was criticized for not providing sufficient attention to doctrinal issues and the operational level of war. This was felt to have significantly contributed to US Army dominance over US joint doctrine and to doctrinal tension between the USAF and the other services. Perhaps in reaction to this criticism, USAF interest for doctrinal issues appears to have increased in the past five years.

Conceptually, it can be envisioned that the establishment of an organic, service-oriented perspective for the engagement of aerospace assets at campaign level could lead to a changed approach towards joint warfare and better support the aerospace campaign planners. Ultimately, nurturing this organic approach could allow air forces to increase their relative operational-level value in relation to armies and navies.

CANADIAN AEROSPACE POWER DOCTRINE AND ROLES

At this point, it is necessary to address the relevance of Canadian aerospace doctrinal issues with respect to the thesis of this paper. To this end, it is appropriate to first assess the importance and current status of Canadian aerospace doctrine, then present some issues that affect this doctrine, and, finally, suggest a possible avenue for creating doctrine that can be applied in instances of operational command.

Canadian Aerospace Doctrine

According to the Canadian aerospace doctrine, *Out of the Sun*, military doctrine is defined as follows:

> [It] is comprised of principles, theories and policies, accepted as valid and reliable, which offer military forces good chances for success when applied in periods of tension, crisis or war. Military doctrine explains in broad terms how operations should be conducted so that operational objectives can be realized. Doctrine is, in essence, "that which is taught." It is an accumulation of knowledge which [sic] is gained primarily from the study and analysis of experience. As such, doctrine reflects what works best.[29]

Within NATO, the application of military doctrine is neither dogma nor mandatory. Its intent is to provide "a framework within which military operations can be understood."[30]

In the context of operational command, doctrine provides the basis upon which all can have appreciation of the commander's application of aerospace power. For example, the USAF has undertaken the development of doctrine to achieve this goal. It is "stepping up to the challenge of revitalizing its doctrine for a world in which joint operations will depend on greater understanding of the contributions from air and space forces."[31]

Canadian Doctrinal Issues

An evaluation of the Canadian Forces (CF) aerospace doctrine, presented at the Canadian Forces College Air Symposium in 1999, found that Out of the Sun is, indeed, much in need of "revision to reflect current aerospace philosophy, concepts and operations."[32] Furthermore, there were several fundamental areas identified in which the current aerospace doctrine is lacking. Firstly, there is minimal attention to jointness and the understanding that "airpower, shared as it is by all the services, has an amorphous doctrine that is flexible and sophisticated enough to have great applicability"[33] across the spectrum of military conflict.[34] Secondly, there is restrictive "pigeon-holing" in the description of operations. Thirdly, there is an omission of guidance on the application of Information Operations.[35]

There is no doubt that the publication of *Out of the Sun* – in 1997 – was an important first step in what should be a continuous process of providing rigorous air force guidance in support of CF operations. That being said, the authors' evaluation of Out of the Sun also brings rise to a number of observations that suggest the necessity for regular updates.

Indeed, *Out of the Sun* contains several references to outdated concepts and terminology, which detracts from its message to the reader. For example, the doctrine refers to air transport operations and its subsets. Yet, for some time now, the concept of "air mobility operations" has superseded that of air transport operations. References to other outdated concepts, e.g. "strategic defence initiative (SDI)," give the document a decidedly stale flavour. Furthermore, *Out of the Sun* does not suitably reflect asymmetric threats, whose importance for continental defence – and therefore the CF and the Canadian air force – has been highlighted by the sinister terrorist attacks of 11 September 2001. As but one example, the North American Aerospace Defence (NORAD) capability has historically focused its efforts on an "outward-looking concept" for threats penetrating the North American perimeter. In the context of Homeland Defence, NORAD must develop a more robust ability to assess and respond to actions within the continent as a whole.

Finally, aerospace doctrine must serve as the basis for acquisition activities and capital expenditures on behalf of the air force. The commitment of limited funds in pursuit of developing inventories that permit the effective application of aerospace power is paramount to all CF operations. For example, the inability of air mobility resources to unilaterally support intended CF operations, such as the deployment of the army to Afghanistan during Operation APOLLO, points to an acute failure in the application of aerospace power.

A Possible Avenue For The Future

In examining the application of doctrine to the air force, the following issue is paramount: Where should the air force progress with its doctrinal initiatives? Next, there is a need to identify an organization that should be provided with the mandate and manning to address these initiatives. Finally, it is necessary to ensure such initiatives address the joint structure espoused by today's CF, as provided for in the Canadian Forces Operations Manual.[36] These three considerations will now be further elaborated.

The first consideration in the creation of a doctrinal document intended to serve the aerospace mission is that it should clearly elucidate the various roles that the air force may be engaged in over the next twenty years, and confirms the legitimacy of these roles in the application of aerospace power. An approach that would better serve users of aerospace doctrine is to bring CF aerospace doctrine more in line with the latest developments in USAF aerospace doctrine. That is, the authors contend that CF aerospace doctrine should reflect the USAF's presentation of its "air and space power functions."[37] This approach would reflect the reality that the CF is likely to engage in operations in conjunction with US forces. In turn, as will be seen later, this would provide a viable framework for the evaluation of aerospace operational-level command.

Due to limited space, it is not possible to treat all of these USAF aerospace power functions in detail. However, it is appropriate to make some observations on those functions that have been the most relevant to the CF military in recent years, and are envisioned to be significant for the future, namely: counter-air/-land/-sea; counter-information; air mobility; intelligence, surveillance and reconnaissance (ISR); and command and control.

The consideration of the first three "counter" capabilities – i.e., counter-air/-land/-sea – is fundamental to the creation of a military force. In a nutshell, aerospace doctrine must address friendly use of otherwise contested battlespace and reduce the threats posed by enemy forces. Counter-information is relevant in the interests of maintaining the ability to pursue conflict from an information operations (IO) perspective, coincident with the employment of military forces. Air mobility is an integral pre-condition to the ability to employ/deploy military forces in virtually any operation – be it domestic, international, joint or within a coalition. Robust ISR assets and an ability to employ these assets effectively with military forces will ensure a holistic approach to any operational theatre. Of critical importance is the ability to effect command and control (C^2) at the strategic, operational, and tactical levels of conflict. Most significantly,

> [US] Air Force forces are employed in a joint force context by a joint force commander. C^2 of those forces can be through a Service component commander or a functional component commander if more than one Service's air assets are involved. This officer, the JFACC [Joint Force Air Component Commander], is the Service commander with the preponderance of air and space assets and the capability to plan, task, and control joint air and space operations. It is a basic principle of air and space doctrine that C^2 of air and space forces be centralized under one officer – an airman.[38]

Thus, only a commander who fully appreciates and understands the capabilities and limitations of aerospace power can effectively apply this power.

The second consideration is that the implementation of aerospace doctrinal initiatives of the magnitude previously suggested will necessitate the identification of a suitable and appropriate "agency" with an adequate mandate and manning. The Canadian air force has traditionally had a propensity to implement such initiatives as secondary or peripheral activities. It must now be recognized that the development of thorough and lucid guidance is of the utmost importance, particularly since many operations are undertaken with little experience, training or practice in the necessary mode of application of aerospace power. The creation of a CF doctrine centre for aerospace power would address this shortcoming. In the interest of rigour, it would be imperative for this centre to carry out its mandate with the central focus on the employment of aerospace power in a unilateral or joint application. Care must be taken to avoid the subversion of aerospace power to other environments or interests within the air force itself. Such an agency must be well rounded and permitted a reasonable degree of latitude in its scope. For obvious reasons, this centre would have to answer to the highest levels of air force command.

Finally, the third consideration is that a modern aerospace doctrinal document must ensure that the perceived joint vision of today's CF is adequately addressed. Irrespective of the necessity to create doctrine without external influence, it is evident that the needs of the CF supersede the unilateral interests of the air force. Furthermore, it is equally important that the joint doctrine required by the CF not be influenced disproportionately by the visions of other environments. As previously discussed, there is a strong perception that Western military doctrine, and in particular American joint doctrine, is overly influenced by Army-centric inputs and experiences. Consequently, it is paramount for the Canadian air force to clearly articulate its doctrinal focus and joint vision to ensure its operational success – across the spectrum of military conflict – as the CF enters the 21st century.

Key Lessons

From what precedes, it is clear that Canadian aerospace doctrine should be much more closely aligned with the evolving USAF counterpart. This stems primarily from the assessment that in the foreseeable future, Canada's non-domestic military operations will take place in coalitions led by the United States. Also significant is the need to ensure that an air force commander retains primacy in the application of aerospace power. Jointness aside, this consideration cannot be overstated. In conclusion, an increased emphasis on doctrine at the operational level of command is vital to ensure that aerospace power remains relevant and effective.

RECENT EVOLUTION AND FUTURE OF AEROSPACE POWER AND ROLES

Having elucidated the proposed future for Canadian aerospace doctrine, it is now relevant to examine the recent evolution of aerospace power and to discuss its future. To this end, it is appropriate to first consider the Revolution in Military Affairs (RMA), then look at the issue of battlespace dominance and finally examine the role of aerospace power in maneuver warfare.

The Influence of the Revolution in Military Affairs

The compelling factor that has led the aerospace force hierarchy to reconsider its role at the operational level is the phenomenon that many military intellectuals have defined as the RMA. Although a discussion of the specific technologies that are associated with the current RMA is beyond the scope of this paper, these technologies include advances in survivability, intelligence, reconnaissance, communications, targeting, weapons, weapons delivery, and command and control. As aerospace force personnel have learned from recent conflicts in the Persian Gulf, Kosovo, and Afghanistan, advances in aerospace power have dramatically redefined their role in the prosecution of conflict.

Whereas in their traditional role aerospace forces were merely supporting ground and naval forces at the tactical level, they have now come to clearly dom-

inate the battlespace, not only at the tactical level but – more importantly – at the operational level. It is now essential for the aerospace force hierarchy to recognize and embrace this momentous paradigm shift, for only with their formal endorsement of this new reality can meaningful change begin to take place. As McKercher and Hennessy have stated,

> [d]iscontinuity and permanent fundamental and rapid change characterize the revolution. To be successful, a revolution requires adaptation from the organizations and the people it affects as well as the latter's recognition and legitimization of change.[39]

Once the RMA is recognized and the change that it will bring about is accepted within the leadership, a change in thinking within the military must also occur. As always, "[a] revolution in military affairs represents a fundamental advance in technology, doctrine, or organization that renders existing methods of conducting warfare obsolete."[40]

In the current RMA, aerospace forces have achieved an overwhelming supremacy on the battlespace, and in so doing have extinguished the traditional dominance of ground forces. Thus, the traditional method of conducting warfare, whereby ground forces are engaged prior to the annihilation of the enemy's will to fight, has become outdated. Certainly, it can be expected that this shift in dominance will be met with fierce resistance within the camp of the ground force commanders.[41] However, aerospace force commanders must recognize and face this challenge by educating their ground force brethren. This will be by no means an easy task, as this revolution in the conduct of warfare will challenge the traditional core of the ground force commanders' beliefs and culture.

As history has shown, revolutions in thought constitute an explicit threat to existing tenets because the revolution creates new conditions that challenge the status quo and the existing structures and bureaucracies of a regime. Although the current RMA has yet to be fully developed and widely accepted, there is a clear and unequivocal need for bold, forward- thinking and concrete initiatives on the part of prominent military leaders.[42] For example, one aspect of the new RMA that must be addressed is the incorporation of uninhabited combat air vehicles. These weapon systems have the potential to revolutionize aerial warfare as we know it today and demonstrate the change in approach to warfare that has come about through the advancement of aerospace technology. The concurrent elevation in the dominance of aerospace forces in recent operations will now be discussed.

Dominance

During the First World War, military strategists realized that the air battle had to be won before the artillery and then the maneuver arms could succeed.[43] This means that although aerospace power dominance was recognized during early specific stages of the battle, it was still considered subservient to both ground and maritime forces. Aerospace power evolution has assumed an increasing dominance of the battlespace, as will now be seen through a brief review of important post-Second World War operations and developments including: the Berlin Airlift; Russian occupation of Afghanistan; evolving Israeli Air Force doctrine; the Gulf War; NATO intervention in Kosovo; and the current conflict in Afghanistan.

The Berlin Airlift "achieved maneuver objectives relative to strategic political centres of gravity that surface forces could not have achieved without a world war."[44] Unquestionably, allied forces applied aerospace power in a magnificent manner during that operation. In delivering almost two and one half million tons of coal and food, the operation achieved its objective of sustaining the city of Berlin, suffering only 77 casualties to air accidents over the 15 months that the operation lasted.[45] Success, defined by the opening of ground routes to Berlin, was made possible by American and British ability to project power and to maneuver in the air.[46] This Cold War battle, won by air power alone, precluded a land battle.

The Soviet occupation of Afghanistan during the 1980s illustrates the continuing trend of aerospace power dominance. Soviet rotary-wing assets maintained air dominance over Afghani insurgent forces for the majority of the ten-year conflict, until the insurgents received modern air defence weapons. As terrain limited the effectiveness of Soviet land forces acting autonomously, air assault battalions were paired with helicopters performing close air support to shape the land battle. The concept of airmobile troops reflects the evolving role of aerospace power, building upon the US application of airmobile assault during the Vietnam War. The Soviets successfully used this doctrinal approach until they accumulated unacceptable losses in the face of modern air defence weapons. When aerospace power lost battlespace dominance, Soviet land forces were compelled to withdraw from the theatre.[47]

Unlike the Soviets in Afghanistan, the Israelis have relied less on airmobile doctrine and more heavily upon the inherent speed and flexibility of aerospace power to defend their nation. Drawing lessons from recent conflicts, the Israeli Defence Force has sought to modify its operational doctrine to reflect the dominance of aerospace power in future battles.[48] During the Six-Day, Yom Kippur, and Lebanon Wars, the Israeli Air Force inflicted heavy casualties on enemy land forces but had only a sporadic, non-lasting impact on the land battle. Currently, using advanced anti-armour helicopters, uninhabited combat air vehicles and a wide range of state-of-the-art precision-guided munitions, the Israelis can sustain close air support, interdiction, and long-range strike missions, effectively sealing off the battlefield. This barrier prevents enemy reinforcement of the fielded forces while also preventing their escape. Their current capability to sustain both close and deep attacks will allow Israeli aerospace power to have a decisive impact on the future land battle.

The Gulf War represented a high point in the continuing trend towards dominance of the battlespace by aerospace power. This was achieved by the marriage, and large-scale use, of new stealth technology with improved preci-

sion-guided munitions, as well as the increased use of unmanned aerial vehicles and the integration of non-traditional assets such as attack helicopters within the Air Tasking Order. It was the combination of the number of targets attacked and the sustained intensity of these attacks, rather than specific target destruction, that achieved the defeat of the Iraqi army.[49] During the Gulf War, aerospace power demonstrated the ability to maintain a continuous effective presence in the land battle.

The NATO intervention in Kosovo further accentuated the trend toward the dominant application of aerospace power for the decisive battle. This operation serves as an example of the risk-averse nature of current conflicts, in that there was a 50,000-man land force assembled but never placed in harm's way. Instead, by effecting 36,000 air sorties during which NATO forces dropped 25,000 bombs, air units hit 93 tanks, 153 armoured personnel carriers, 339 other military vehicles, and 389 artillery pieces and mortars. In the course of these operations, NATO casualties were limited to two helicopter pilots killed in a training accident.[50] The assembled NATO land forces were deemed the "safest army in history."[51] Aerospace power enabled highly effective application of military force during this conflict, while minimizing the risks incurred by friendly troops. In short, enemy forces could simply not mass to threaten the land force, because if they did, air units would then have decimated them. However, it is acknowledged that the failure to mount a supporting land offensive enabled Serb forces to disperse and hide, which reduced the ability of aerospace forces to decisively engage.

The evolution of aerospace power dominance has also been illustrated during the ongoing US-led coalition operation in Afghanistan. Aerospace power was decisively employed with devastating effect to crush and contain enemy forces that were often very well concealed, thus enabling friendly ground forces to concentrate on final mop-up operations at a much reduced risk level. Although it is still expected that sporadic – albeit fierce – fighting will occur on the ground, aerospace power has thus far been the dominant element in establishing sustained and unchallenged three-dimensional control throughout Afghanistan.

For the greater part of the previous century, land doctrine dominated the battlespace and aerospace power was relegated to a subservient role. This has changed with the advent of the 21st century, as aerospace power has assumed the predominant role: "The requirement to form a new joint doctrine emphasizing aerospace power as the operational lead in modern conflict has become more of a reality because of its pre-eminence in the battlespace."[52]

There are problems, however, when aerospace power is applied by the unskilled. Aerospace power is most effectively employed when its speed, range, flexibility, lethality, and precision are used across a theatre. Aerospace power is inefficiently used when it is distributed to surface maneuver commanders.[53] To be effective, aerospace power must be employed by those most skilled in its application. The predominance of aerospace power was clearly demonstrated during the Berlin Airlift, the Russian occupation of Afghanistan, the Gulf War and the NATO intervention in Kosovo. Therefore, in campaigns where aerospace forces predominate, the campaign commander must be an aerospace commander.

As ground force commanders have learned through historical experience, it is mandatory that those who wield ground force power be experts in all facets of its usage in order to be successful. Indeed, as a result of recent conflicts, experts in aerospace power have come to recognize that this basic truth also applies to the proper application of aerospace power. This is evident when looking at the experience of the Kosovo air campaign. During this campaign, General Wesley Clark denied the basic tenets of air power (concentration, speed and flexibility) as well as the advice proffered by his aerospace power commander, thereby nearly causing the aerospace campaign to fail.[54] Fortunately, the tenets of aerospace power were eventually applied to the campaign, thus ensuring its success. However, this close call has undeniably highlighted the growing requirement for aerospace force expertise at the operational level. In truth, it has underscored the necessity for aerospace leadership at that level.

Maneuver Warfare

In order for aerospace leadership to occur at the operational level, military doctrine must change to reflect the new reality of aerospace dominance. Historically, it is clear that when compared to the other services, the army has been able to astutely and continuously update its doctrine. This adroitness has allowed army doctrine to dominate, not only the other individual service doctrines, but also joint doctrine. As a result of its dominance over doctrinal issues, the army has been able to ignore the fact that aerospace power has come to dominate the battlespace. Consequently, the army has been free to maintain its doctrinal belief that the air force has been, and is still, merely a support service. In her 1997 analysis of that situation, Rebecca Grant opined that the US Army's philosophy was embodied in a statement found in the influential US Army's keystone doctrine document FM 100-5, *Operations*: "In peace or in war, the Army is the nation's historically proven force."[55] Hence, for Grant, "Army officers feel a special burden to win and terminate the nation's wars – a role that, in their view, is not shared by other services who are considered valuable but supporting arms in the joint force."[56] Army doctrine, and therefore joint doctrine, characterizes air forces as supporting forces, when in fact air force thinkers characterize them as maneuver forces.[57]

This difference of thought regarding aerospace forces as being either support or maneuver lies in one respect at the heart of battlespace ownership, since whoever owns the battlespace becomes a maneuver commander. Doctrinally, the air force is currently apportioned no part of the battlefield, and hence is not viewed as a maneuver force. Supporting this argument, Pivarsky concludes:

> Let us take off the gloves and face facts. The underlying issue is 'who controls the battle field?' A maneuver force has boundaries with other maneuver forces. Within its boundary, a maneuver commander owns the battlefield.

> Since this … specifically excludes the Air Force as a maneuver force, the AF [Air Force] owns no portion of the battlefield. This disregards the fact that the AF (and to a limited degree the Navy) has the ability now to see, control, and provide the preponderance of force beyond the indirect fire range (Army Tactical Missile Systems excluded) of surface forces inside the surface maneuver commander's boundary.[58]

This notion of maneuver forces, which provides that a maneuver force has boundaries with other maneuver forces and that within its boundary a maneuver commander owns the battlefield, has key implications. For example, the following statement could be found in a document issued by the Chairman of the US Joint Chief of Staff in 1992: "Aerospace Power (except air assets organic to the surface force) is not included as a type of maneuver force. This means that only air force assets are not maneuver forces."[59] So in effect, this equates to saying that, for example, Marine Corps air assets are considered maneuver forces (as they are organic to surface forces) but that air force assets are not. Clearly, as Pivarsky observed in 1993, this is an absurd idea.[60]

Because they constitute a maneuver force, aerospace forces should be commanded at the operational level, as that is where operational maneuver at the campaign level is designed. This can be illustrated by looking at the realm of air interdiction. Normally, the JFACC is the supported commander for the overall air interdiction effort. However, when air interdiction occurs within the larger framework of land forces boundaries, the land force commander becomes the supported commander. Naturally, a supported air interdiction commander has very specific responsibilities such as the synchronization, timing, and targeting of the air interdiction effort. Accordingly, the priority assigned to the land force commander is reflected in the apportionment decision and air interdiction is then planned and executed by the JFACC as overall air interdiction commander. But such a process can be used to instigate operations that fall within the definition of battlefield air interdiction (sub-apportionment), without even resorting to that term! In practice, this often gives rise to poorly veiled attempts by the land commander to take control of aerospace power for use in his deep fight. This is not a smart way to do that job. The fundamental flaw in the current way of thinking is the land forces' inability to see, or accept, that air interdiction is simply maneuver at the operational level of war. Ultimately, as long as the air component is treated as only fire support and not as a maneuver force, the joint effort will be saddled with inefficiencies and duplicated effort that cannot be afforded.[61]

Stated simply, as a maneuver force commander is in command and in control of his portion of the battlefield, all other forces, whether or not they are maneuver forces, are in support when operating in his area of responsibility (AOR). The maneuver argument is all about who exercises control of the battlefield.[62] One solution might be to give ownership of the forward portion of the battlespace, preferably short of the Fire Support Co-ordination Line (FSCL), to the JFACC, effectively recognizing that aerospace forces are maneuver forces.

There is great potential synergy between maneuver warfare doctrine and emerging aerospace doctrine, in that the latter offers new innovative methods for conducting joint warfare. Consequently, it is not unrealistic to envision the army's role in the modern battlespace generally evolving from a supported role to a supporting one. This can be illustrated by using a "bird-dog" analogy. The army will be used to point out and fix the enemy in position for aerospace disposal, or to flush them into the open for aerospace dispatch. Once the enemy has been destroyed or greatly diminished, the army will then occupy the terrain.

Key Lessons

The seminal military campaigns of the past five decades attest to the clear path of increasing battlespace dominance by aerospace power. In particular, the implications of the current RMA demand that emerging aerospace dominance must be recognized by joint doctrine. First World War military strategists realized that the air battle had to be won before other forces could be successful. During the Berlin Airlift, aerospace power was so dominant that it precluded the necessity for land forces in this first Cold War battle. Military operations during the Russian occupation of Afghanistan showed that, without air dominance, land forces could not achieve their objectives. The increased dominance of aerospace power has proven so important to the Israeli Defence Force that it has initiated significant updates to its operational doctrine to reflect this evolution. The Gulf War showcased aerospace power as the sole dominant and sustained combatant for a substantial portion of the war, before coalition land forces were committed to a very short-lived land battle. In the current conflict in Afghanistan, aerospace power has been the dominant element in establishing sustained and unchallenged three-dimensional control of the battlespace.

Faulty doctrine, traditionally dominated by the land force, fails to recognize aerospace dominance. It also suggests that aerospace forces own no part of the battlespace and are therefore not maneuver forces. This concept is absurd, since aerospace forces are in fact full-fledged maneuver forces. Accordingly, aerospace forces must be commanded at the operational level, for this is where operational maneuver at the campaign level is designed. Therefore, in campaigns where aerospace forces predominate, the campaign commander must be an aerospace commander. Moreover, as aerospace power is the predominant force in the battlespace today, and for the foreseeable future, an aerospace force commander should command all forces at the operational level.

CONCLUSION

The operational level of war demands that planners focus on the operational goal of a campaign. Doctrine supports the campaign planning process by providing a theoretical structure that is adaptable to the requirements of specific campaigns. This is essential in order to make efficient use of available military capabilities. The operational level of war normally encompasses a joint perspective. However, even major single-service operations require a solid foundation in operational art. For the air force, whose resources are scarce, this has two main implications. Firstly, within the

context of joint warfare, the engagement of air assets has to be based upon an adequate doctrinal foundation in relation to the army and navy. Secondly, single-service operations at the operational level of war require a sufficient aerospace doctrinal background. Due to a doctrinal deficit at the operational level of war, air force planners have to adjust to the campaign design of the army or navy in the joint context or have to start from scratch with every aerospace campaign.

Aerospace power doctrine is important in that, in the context of operational command, it provides a foundation for a complete understanding of the air component commander's application of his available resources. In that respect, it is clear that the Canadian Forces aerospace doctrine, Out of the Sun, requires timely revision to address several outdated concepts and terminology. In the Canadian air force, three measures must be taken in order to initiate and sustain a revitalized doctrinal process. Firstly, potential air force roles and their legitimacy must be clearly elucidated, so as to ground the CF aerospace doctrine on a firm foundation. Secondly, a suitably mandated and staffed organization must be created to look after this revitalized doctrinal process. Thirdly, the Canadian air force doctrinal focus and joint vision must be clearly articulated.

With regard to doctrinal focus, a bold and judicious initiative would be to take steps to more closely align Canadian aerospace doctrine on its USAF counterpart. This stems primarily from the assessment that in the foreseeable future, Canada's non-domestic military operations will take place in coalitions led by the United States. Furthermore, the doctrine should recognize unequivocally that, even in a joint context, an air force commander – by virtue of his professional expertise – must retain primacy in the application of aerospace power in the modern battlespace. That is, the employment of aerospace power must be centralized under one commander – that commander being an airman.

In recent years, a revolution in modern warfare has taken place and has positioned aerospace power at the forefront of battlefield dominance. The major military campaigns of the past five decades attest to the new-found dominance of aerospace power. However, current joint doctrine is still rooted in traditional land-centric dogma that fails to recognize aerospace dominance of the battlespace. This inadequacy must be corrected and properly reflected in the future development of both aerospace and joint doctrine. This will ensure maximum effectiveness of aerospace power – applied in conjunction with land and sea power – and lead to swift and efficient prosecution and conclusion of future conflicts.

The doctrinal environment of the past, in which land forces were traditionally recognized as the predominant force on the battlespace, has resulted in joint force commanders being consistently drawn from the army. Given that aerospace power has evolved to take on the position of battlespace dominance once held by land forces, the requirement for aerospace commanders to command at the operational level is paramount. It is therefore clear that, as aerospace power now dominates the battlespace, the operational level of command, where campaigns are designed and implemented, is even more relevant for aerospace forces of the 21st century.

NOTES

1. James A. Mowbray, "Air Force Doctrine Problems: 1926-Present," *Aerospace Power Journal*, No. 4 (Winter 1995), pp. 21-41. Available from <http://www.airpower.maxwell.af.mil/airchronicles/apj/mowbray.html> [Accessed 18 March 2002].
2. Clifford R. Krieger, article "Airpower," in Trevor N. Dupuy et al., eds., *International Military and Defense Encyclopedia*, (Washington: Brassey's, 1993), Volume 1, pp. 77-82.
3. See, in particular: Carl R. Pivarsky, "Dangerous Doctrine," *Military Review*, LXXIII, no. 9 (September 1993), pp. 42-51; Rebecca Grant, "Closing the Doctrine Gap," *Air Force*, 80, no. 1 (January 1997), pp. 48-52; and Carl R. Pivarsky, *Airpower in the Context of a Dysfunctional Joint Doctrine*, Air War College Maxwell Paper No. 7 (Maxwell Air Force Base (Alabama), Air War College, 1997).
4. Krieger, p. 81.
5. Excerpted from Canadian Forces Publication B-GA-400-000/AF-000, *Out of the Sun: Aerospace Doctrine for the Canadian Forces*, (On-line version, Updated 15 August 2001), Chapter 3, Section 2, article 314.1. Available from <http://www.airforce.dnd.ca/libradocs/library1_e.htm>. [Accessed 18 March 2002]. In the remainder of this paper, this publication will be referred to as *Out of the Sun*.
6. Excerpted from *Out of the Sun*, Chapter 3, Section 2, article 314.3.
7. *Out of the Sun*, Chapter 2, article 207.3.
8. Clayton R. Newell, *The Framework of Operational Warfare*, (London (Ontario): Routledge, 2001), p. 16.
9. Canadian Forces Publication B-GG-005-004/AF-000, *Canadian Forces Operations* (Ottawa: Department of National Defence, 18 December 2000), Chapter 3, Section I, p. 3-1. Available from <http://barker.cfc.dnd.ca/Admin/jointdocs/cdnpubs.html>. [Accessed 18 March 2002]. Hereafter this publication will be referred to as the *Canadian Forces Operations Manual*.
10. Joint is "[a]n adjective that connotes activities, operations, organizations, etc [sic] in which elements of more than one service of the same nation participate." *Canadian Forces Operations Manual*, Glossary, G-E-5
11. Wayne P. Hughes, "Naval Maneuver Warfare," *Naval War College Review*, 50, no. 3 (Summer 1997), p. 27.
12. Ibid.
13. See, in particular: Arden Buchholz, Moltke, *Schlieffen and Prussian War Planning*, (Oxford: Berg Publishers,1991), pp. 53-54; and Michael D. Krause, "Moltke and the Origins of Operational Art," *Military Review*, LXX, No. 9 (September 1990), pp. 28-44.
14. D. Robert. Poynor, "Organic versus Joint: Thoughts on How the Air Force Fights," *Strategic Review*, 29, no. 1, (Winter 2001), p. 58.
15. See endnote 3.
16. Grant, p. 48.
17. Ibid.
18. Ibid., p. 49.
19. Ibid.
20. Ibid., pp. 49-50.
21. Ibid., p. 50.
22. Ibid., p. 50.
23. Here, Grant refers to Strategic Air Command, Tactical Air Command and Military Airlift Command.
24. Ibid., pp. 50-51.
25. Ibid., p. 52.
26. As of 20 March 2002, 33 AFDDs were listed on the Air Force Doctrine Center (AFDC) web site, as having the following status: 'Approved' (20); 'Approved/In Revision' (12); or Draft (1). Of these 33 documents, one was published in 1997, five in 1998, 14 in 1999, four in 2000, seven in 2001 and two in 2002. Information obtained from <https://www.doctrine.af.mil/Main.asp>. [Accessed 20 March 2002].
27. This web site is located at <https://www.doctrine.af.mil/Main.asp>. [Accessed 20 March 2002].
28. For example, these concepts are described in two keystone AFDDs, namely, AFDD 1 (*Air Force Basic Doctrine*, 1 September 1997) and AFDD 2 (*Organization and Employment of Aerospace Power*, 17 February 2000). In particular, both the first version (28 September 1998) and revised and current version (17 February 2000) of AFDD 2 address the concept of aerospace maneuver warfare. The current version of the AFDDs 1 and 2 can be downloaded from the AFDC web site, <https://www.doctrine.af.mil/Main.asp>. [Accessed 20 March 2002].
29. *Out of the Sun*, Chapter 1, article 101.1.
30. Ibid., Chapter 1, article 101.2.
31. Grant, p. 48.
32. Brian D. Wheeler et al., "Aerospace Doctrine," in David Rudd, Jim Hanson and André Beauregard, eds., *Air Power at the Turn of the Millenium*, (Toronto: Canadian Institute of Strategic Studies, 1999), p. 163.
33. John Hillen, "Peacekeeping at the Speed of Sound: The Relevancy of Airpower Doctrine in Operations Other Than War," *Airpower Journal*, XII, no. 4 (Winter 1998), pp. 6-16.
34. The spectrum of conflict spans across peace operations (i.e., domestic disaster relief, domestic civil support,

environmental operations, and peacemaking), through peacekeeping and counter-terrorism, to combat operations (i.e., counter-insurgencies, major theatre war, and international war – conventional and nuclear.)

35. Wheeler.
36. *Canadian Forces Operations Manual*, p.ii.
37. USAF Air Force Doctrine Document 1, *Air Force Basic Doctrine*, (Maxwell Air Force Base (Alabama): Headquarters Air Force Doctrine Center, September 1997), p. 45. Available from <http://bbs.cfc.dnd.ca/Admin/ACP/Doctrine/doctrine.en.html>. [Accessed 18 March 2002]. The *Air Force Basic Doctrine*, lists 17 air and space power functions: counter-air; counter-space; counter-land; counter-sea; strategic attack; counter-information; command and control; airlift; air refueling; spacelift; special operations employment; intelligence; surveillance; reconnaissance; combat search and rescue; navigation and positioning; and weather services.
38. Ibid., p. 54.
39. Stéphane Lefebvre, Michel Fortmann and Thierry Gongora, " 'The Revolution in Military Affairs': Its Implications for Doctrine and Force Development Within the US Army," in B.J.C. McKercher and M.A. Hennessy, eds., *The Operational Art: Developments in the Theories of War*, (Westport: Praeger Publishers, 1996), p. 173.
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43. Ibid., p. 12.
44. Carl R. Pivarsky, Jr, "Dangerous Doctrine," *Military Review*, LXXIII, no. 9 (September 1993), pp. 45-46.
45. "Berlin Airlift Quick Facts," US Air Forces in Europe Berlin Airlift Web Site. Available from <http://www.usafe.af.mil/berlin/quickfax.htm>. [Accessed 7 March 2002].
46. Pivarsky, pp. 45-46.
47. Mohammad Yahya Nawroz and Lester W. Grau, "The Soviet War in Afghanistan: History and Harbinger of Future War?," Foreign Military Studies Office, Fort Leavenworth (Kansas), 1995. Available from <http://call.army.mil/fmso/fmsopubs/issues/waraf.htm> and <http://www.bdg.minsk.by/cegi/N2/Afg/Waraf.htm> [Accessed 7 March 2002].
48. David Rodman, "The Role of the Israel Air Force in the Operational Doctrine of the Israel Defense Forces: Continuity and Change," Aerospace Power Chronicles, Contributors' Corner, 29 June 2000. Available from <http://www.airpower.maxwell.af.mil/airchronicles/cc/rodman.html> [Accessed 7 March 2002].
49. Thomas A. Keaney, "Surveying Gulf War Airpower," *Joint Force Quarterly*, no. 2 (Autumn 1993), pp. 25-36.
50. Niall Ferguson, *The Cash Nexus: Money and Power in the Modern World*, (New York: Basic Books, 2001), pp. 414-415.
51. Ibid.
52. Grant.
53. Pivarsky, p. 50.
54. William M. Arkin, "Review of Waging Modern War: Bosnia, Kosovo and the Future of Combat" by General Wesley K. Clark. *Aerospace Power Journal*, XV, no. 3 (Fall 2001), pp. 123-125. Available from <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj01/fal01/fal01.html>. [Accessed 19 March 2002].
55. US Army Field Manual (FM) 100-5, *Operations*, (Washington: Department of the Army, 14 June 1993), Chapter 1, p.1-4. Since Rebecca Grant's article was published (January 1997), FM 100-5 has been superseded by FM 3-0, Operations, (Washington: Department of the Army, 14 June 2001), which does not appear to contain the statement cited by Grant. That being said, article 1-1 of FM 3-0 reads as follows: "Army forces are the decisive component of land warfare in joint and multinational operations. The Army organizes, trains, and equips its forces to fight and win the nation's wars and achieve directed national objectives. Fighting and winning the nation's wars is the foundation of Army service – the Army's non-negotiable contract with the American people and its enduring obligation to the nation." Information on the status of FM 100-5 and a softcopy of FM 3-0 were obtained from the US Army Training and Doctrine Command (TRADOC) web site, <http://www-tradoc.army.mil/>. [Accessed 21 March 2002].
56. Grant, p. 49.
57. Pivarsky, p. 43.
58. Ibid., p. 46.
59. Chairman of the US Joint Chief of Staff, Document CM-1502-92, *A Joint Doctrinal Statement on Selected Joint Operational Concepts*, 10 November 1992, cited in Pivarsky, *Dangerous Doctrine*, p. 42.
60. Pivarsky, p. 43. Note that it is possible that the USAF's own notion of maneuver warfare may have evolved since the publication of Pivarsky's article, in 1993. As pointed out in endnote 28, the concept of aerospace maneuver warfare has been addressed in the first version (28 September 1998) and revised and current version (17 February 2000) of AFDD 2 (*Organization and Employment of Aerospace Power*).
61. Ibid., pp. 48-49.
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Rethinking "Centralized Command and Decentralized Execution"

Dr Allan English

The Canadian air force has adopted the mantra of "centralized command and decentralized execution" to encapsulate its command and control (C^2) philosophy. Yet on closer examination, this slogan does not really describe the actual C^2 processes used by the air force either today or in the past. Furthermore, this expression, while widely used by those describing air force C^2, is not well understood. For example, at the 2002 Air Symposium held at the Canadian Forces College, some participants used the expressions "centralized command and decentralized execution" and "centralized control and decentralized execution" almost interchangeably, and, when pressed to explain the differences between the two expressions, were unable to do so in a convincing manner.

Much of this confusion with the use of the expression stems from the current Canadian Forces (CF) Aerospace Doctrine manual, Out of the Sun, which does not clearly explain the concepts of command, control, and execution in this context.[1] Part of the problem can also be explained by a lack of precision in the terms used to describe C^2 in the CF and other Western armed forces. Definitions are often circular and the same words are defined differently by different users.[2] Perhaps the most disconcerting aspect of the use of this expression is when it is employed to foreclose discussion about alternative air force C^2 arrangements. This occurs when "centralized command and decentralized execution" is portrayed as the only viable C^2 philosophy for the air force.

This paper argues that the expression "centralized command and decentralized execution" is an imprecise and inaccurate description of how of air forces exercise C^2, and that alternate ways, based on a clearer understanding of the terms in the expression, should be investigated to optimize C^2 in the air force in the 21st century.

In order to evaluate the expression properly, useful definitions are required. I have selected those put forward by Pigeau and McCann because their model is one of the leading empirically-based models of C^2 currently being developed. Furthermore, as a model being developed by Canadian researchers, using Canadian (as well other) data, it is compatible with the organizational culture of the CF, and it addresses the major challenges confronting Canadian decision-makers.[3]

McCann and Pigeau define command as "the creative expression of human will necessary to accomplish the mission."[4] In the context of this discussion there seems to be general consensus that command in the air force should be centralized as much as possible. Unlike the army, which advocates a mission-oriented command philosophy devolving command functions to the lowest practicable level, air forces tend to favour concentrating most command func-

tions at higher levels. One rarely hears air force officers advocating "**decentralized** command and decentralized execution." This implies that air force and army command philosophies are fundamentally different, as we shall see later. While air forces recognized that some C^2 functions should be decentralized in their operations, this is usually articulated as "decentralized execution." But what does this expression really mean?

Current Canadian air force doctrine describes "decentralized execution" as "delegating appropriate authority to execute missions and tasks" to "lower-level commanders."[5] However, this interpretation conflates the separate functions of command, control, and execution and serves only to confuse many who use the air force C^2 mantra. If one accepts that the functions of command, control, and execution are separate and distinct activities then "execution" should be used in its normal context of carrying out the mission.[6] The delegation of authority is a different activity and, as we shall soon see, should be described by another term. If we accept the definition of "execution" in its most common sense of carrying out the mission, we can see that air forces today practice decentralized execution because those assets or resources carrying out the mission are almost always separated in space and time from the commander who is responsible for their use.

In order to understand the concept of decentralized execution more clearly, it is worth looking at how centralized execution, its logical opposite, might work. This can be illustrated by imagining what "centralized command and centralized execution" might look like. In this case, the commander and the means of carrying out the commander's intentions would be physically co-located. In the not-too-distant future, an aerospace commander might be co-located with a space-based or airborne directed energy weapon and be able to personally employ the weapon – this is true centralized execution. Until that day dawns, I would argue that the real debate in the C^2 of air force assets is between centralized and decentralized **control**.

Using Pigeau and McCann's framework and definitions we can see why. They define control "as those structures and processes devised by command to enable it and to manage risk." They then provide the following elaboration:

> 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 for diligent purposefulness.

From this explanation flow the actions associated with command and control. Controlling involves such activities as "monitoring, carrying out and adjusting processes that have already been developed" according to pre-established plans. Commanding, on the other hand, involves "creating new structures and processes (i.e., plans, SOPs, etc.)," initiating and terminating control, making unanticipated changes to plans, and modifying control structures and processes as required.[7]

Pigeau and McCann also argue that commanders harness command potential by imposing control on the expression of command, and that there will always be a tension between command creativity and the requirement to limit creativity in a complex military organization if the effective co-ordination of activities is to take place.[8]

Based on this framework we can see that the term "execution," – defined in CF aerospace doctrine as "delegating appropriate authority to execute missions and tasks" to "lower-level commanders" – when used in the expression "centralized command and decentralized execution" really describes control rather than execution. The key issue then in this discussion is, given the ability to exercise greater degrees of control, how much control will higher commanders delegate to lower level commanders. It is recognized that commanders at all levels perform some command functions, but it will be argued that the ability for lower level commanders to exercise their creative will to accomplish the mission has been closely circumscribed in modern air forces.

HISTORICAL CONTEXT

A short historical example of the evolution of air force C^2 will provide a background against which current trends can be evaluated. I have chosen some examples from the British flying services because they have the longest history of the C^2 of an independent air service. The Royal Flying Corps (RFC) began the First World War with a somewhat centralized C^2 system. Most force generation issues were handled by the War Office, and beginning in January 1918, by the Air Ministry, in London. Force employment was the purview of different theatre headquarters (HQ), the largest located in France. At first, control structures and processes were weak as the HQs were very small and did not have the capability to exercise strong centralized control. There was virtually no body of written air doctrine extant and local initiatives and experience guided the application of air power in those early days of manned flight. Missions were passed by the theatre HQ directly to squadrons who had a great deal of latitude in planning and executing the missions. As the size of air forces increased, for example the British air services grew and evolved from just over 2,000 men in 1914 into the Royal Air Force (RAF) with over 290,000 men and women in uniform in1918,[9] more control mechanisms were required. These developed in the form of an increasingly formalized written doctrine, plans, and SOPs and more complex control structures involving the organization of air resources into Wings and Brigades[10] which exercised command and control over what had been semi-autonomous squadrons. By the end of the war as many as 2,000 aircraft from different nations could be employed in offensive operations, for example, at the battle of Amiens (8 August 1918). To deal with this complexity, new C^2 arrangements were therefore devised, with Canadians among the pioneers in these innovations,[11] so that by 1918 the RAF had created a relatively sophisticated C^2 system by the standards of the day.[12]

As often happens after great wars, much of the C^2 knowledge acquired dur-

ing the First World War was lost in the inter-war years. The small size of the RAF dictated a return to small and relatively simple C^2 arrangements with the fewer higher HQs and lack of resources leading to a more decentralized control process. Squadrons deployed around the British Empire, in locations as remote to the United Kingdom as Singapore, India, and the Middle East, exercised considerable autonomy in day-to-day operations.[13] In the late 1930s, as the size of the RAF increased, C^2 systems became more complex again, most notably in Fighter Command, based on the First World War system created to defend London against raids by German airships and bombers.[14] Bomber Command also instituted more complex C^2 arrangements. Its raids early in the war, consisting of small numbers of aircraft,[15] were executed by squadrons that often planned many of the details of the raids independently. However, as the size of the raids increased, culminating in the 1000-plane raids which began in 1942, where bomber, fighter, air defence, electronic warfare and other resources had to be co-ordinated, control became more centralized. Groups and Wings provided closer control of squadrons, but the number and dispersed nature of the bomber forces left some latitude to squadrons in planning their missions. Written doctrine, which had been studied in some detail during the inter-war years proved to be of limited use during the war,[16] and it evolved in a semi-formal way with higher HQs codifying practices that had been found effective in combat, sometimes with the help of operations researchers.[17]

The example of the Second World War shows a pattern similar to the First World War for changes to C^2 arrangements. At first, small higher HQs exercised relatively little control over squadrons, because they did not have the resources, processes, or structures in place to exercise closer control. As the size of the air forces increased, the higher HQs used increasingly complex processes and structures, including more subordinate HQs, to exercise closer control of their assets. While it could be argued that more HQs was an indication of decentralized control, in this context the increased number of intermediate HQs was used to increase the influence of central HQs, like Bomber Command, over squadrons that early in the war had more autonomy in executing operations than later in the war. I would argue, therefore, that in both wars control became increasingly centralized to effect the co-ordination of increasingly larger air forces.

This same trend can be seen in more recent air operations. The air C^2 arrangements in the Gulf War (1990-91) showed a system in transition between the types of systems used in the Second World War and those used today. While the technology certainly permitted air commanders in the Gulf War to exercise closer control of their forces, the overall system would be recognizable to many veterans of Bomber Command. The Air Tasking Order (ATO) process used in the Gulf imitated a process similar to the one Bomber Harris used in his assault on Fortress Europe and in subsequent attacks when the United States Army Air Forces joined the Commonwealth bomber forces to mount the Combined Bomber offensive.[18] Since then, aerospace forces have been subjected to even closer command and control.

The two most recent Western air campaigns, Operation Allied Force and air operations both in the continental defence of North America and in Afghanistan, have demonstrated that commanders at the highest level can now exercise close control over aerospace assets, much more so than could be exercised over air forces in the past or by the army and navy today. It has come to the point where a four-star general can see what is happening in an individual cockpit and direct a pilot personally. This has severely limited the authority of aircrew and their immediate commanders in carrying out the functions of control, or command.

Some have described the current air campaign in Afghanistan as unique and it has highlighted some problems of the trend to more centralized control of air assets. Unlike the Gulf War, where US military commander, Norman Schwarzkopf, had his HQ in the theatre of operations, in the Afghanistan campaign Central Command, the major US HQ responsible for prosecuting the war, is 7,000 miles from the theatre of operations. On the other hand, the Combined Air Operations Center, responsible for running the air war, is located in Saudi Arabia. A recent report on this command arrangement has identified a number of problems with it. The most troubling appears to be that "instant communication" has allowed Central Command to exercise extremely close control over not only deployed HQs but also all the forces in theatre, and that is seen by some as severely restricting local initiative.[19] Meilinger argues that the technology now exists to conduct either a centralized control - centralized execution or decentralized control - decentralized execution air campaign, but that the C-in-C Central Command, Tommy Franks, has opted for the former, using his staff rather the component commanders to exercise control over aerospace resources.[20]

Another trend – the lethality of weapons – has also had a direct effect on the C^2 of aerospace forces.[21] Now a handful of aircraft, or in certain cases even one platform, can accomplish with precision-guided munitions what it took hundreds of bombers to achieve in the Second World War.[22] This trend plus "instant communication" have allowed aerospace commanders to do something Bomber Harris could not do – personally monitor the execution of an entire mission. Today's aerospace commander is in a position to exercise extremely close control, to the point of personally authorizing weapons release against all the targets in a mission. Doctrinally the US Air Force supports this trend, declaring that the historical record proves that "centralized control [is] the best way to effectively employ airpower."[23]

This new capability has been interpreted by some as "centralized execution." I would disagree, based on the previous discussion. Execution of the mission is still decentralized, because the platforms executing the mission are physically remote from the commander, and, therefore subject to some friction that would not be present with true centralized execution. The real issue, as I have argued, is the degree of control to be exercised by higher air force commanders.

In summary, air force commanders have favoured centralized control of aerospace forces during the past century for two main reasons. First, air assets are often relatively scarce and the most effective way to use them is to pool them together under a single commander. Second, when air forces are large, operations

are complex and the split-second co-ordination required to execute missions demands centralized control as exemplified by the ATO process used by most Western air forces today. In the past, when air forces were very small, HQs did not have the resources to exercise close control of geographically dispersed air assets and were content to let squadrons have a great deal of autonomy in carrying out operations. However, today, even in relatively small air forces, technology has given commanders the ability to exercise closer control with small headquarters and limited resources. This has led to a trend towards increasingly close control of aerospace forces because of the desire of commanders to be intimately involved with some missions and the technical capacity for them to do so.

As several participants in the Air Symposium remarked, this is not necessarily a bad thing. Commanders are being held increasingly accountable for every action of their forces, such as even relatively small (by Second World War standards) collateral damage, and command decisions are becoming more sensitive (for example the potential of a decision to order the destruction of a civilian airliner since the 11 Sep 2001 terrorist attacks on the US). Therefore, some believe that there are instances where very close control of air assets is warranted. On the other hand, in large air campaigns it is possible that the number of resources employed will exceed the aerospace commander's ability to personally control them and that a looser control will be appropriate.

The examples given above show some trends in the changing relationship among command, control, and execution in the C^2 of air forces. Command of large air forces has generally remained centralized and execution decentralized because of the nature of air assets and the environment in which they operate. I would argue that execution has become somewhat less decentralized, compared to the past, because the increased lethality and range of aerospace weapons has reduced the number of platforms assigned to a given commander and therefore reduced the need for many units to be dispersed around the world. At the same time, given the sensitivity of some of these operations, commanders have chosen to exercise very close control of these platforms. Technology has permitted commanders to exercise greater control over these assets, and they have done so both because of the heightened sensitivity of some operations and because of the degree of co-ordination required to execute increasingly complex air operations. In the foreseeable future, commanders may be physically co-located with weapons systems, and, therefore would be able to exercise a maximum degree of control over these weapons. This situation would lead to perhaps the first instance in history where the execution of the aerospace mission is actually centralized. Of course, many other aerospace missions could remain decentralized in execution. Nevertheless, we should consider all possible C^2 eventualities.

IMPLICATIONS FOR JOINT DOCTRINE

These trends in aerospace C^2 have some important implications for joint C^2 doctrine. First of all, they clearly show that there are significant differences between air force and army C^2 practices. Both the Canadian and American armies (and the US Marine Corps) have advocated a "mission oriented" command style based on the German command philosophy of auftragstaktik.[24] While the nature of army operations favours this command style based on what is often referred to as operational art, it cannot be applied in the same way to air forces. Land forces operate in an environment that has a great deal more friction than the air environment, and, therefore it is appropriate to give even the most junior commanders a significant amount of latitude in deciding how to accomplish their missions. While land forces must co-ordinate their activities, this co-ordination is not required to the same degree as air forces where the activities of many aircraft must be co-ordinated down to literally the second. This allows lower level air force commanders much less latitude than their army colleagues in executing their missions. Rear Admiral J.C. Wylie (US Navy) put it this way: "Where the sailor and the airman are almost forced by the nature of the sea and the air, to think in terms of a total world or, at the least to look outside the physical limits of their immediate concerns, the soldier is almost literally hemmed in by his terrain." He concludes "The operational art is an artifice appropriate to ground force doctrine but the navy (and the air force) have no need for such a concept."[25]

In the joint environment this means that, as van Creveld said, there is no "one fits all" C^2 system.[26] While some in the CF believe that it is possible to devise one method of C^2 for all three services, as we have seen, this is not possible. Nevertheless, there are constant pressures in the CF to create some sort of all-encompassing C^2 system based on a land-centric joint doctrine.[27]

This issue continues to be debated because air forces have, until very recently, been well behind armies in doctrinal development. As US Air Force historian Richard Hallion put it: "Doctrine traditionally has been an area in which the air forces of the world have been most weak."[28] In particular, USAF doctrine has lagged far behind formal US Army doctrine for a number of reasons as described in James Mowbray's analysis.[29] This has had a direct impact on CF aerospace doctrine because ever since the Second World War the Canadian air force has been particularly closely associated with the US Air Force and has adopted most of its doctrine and philosophy unreservedly.[30] Yet this carries with it serious risks. A number of Canadian and foreign officers who have studied joint doctrine extensively have cautioned us that because allied joint doctrine "contains serious flaws" and may have been written to resolve national service issues that are not necessarily problems in Canada, we should avoid the current practice of importing large amounts of unmodified foreign joint doctrine.[31]

This is an important issue because historically the Canadian air force has not been able to produce coherent, up-to-date aerospace doctrine. For example, at the 1984 Air Doctrine Symposium, the Chief of the Defence Staff, an air force officer, criticized the participants' use of self-serving arguments for specific doctrine to justify new equipment acquisitions.[32] And in 1989, the policy of the CF Aerospace Doctrine Board was still to use ad hoc methods and temporary working groups "to review and resolve doctrinal issues on behalf of the Board."[33] The proceedings of the 2002 Air Symposium and a recent study of CF

air doctrine indicated that 13 years later little has changed.[34] The implications for CF joint doctrine are that without a strong and clearly articulated aerospace C^2 doctrine to balance extant land force doctrine, CF joint C^2 doctrine will continue to be based on land-centric concepts, which as we have seen, are inappropriate in many ways for the C^2 of aerospace forces.

The principle upon which joint C^2 should be exercised is that each service must have its own C^2 doctrine and control systems, and that the joint C^2 arrangements must be devised to co-ordinate the effects of the various services, not to become involved in how these effects are actually executed.[35] In fact, this appears to be the arrangement that actually exists in the CF, but it is difficult to know for certain.

Discussions in a syndicate on air doctrine and joint doctrine at the Air Symposium revealed that, even in a group of senior officers and academics who have studied CF C^2 and who understood the doctrinal and theoretical aspects of the issue, there was no clear and unambiguous understanding of how the current CF joint C^2 structure actually works. This should really not come as a surprise, as Mandeles and Reynolds have demonstrated that how C^2 systems actually work bears little resemblance to formal descriptions of how they are supposed to work. This is not necessarily a bad thing as doctrine should allow for flexibility and should not be over-prescriptive by defining every detail of the C^2 process. Nevertheless, the situation observed at the 2002 Air Symposium should alert us to the fact that, in Canada, we do not have accurate descriptions of how our CF joint C^2 arrangements are supposed to work let alone how they actually work. It is essential that we acquire this knowledge if we are to be able to study and understand the complexities of this subject in the future.

CONCLUSION

This paper began with the assertion that the expression "centralized command and decentralized execution" used by the Canadian air force to describe its command and control philosophy is not only poorly understood, but also that it has hindered rigorous debate about the C^2 of aerospace forces in this country. It was argued, using the Pigeau-McCann framework for C^2, that the word "execution" in the expression should be replaced by "control" and that the real debate about air force C^2 today should be focussed around the concept of centralized command using varying degrees of control.

The C^2 of Western air forces over the past 90 years have changed to meet changing circumstances. Until recently, as air forces expanded, their higher HQs often used subordinate HQs, like the Group and Wing HQs in Bomber Command in the Second World War, to exercise closer control of forces which were relatively scarce and which needed to be co-ordinated to a much greater degree than land forces. In the 21st century aerospace commanders now have the capacity to exercise very close control over air assets without necessarily resorting to the device of intermediate HQs. At some point in the not-too-distant future commanders may even be able to directly control physically co-located weapons systems, thereby actualizing true "centralized command and centralized execution." Yet even then, aerospace force commanders will require the capability to employ decentralized control techniques to execute operations where the number of aerospace assets under their command exceeds their span of direct control.

These developments have serious implications for joint doctrine. As we have seen, it appears that air forces and land forces have C^2 philosophies that are fundamentally different. Therefore, current joint C^2 concepts based on a land-centric operational art may not be entirely appropriate for air (and naval) forces. This has serious implications for Canadian joint doctrine; however, the current state of Canadian aerospace doctrine does not permit any coherent contribution to this debate.

The ideas put forward here are preliminary in nature and seek to stimulate debate in an area where very little has been written. While a great deal of descriptive material has been published concerning the air operations of both World Wars, very little of an analytical nature on C^2 has been produced. Some analytical works concerning the C^2 of air resources in the Gulf War have been published, but there is still much to be done in the field of rigorous analysis of air force C^2 arrangements for this and other campaigns.

Moreover, virtually no analytical work has been done to describe how current CF joint C^2 systems are supposed to work let alone how they actually work. Some ideas for pursuing lines of research have been mapped out,[36] but beyond formal doctrine and published organization charts, we have a very limited idea of how CF joint C^2 really functions. As Mandeles and Reynolds have shown, it is imperative to get first hand accounts from those involved in running the systems because official documents only gives us a limited insight into C^2 processes.

Until we know a great deal more about these subjects, the debate about air force C^2 arrangements in this country will be dominated by speculation and uninformed comment. It is time to start a serious analysis of these issues in Canada and replace time-worn doctrinal slogans with sound explanations, based on rigorous definitions, of how Canadian aerospace C^2 really works now and how it should work in the future.

NOTES

1. See for example, *Out of the Sun: Aerospace Doctrine for the Canadian Forces* (Winnipeg, MB: Craig Kelman & Associates, nd [1997]), pp. 38-39, where, when explaining "key principles" no distinction is made between command and control.
2. Ross Pigeau and Carol McCann, "What is a Commander?" in Bernd Horn and Stephen J. Harris, eds., *Generalship and the Art of the Admiral: Perspectives on Canadian Senior Military Leadership* (St Catharines, ON: Vanwell Publishing, 2001), pp. 80-3.
3. See G.E. (Joe) Sharpe and Allan D. English, *Principles for Change in the Post-Cold War Command and Control in the Canadian Forces*, report prepared for the DCDS Group, NDHQ, 28 June 2001, published by the Canadian Forces Training Material Production Centre, Winnipeg, MB, 2002, p. 98.
4. Ross Pigeau and Carol McCann, "Re-conceptualizing Command and Control," *Canadian Military Journal* 3, no. 1 (Spring 2002), p. 56.

5. *Out of the Sun*, p. 38. The concepts expressed here are almost identical with those espoused by the US Air Force, see Air Force Basic Doctrine, AFDD-1, (Sep 1997), p. 23.
6. *Oxford English Dictionary*, sixth ed., (1980), p. 362.
7. Pigeau and McCann, "Re-conceptualizing Command and Control," p. 56.
8. Pigeau and McCann, "What is a Commander?" p. 83.
9. H.A Jones, *War in the Air*, Appendices, (Oxford: Clarendon Press, 1937), Appendix XXV.
10. For example, in 1918 VIII Brigade consisted of three Wings, each Wing comprising two or three squadrons, Jones, *War in the Air, Appendices*, Appendix XV, p. 87.
11. S.F. Wise, *The Official History of the Royal Canadian Air Force. Vol. 1: Canadian Airmen and the First World War* (Toronto: Univ. of Toronto Press, 1980), p. 520.
12. Many descriptive accounts of the exploits of British and Canadian airmen in the First World War have been published, for example Wise, *Canadian Airmen and the First World War*; Lee Kennett, *The First Air War* (New York: The Free Press, 1991); Walter Raleigh and H.A. Jones, *War in the Air* (Oxford: Clarendon Press, 1922-1937), 6 vols. and appendices; Denis Winter, *The First of the Few* (Athens, Georgia: Univ. of Georgia Press, 1983). C^2 issues are described to a certain extent in Maurice Baring, *Flying Corps Headquarters* 1914-1918 (London: Blackwood, 1968); Andrew Boyle, *Trenchard* (London: Collins, 1962); Basil Collier, *Heavenly Adventurer: Sefton Brancker and the Dawn of British Aviation* (London: Secker & Warburg, 1959); and Raymond H. Fredette, *The Sky on Fire* (New York: Holt, 1966).
13. David E. Omissi, *Air Power and Colonial Control: The Royal Air Force, 1919-1939* (Manchester: Manchester Univ. Press, 1990) provides an excellent description of this era.
14. After the First World War the RAF had been reduced to fewer than 30,000 personnel. Phillip S. Meilinger, "Trenchard, Slessor, and Royal Air Force Doctrine before World War II," in Phillip S. Meilinger, ed. *The Paths of Heaven* (Maxwell Air Force Base, Ala.: Air University Press, 1997), p. 47. By October 1944 the RAF numbered 1,171,421 all ranks. John Terraine, *The Right of the Line* (London: Hodder and Stoughton, 1985), p. 535.
15. Generally just a handful at a time, but rarely more than 30, up to 1940. See Martin Middlebrook and Chris Everitt, *The Bomber Command War Diaries* (London: Penguin, 1990) for details of the raids.
16. See for example, Tami Davis Biddle, "British and American Approaches to Strategic Bombing," *Journal of Strategic Studies* 18 (March 1995), pp. 91-144; and Allan D. English, "The RAF Staff College and the Evolution of British Strategic Bombing Policy 1922-29," *Journal of Strategic Studies* 16, (September 1993), pp. 408-31.
17. The story of the RAF and RCAF, including Bomber Command's exploits, has been told well in a number of books, notably Terraine, *The Right of the Line*; Brereton Greenhous, et al. *The Official History of the Royal Canadian Air Force*. Vol. 3: *The Crucible of War 1939-1945* (Toronto: Univ. of Toronto Press, 1994); Charles Webster and Noble Frankland, *The Strategic Air Offensive Against Germany 1939-1945* (London: HMSO, 1961), 4 vols. Sir Arthur ("Bomber") Harris' role in these events is described in Arthur Harris, *Bomber Offensive* (London: Collins, 1947); Charles Messenger, *"Bomber" Harris and the Strategic Bombing Offensive*, 1939-1945 (London: Arms and Armour Press, 1984); Dudley Saward, *"Bomber" Harris* (London: Cassell, 1984). However, no detailed analysis of Bomber Command's C^2 system has been published.
18. A great deal has been written on the Gulf War. Some of the better sources on C^2 are Mark D. Mandeles, Thomas C. Hone, and Sanford S. Terry, *Managing "Command and Control" in the Persian Gulf War* (Westport, CT: Praeger, 1996); and Richard T. Reynolds, *Heart of the Storm: The Genesis of the Air Campaign Against Iraq* (Maxwell AFB, Alabama: Air University Press, 1995). One of the few detailed analyses of an aspect of Canadian air force C^2 in the Gulf War can be found in Jean Morin, "The Command and Control of the Air Transport Group during the Gulf War," in *Proceedings*, 3rd Annual Air Force Historical Conference (Winnipeg : 1 Canadian Air Division, History and Heritage, 1998), pp. 117-24. A more general analysis of Canadian C^2 in the Gulf War can be found in Jean Morin and Richard H. Gimblett, *Operation Friction, 1990-1991: The Canadian Forces in the Persian Gulf* (Toronto: Dundurn Press, 1997).
19. Thomas E. Ricks, "Un-Central Command Criticized: Marine Corps Report Calls Fla. Headquarters too far from Action," *Washington Post* (3 Jun 2002), A01. See also note 20.
20. Phillip S. Meilinger, "Preparing for the Next Little War: Operation Enduring Freedom Points to New Ways of Warfighting," *Armed Forces Journal International* (April 2002), p. 2 of 5 (internet version http://www.afji.com/AFJI/Mags/2002/April/preparing_2.html).
21. A growing literature is emerging on the effects of precision weapons on air warfare. Some sources that provide a perspective related to this discussion and Operation Allied Force are Michael Ignatieff, *Virtual War: Kosovo and Beyond* (Toronto : Viking, 2000); Peter F. Herrly, "The Plight of Joint Doctrine after Kosovo," *Joint Force Quarterly* 22 (Summer 1999), 99-104; Daniel L. Byman and Matthew C. Waxman, "Kosovo and the Great Air Power Debate," *International Security* 24, no. 4 (Spring 2000), 5-38; Alan D. Zimm, "Desert Storm, Kosovo, and 'Doctrinal Schizophrenia,'" *Strategic Review* 28, no. 1 (Winter 2000), 32-9; and Paul Johnston, "Canadian Hornets over Kosovo: A Small Part of a Future Model for Air Power?" in Office of Air Force Heritage & History, eds. *Proceedings* of the 6th Annual Air Force Historical Conference (Winnipeg:1 Canadian Air Division, History and Heritage, nd [2000?]), pp. 113-20.
22. In the Second World War American statisticians calculated that using high level "precision bombing" techniques it required a force of 220 bombers to guarantee a hit on a target 10,000 square feet in size. W. Hays Park, "'Precision' and 'Area' Bombing: Who Did Which, and When?" *Journal of Strategic Studies* 18 (March 1995), p. 147.
23. *Air Force Basic Doctrine*, AFDD-1, (Sep 1997), p. 23.
24. See for example Thomas J. Czerwinski, "Command and Control at the Crossroads," *Parameters* 26, no. 3 (Autumn 1996), pp. 121-32. The Canadian army's endorsement of this philosophy is in *Land Force Command*, (21 Jul 1996), p. 8, available at http://www.army.dnd.ca/ael/pubs/. The fact that Western air forces have focussed on control (in the expression "centralized control and decentralized execution" found in current doctrine) and that Western armies have focussed on command may only be due to the confusion in the C^2 terminology used in Western armed forces. This is an area that warrants further research.
25. Wylie cited in Wayne P. Hughes, "Naval Maneuver Warfare," *Naval War College Review* 50, no. 3 (Summer 1997), p. 12 of 19 (internet version at www.nwc.navy.mil.press/Review/1997/summer/art2su97.htm).
26. Martin van Creveld, *Command in War* (Cambridge, MA: Harvard University Press, 1985), 9, pp. 262-3.
27. F.M. Boomer, " Joint or Combined Doctrine?: the Right Choice for Canada," paper prepared for AMSC 1, http://wps.cfc.dnd.ca/irc/amsc/amsc1/001.html, np.
28. Richard P. Hallion, *Strike from the Sky* (Washington, DC: Smithsonian Institution Press, 1989), p. 3. See also Carl H. Builder, *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the US Air Force* (London: Transaction Publishers, 1994), pp. 34-7.
29. James A. Mowbray, "Air Force Doctrine Problems 1926-present," *Airpower Journal* (Winter 1995), pp. 21-41.
30. J.L. Granatstein, "The American Influence on the Canadian Military," in B.D. Hunt and R.G. Haycock, eds., *Canada's Defence* (Toronto: Copp Clark Pitman, 1993), pp. 134-5; and Boomer, " Joint or Combined Doctrine?" np.
31. D. MacGillivary et al., "Inter-Service Cooperation: Is it the Essence of Joint Doctrine?" in David Rudd, et al., eds., *Air Power at the Turn of the Millennium* (Toronto: Canadian Institute of Strategic Studies, 1999), pp. 192-3.
32. 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, p. 3.
33. Aerospace Doctrine Board: Terms of Reference and SOPs, copy at CFC Library, pp. 1-2, 2-1.
34. The study is John Westrop, "Aerospace Doctrine Study," unpublished report dated 30 Apr 2002, copy at Canadian Forces College library.
35. This issue is raised in a US joint context in Christopher S. Richie, "We Need Functional Doctrine," *US Naval Institute Proceedings* 127, no. 9 (Sep 2001), pp. 52-55.
36. See for example Pigeau and McCann, "What is a Commander?" and Sharpe and English, *Principles for Change in the Post-Cold War Command and Control in the Canadian Forces*.

Canopy Glint: Reflections on *Out of the Sun: Aerospace Operations for the Canadian Forces*

Captain Paul Johnston

It has been widely observed that air forces are usually not as keen on doctrine as armies tend to be,[1] and the Canadian Forces are certainly no exception to this general rule. Whereas the Navy has just reviewed naval theory from first principles and produced their new *Leadmark: The Navy's Strategy for 2020*,[2] and the Army has not only a comprehensive body of doctrinal literature but a large (by CF standards) organization specifically dedicated to its production and maintenance, the Air Force has a three strong staff at 1 Canadian Air Division Headquarters, another three on the staff of the Chief of the Air Staff, and the slim volume known as *Out of the Sun: Aerospace Operations for the Canadian Forces*. Notwithstanding the admirable fact that *Out of the Sun*'s title remains one of the few poetic flourishes in the all-too-often stultifying world of doctrine writing, more needs to be done. First of all, it has almost nothing to say about Operations Other Than War, a key occupation of the modern Canadian Air Force. But even in its chosen niche – air power[3] in conventional war – *Out of the Sun* propagates a doctrinal view that fits poorly with that key feature of air power, seamless flexibility. This paper will concentrate upon what can be done to bring coherence to our doctrinal view of air power in war.

The Rising of the Sun: How We Got Here

The origins of *Out of the Sun* itself are interesting, for it represents a worthy attempt at air force doctrinal reinvention, even if ultimately it has failed.[4] Out of the Sun itself is an odd doctrine manual – not only does it have an eloquent title, it was published in non-standard format by a commercial publisher, unilingually, without a NDID number and without even a publication date. In fact, it was published in June 1997, a rush job to get a publication out in time for that year's Aerospace Power Conference. It replaced the previous manual *Basic Aerospace Doctrine*,[5] but was based primarily upon a précis on air power theory developed at the Canadian Forces College (CFC) in Toronto.[6] Since that time, it has not been in print and because it lacks an NDID number it cannot be traced or requested through the National Defence document system.

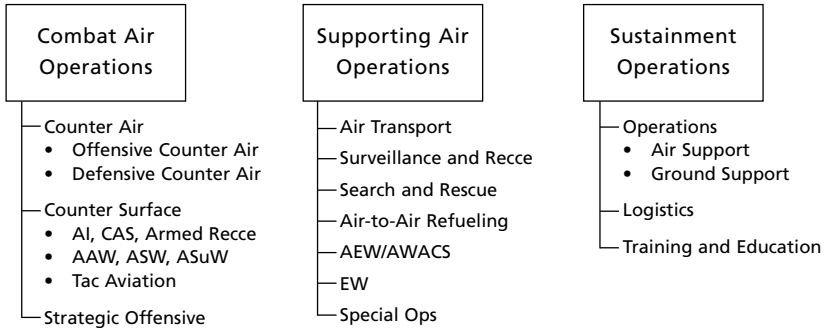
The primary use to which it is put today would appear to be as a classroom reference on the Command and Staff Course at the CFC and on the aerospace operations courses at the Canadian Forces School of Aerospace Studies (CFSAS). Those are worthy enough tasks, but there is scant evidence that it is ever used or referred to by anyone actually applying air power. Indeed, the author recently had the experience of showing the doctrinal air power roles as defined by *Out of the Sun* to a senior officer (a 1000 hour fighter pilot with a Fighter Weapons Instructor Course (FWIC) patch and combat experience over Kosovo no less) who was stunned to hear that the CF officially defined air power roles somewhat dif-

ferently from NATO. He had never even heard of *Out of the Sun*. One suspects that, other than the poor students at CFC and CFSAS who have it inflicted upon them, no one else is reading *Out of the Sun*, much less applying it on active operations. Ironically, it was to avoid this very problem – people not actually reading doctrine – that *Out of the Sun* was published in its non-standard format. The idea was that if it was made small (and hopefully therefore unintimidating), people might be more inclined to actually read it, even to "carry it around in their flight suit pocket."[7] Unfortunately, it has not made doctrine popular reading in our Air Force. More seriously, its contents are not entirely coherent either. As the Air Force Development Committee (AFDC) observed, in order to rationalize Air Force doctrine "a simple rewrite of *Out of the Sun* might not accommodate the full scope of needed change."[8]

Cloudy Skies? Some Critiques of *Out of the Sun*

Central to *Out of the Sun*'s doctrinal vision is the way it groups what air power does into three hierarchical "trees."

The Three Doctrinal "Trees" Defined in *Out of the Sun*[9]



One suspects that a cockpit-level perspective has seeped into our doctrine here. In essence, this three tree doctrinal structure reflects the typical line pilot's view of:

- "flying when we shoot things" (the cool stuff that *Out of the Sun* calls combat air operations);
- "flying when we don't shoot things" (not as cool, but still part of the flying club that *Out of the Sun* calls supporting air operations); and
- "absolutely everything else" (from air maintenance to ground-based air defence to clothing supply; the gratuitously misnamed "sustainment operations").

"Sustainment" is officially defined as "The requirement for a military force to maintain its operational capability for the duration required to achieve its objectives. Sustainment consists of the continued supply of consumables and the replacement of combat losses and non-combat attrition of equipment and personnel."[10] In other words, logistics (broadly understood). Many of the activities *Out of the Sun* groups under "sustainment operations" are palpably not described by this definition, for instance the operational planning function. Even more quixotically, some combat applications of deadly force (such as ground based air defence) are grouped under "sustainment" operations.

Aside from some semantic difficulties with the naming of "sustainment,"[11] there are deeper problems with this "three tree" approach to grouping air power. In what sense are these three groups of operations separate, and even more fundamentally, in what sense are they "operations?" *Out of the Sun* simply defines "operations" as "the processes of carrying on combat." Described thus, it sounds more like "tactical activity," and hence not part of the "operational level of war." Neither is this congruent with the official CF definition of an *operation* – "the employment of an element or elements of the CF to perform a specific mission."[12] Indeed, by that definition, none of the activities grouped together as "combat air operations," "supporting air operations" and "sustainment operations" are really "operations" at all — they are simply what one might call "air power activities," all of which are necessary and of greater or lesser importance to projecting air power.

To be fair, the term "operations" or "operational" is fraught with difficulty. Western militaries have settled upon the concept of the "operational level of war," which descends from the German idea of the *operativ*, hence the English language rendering "operational."[13] Unfortunately, before we imported this from the Germans (along with *auftragstaktik* and a few other terms), the word "operational" was already in widespread English language use – to mean simply the prosecution of active operations. This results in at least two distinctly different senses of the word, which sometimes are almost directly contradictory. For instance, the operational level of war is by definition a higher level function than the tactical, yet what "operational training squadrons" teach is purely tactical. Finally we have the concept of an "operation" as defined by CF doctrine (i.e., an undertaking such as the recent Operation SNIPE by 3 PPCLI in Afghanistan), which may function purely at the tactical level. It is probably best, in these circumstances, to stay away from unnecessary over-use of the term "operations" except when one means specifically the operational level of war or the mounting of a named operation. *Out of the Sun*'s use of the term for combat, supporting and sustaining activities meets neither of those criteria.

The Sun's Warmth: The Relevance of Doctrine?

In truth, as *Out of the Sun*'s predecessor astutely noted, "there is no universally accepted way to categorize all aerospace operations; there will be some overlap regardless of the method adopted."[14] Perhaps it is time to cut-through all of this abstract theorizing and consider what its all for. At the end of the day – or perhaps more accurately at the beginning of the day, as units set out to undertake sorties – the application of air power is going to be refracted through

at different times, and sometimes different things at the same time."[23] While it is less important which word we choose for which meaning, it is important that we have clear meanings and then stick to consistent terminology to describe those meanings. Vague and imprecise terminology is all too often a symptom of vague and imprecise thinking, which might well describe much of air power doctrine's history. This author suggests use of the term "tasks" for the bottom-line activities of air power, if for no other reason than that this is the word used in the term Air Tasking Order (ATO), which is the prism through which air power activities will normally be refracted. Also, use of that term would be consistent with our Army brethren's terminology.

Having argued against the doctrinal super-structure *Out of the Sun* raises over the basic air tasks, what is left if we strip away that super-structure? Taking the lowest elements of all three air power trees leaves the following list:

Current Bottom-line "Roles" or "Tasks" from Out of the Sun

Combat Air Operations	Supporting Air Operations	Sustainment Air Operations
Airfield Attack	Air Transport	C^2
Sweep	Surv & Recce	Int
SEAD	SAR	ATC
Intercept	AAR	Met
CAP	AEW / AWACS	AEM
Escort	EW	GBAD
GBAD	Spec Ops	Grd Def
Conventional Strategic Offensive		AES
Nuclear Strategic Offensive		NBCD
AI		Admin
CAS		• Fin
Armed Recce		• Pers
Maritime Air Ops		• Pers Sp
• ASW		• Med
• ASuW		• Dent
• AAW		Tech Svcs
Tac Avn (Army Helicopters)		• CE
• Recce & Surv		• EME
• Direction & Control of Fire		• Supply
• Fire Support		• Tpt
• Combat Airlift		• Tel
• Logistic Airlift		• Food Svcs
• Support Counter-Mobility		
• Comd & Liaison		
• Aero-medevac		
• Comms Support		

This grouping immediately makes clear an advantage to organizing these tasks into a tree – simply enumerated they make an unwieldy list. However, some rationalization is possible. For instance, the bottom-line branches of the tree under the maritime air category are ASW, ASuW and AAW. There is also the term "TASMO", but as the wording "Tactical Air Support to Maritime Operations" indicates, this is simply a general rubric for any air operations in support of maritime operations, whatever those may be. In other words,

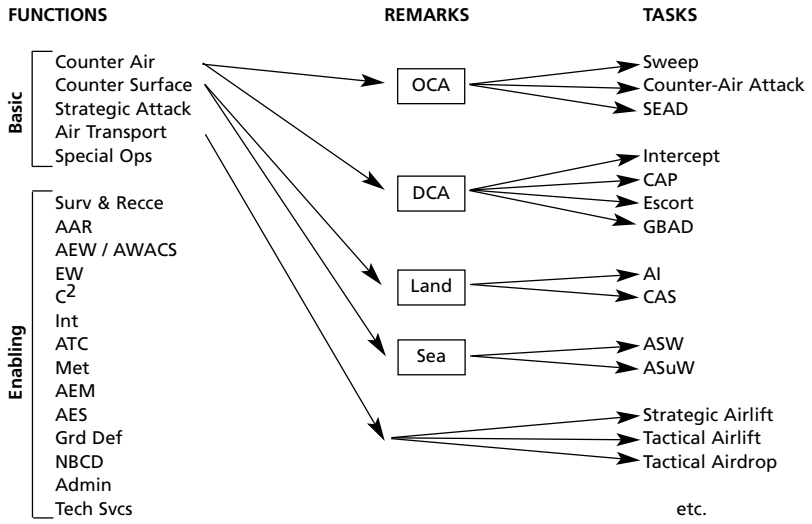
TASMO missions will take the form of either Anti-Subsurface Warfare (ASW), Anti-Surface Warfare (ASuW) or Anti-Air Warfare (AAW) sorties, which is why TASMO was not included in the above list. But the same principle holds true for much of ASW, ASuW and AAW as well. By and large, those terms describe the use to which sorties are being put, not the form they will take. Many of those missions will be some other type of sortie. For instance, "AAW" is likely to take the form of either a Combat Air Patrol (CAP) or Intercept mission. ASuW, and in particular ASW, are more specialized, although they could be regarded as maritime versions of AI.

Still, clearly, some categorization is in order. But keeping in mind the above argument against creating an unwieldy superstructure of doctrinal trees that does not serve to emphasize air power's essential unity, any categorization should be carefully measured. This is probably best accomplished with a simple, two-tier organization that we could call "functions" and then specific "tasks." The bottom-line tasks are important to identify because they are what we will actually do. As stated above, in many ways they represent the "distilled essence" of what we think air power can do, and the ways it can go about doing that. "Functions" are the broader, over-arching areas into which those specific tasks can be usefully organized. Any intermediate groupings are simply illuminating remarks.

Another categorizing principle could be used as well. *Out of the Sun*'s divisions between combat and non-combat is probably not the most helpful, but there is another way to approach the problem, and that is to identify which functions are "basic" and which are "enabling." In this sense, basic functions fulfill an actual end in themselves – those activities that will accomplish the actual mission of the overall operation itself. Examples of basic functions would be Counter Surface in an offensive situation or Air Transport in certain situations (notably Operations Other Than War). Enabling functions would be those required to make basic functions possible, for instance EW, AAR or Intelligence. Note that (although all combat functions wind up as basic functions) this approach is categorization neither upon the basis of whether the function in question is flying or not, nor on the basis of whether it is combat or not.

On the premise that basic air power doctrine should capture that "distilled essence" of how air power works, then the bottom-line requirement for a publication like *Out of the Sun* is a carefully considered list of what we could call the "functions" and "tasks" it is possible to assign to air power, along with the characteristics, strengths and weaknesses, of each. Equally important, we need a concise elucidation of how all these inter-relate. Needless to say, each of the tasks must be realistic and viable (unlike the current armed recce). Finally, such a list would match nicely with the new approach at Chief of the Air Staff level where Defence Planning Guidance is being broken into an "Aerospace Capability Framework." What would such a thing look like?

Proposed Functions and Tasks



Only the basic functions have been broken out into discrete tasks here. Expert opinion from the other communities themselves would be the way to fill in the rest of this table.

Such an approach is flexible – by comprising a "menu" of functions the essential unity of air power is stressed. Also, this approach most clearly identifies the essential functions of an air force, which would allow for more seamless integration into national policy documents such as Chief of the Air Staff Guidance and Defence Planning Guidance. At the other end, a list of clearly elucidated tasks forms the clearest possible description of what it is that air power will actually do. This would allow for more seamless integration of tactical doctrine and procedures into operational doctrine. In short, a two-tier listing of air power functions and tasks could clearly and succinctly capture the distilled essence of our understanding of air power and form the heart of an operational level of doctrine that would tightly bridge the strategic to the tactical.

The Sun in the Heavens: Doctrinal Hierarchy

This raises another key issue – the role of operational-level doctrine in the hierarchy of the levels of war. One of the most fundamental critiques of *Out of the Sun* is that "There is nothing that describes what the air force is for or what it is meant to accomplish. ... *Out of the Sun* tells one how the air force seeks to accomplish its missions, but not why, nor more importantly, why this is critical to Canada as a nation."[24] The Army, with their B-GL-300 series of publications, has *Canada's Army: We Stand on Guard for Thee*, which explains exactly what an Army is, why Canada has one, and what it should be. With its *Leadmark*, the Navy has just produced a somewhat equivalent publication. The Air Force, however, has never articulated any such basic statement. According to *Out of the Sun*'s original drafters, their intent was that the higher level CF and DND publications would constitute this most basic doctrine.[25] Nevertheless, that is probably insufficient, especially in a world where groups like Canada 21 will question why we even have armed aircraft. As Dr Paul Mitchell, the Director of Academics at the Canadian Forces College has noted, the Air Force may consider "the reasons for possessing an air force so blindingly obvious that none have considered it necessary to explain it ... [but] to many Canadians, it is not obvious why Canada needs equipment like fighter aircraft."[26] An Air Force equivalent to *Canada's Army: We Stand on Guard for Thee* and *Leadmark* would probably be well worth the effort.

This illustrates a larger point – doctrine is best constructed in a hierarchy, with separate strategic (or basic), operational- and tactical-level publications. As alluded to above, our Army has a well fleshed out hierarchy of doctrinal publications, as does the USAF. NATO's recent re-working of their air doctrine was part of an initiative to organize the previously haphazard "Allied Tactical Publications" (ATPs) into a coherent hierarchy of "Allied Joint Publications" (AJPs). This is the way we as an Air Force need to go. In fact, an effort to do just that is another one of those worthy doctrinal initiatives that has fizzled out. As far back as the 1980s, when the Air Doctrine Board (ADB) was established, a hierarchy of air force doctrinal publications was envisioned (see Annex A).[27] There was to be one keystone manual (which became the previously cited B-GA-400-000/FP-000 *Basic Aerospace Doctrine* 30 June 1989), along with no less than eight subordinate publications:

- B-GA-401, Air Force Glossary;
- G-GA-410, Support to Aerospace Operations;
- B-GA-415, Aerospace Training;
- B-GA-430, Tactical Fighter Operational Doctrine;
- B-GA-440, Tactical Aviation in Operations;
- B-GA-450, Air Transport Operational doctrine;
- B-GA-460, Search and Rescue Operational Doctrine; and,
- B-GA-470, Maritime Air Operational Doctrine.

These manuals were all duly produced and, as a recent official study of the state of our Air Force's doctrine noted, "as far as can be determined they have never been officially rescinded."[28] They are, however, apparently "inactive" on the CF publication database and – more to the point – few officers are aware that they even exist.[29]

The doctrinal hierarchy concept was well appreciated by *Out of the Sun*'s drafters. While they did not envision a need for any Air Force publications higher in the hierarchy than *Out of the Sun*,[30] their intent at the time was specifically to create a doctrinal hierarchy below *Out of the Sun*, flowing logically down to the tactical level. One of their key concepts was that making such a hierarchy explicit was actually more important than writing the doctrine manuals in question.[31] The very structure of such a hierarchy would go a long way

towards expressing Canada's vision of air power doctrine, and for any particular "slot" in this hierarchy we could decide whether to write our own manual, adopt without reservation an allied manual (which would obviously ensure interoperability and also save scarce doctrinal staff resources), or consciously chose to leave that slot empty. The later option would recognize the doctrinal validity of a particular function, and the resource limited reality of Canada's inability to fulfill that particular function. An example of this would be Combat Search and Rescue. Unfortunately, while several such hierarchies have been proposed none has ever been published in an authoritative doctrinal manual, once again reflecting our propensity to let doctrine fizzle out.

This raises another question – why exactly do we need any uniquely Canadian air power doctrine? Why not simply adopt someone else's? Do we have any original contributions to make to air power theory? The haphazard inclusion of armed recce in *Out of the Sun* suggests that there might even be some dangers in developing our own. If swallowing USAF doctrine whole might stick a bit in Canadian throats, then why not NATO doctrine which has just been re-written (with some Canadian input no less) into a coherent hierarchy?

A Canadian Sun: The Case for Canadian Air Power Doctrine

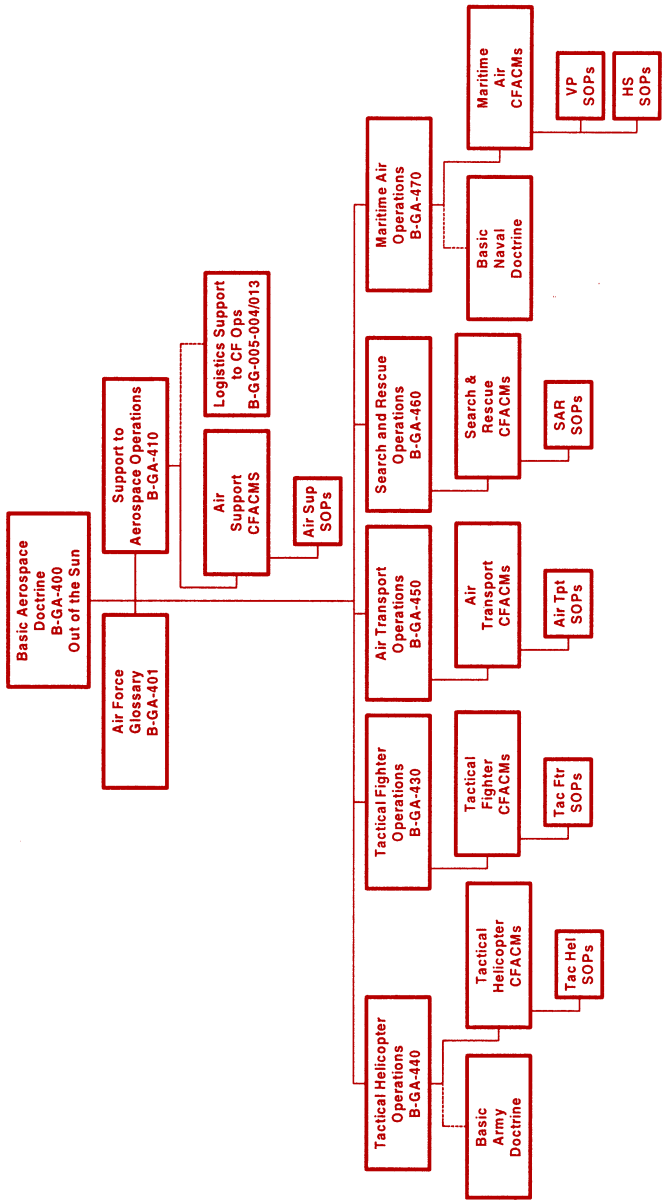
Perhaps the best reason for writing our own doctrine is that the very act of doing so would be a useful exercise for our collective air power community. Commentators have observed that our Navy's recent similar exercise, which culminated in Leadmark, "blew out some cobwebs" and forced the Navy to think.[32] Anything that might force our Air Force to think (beyond technical and tactical levels) would probably be a good thing. Another point is that if we have no basic doctrinal manual, just where would the statement of what constitutes the authoritative CF hierarchy of air power doctrine be published? Certainly some functions or tasks could be left to allied publications, particularly those we do not fulfill such as Suppression of Enemy Air Defences (SEAD) or Combat Search and Rescue (CSAR). But who would argue that as a nation we do not need our own basic doctrinal manuals for those activities in which we do work?

A New Day Dawning?

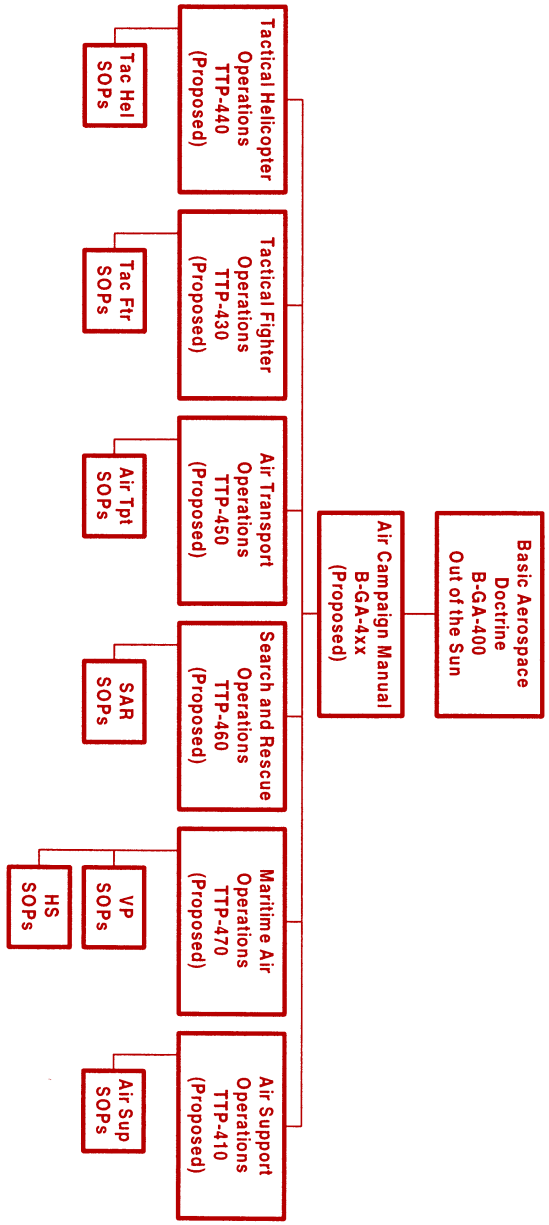
Such a conclusion appears to be the thinking of our leaders. It is now the official position of the Air Force that the CF's air doctrine needs "reinvigoration." To this end, a preliminary study has been conducted by Colonel John Westrop.[33] Such an initiative is long overdue, and will need to include (amongst other things) a thorough re-write of *Out of the Sun*.

Annex A

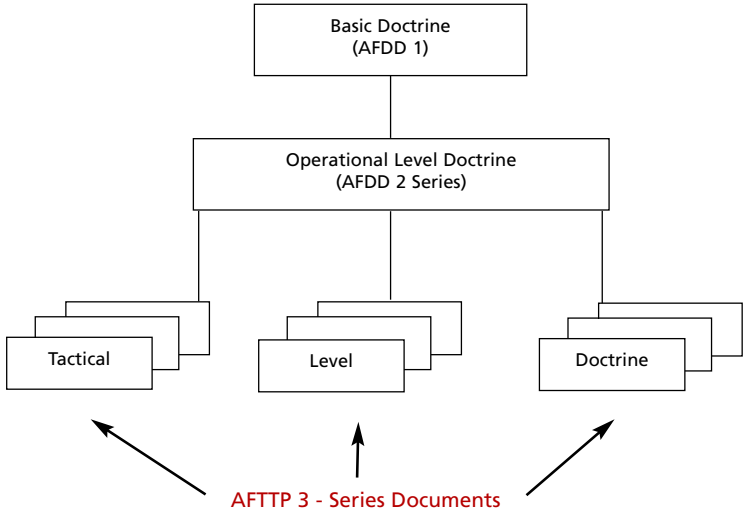
Doctrinal Hierarchy originally sanctioned by the Air Doctrine Board (ADB) late 1980s[1]



Revised Doctrinal Hierarchy Proposed by the ADB in the mid 1990s[2]



Current USAF Doctrinal Hierarchy[3]



(Note: *Out of the Sun* equates roughly with what the USAF considers Operational Level Doctrine. *Out of the Sun*'s closest match in the USAF doctrinal hierarchy is probably to AFDD 2-1 *Air Warfare*.)

USAF List of "Basic Functions"[4]

- Counter Air
- Counter Space
- Counter Land
- Counter Sea
- Strategic Attack
- Counter Information
- Command and Control
- Airlift
- Space Lift
- Air Refueling
- Special Operations
- Intelligence
- Surveillance
- Reconnaissance
- Combat SAR
- Navigation and Positioning
- Weather Services

NOTES

1. See for instance Carl A. Builder, *The Icarus Syndrome* (New Brunswick, NJ: Transaction Publishers, 1994) and Dr James Mowbray "Air Force Doctrine Problems: 1926-Present," *Airpower Journal* (Winter, 1995) or, from closer to home, Colonel P.J. Taggart, "A Working Paper on Proposals for the Development and Dissemination of Air Force Doctrine" in *Air Doctrine Symposium, Summary of Proceedings* (unpublished symposium notes, 1994).
2. On the other hand, *Leadmark* has not been without its critics either. See for instance, Martin Shadwick "The Leadmark Chronicles" in the *Canadian Military Journal* 2, no. 3 (Autumn 2001), p. 75.
3. Swimming somewhat against the current, this paper will use the older term "air power" in favour of the newly vogue "aerospace power", on the grounds that what air forces do is about air breathing machines. Space-based applications provide purely ancillary support, and not uniquely to air forces either. Merely because armies too use satellite communications and GPS does anyone propose that we adopt the term "ground-space power?"
4. Or, perhaps more fairly, fizzled out.
5. B-GA-400-000/FP-000 *Basic Aerospace Doctrine* 30 June 1989.
6. Specifically *ACSP-1 Air Doctrine Manual*, according to Col Westrop, Annex A, "The Evolution of CF Aerospace Doctrine," to his *Aerospace Doctrine Study* (Final Report) dated 30 April 2002, paragraph 8, p. 41.
7. Author interview with LCol G.M. Reid, 13 March 2002, who as 1 CAD A7 was one of the staff principals in the production of *Out of the Sun*.
8. Minutes, AFDC, 20 Dec 2000, extract provided by Col Westrop.
9. Canadian Forces, *Out of the Sun*, (Winnipeg: Craig Kellman & Associates Ltd, nd but actually 1997), p. 33.
10. B-GG-005-004/AF-000 *Canadian Forces Operations*, 2000, p. GL-E-8.
11. Apparently the term "sustainment" was chosen in an effort to pick a title that "would not alienate the support trades from operations." LCol Reid interview.
12. *Canadian Forces Operations*, p. ii.
13. For an analysis of this see, for instance, Bruce W. Menning "Operational Art's Origins," *Military Review* 7, no. 5, (September-October 1997), pp. 32-47.
14. *Basic Aerospace Doctrine*, 1989, p. 6-3-1.
15. Joint Force Air Component Commander's Headquarters. See NATO publication *Joint Air and Space Operations Doctrine* (AJP-3.3(ATP 33(C), September 1999)).
16. For the best scholarly study of armed recce late in the Second World War, see Ian Gooderson, *Air Power at the Battlefront: Allied Close Air Support in Europe 1943-45* (London: Frank Cass, 1998).
17. The April 2002 fratricide of Canadian troops in Afghanistan by a relatively free-ranging US fighter-bomber illustrates the hazards all too clearly.
18. This is the thrust of the new NATO publication *Joint Air and Space Operations Doctrine* (AJP-3.3(ATP 33(C), September 1999)) which replaces the previous ATP 33(B) Tactical Air Doctrine.
19. *Basic Aerospace Doctrine*, 1989.
20. United States Air Force, *Air Force Basic Doctrine* (Air Force Doctrine Document 1 (AFDD-1), 1997), p 45.
21. Out of the Sun, p.33.
22. Ibid, 90.
23. Col Westrop, notes provided to the author, "CF Aerospace Power and Doctrine" (Draft 14 Jan 02).
24. Dr Paul Mitchell, "The Revolution in Military Affairs and the Canadian Air Force" in *Air Power at the Turn of the Millennium* ed. by David Rudd et al (Toronto: Canadian Institute of Strategic Studies, 1999), p.43.
25. For instance B-GG-005-004/AF-000 *Canadian Forces Operations*, the Defence Planning Guidance, and the most recent *White Paper* itself. Author interview with LCol Reid.
26. Dr Paul Mitchell, "The Revolution in Military Affairs and the Canadian Air Force," p.43.
27. Westrop, Annex A, "The Evolution of CF Aerospace Doctrine," to his *Aerospace Doctrine Study* (Final Report) dated 30 April 2002, paragraph 5, p. 40.
28. Ibid, paragraph 6, p. 41.
29. Lieutenant Colonel Brian Wheeler et al "Aerospace Doctrine" in *Air Power at the Turn of the Millennium* ed. by David Rudd et al (Toronto: Canadian Institute of Strategic Studies, 1999), 146.
30. See note 25 above.
31. LCol Reid interview.
32. Dr Paul Mitchell, "The Revolution in Military Affairs and the Canadian Air Force," 43.
33. *Aerospace Doctrine Study* (Final Report) dated 30 April 2002. The author is indebted to Col Westrop for generously providing a copy of this and various other materials.

NOTES

Annex A

1. "The Evolution of Aerospace Doctrine in Canada."
2. Ibid.
3. AFDD-1, p. 3.
4. Ibid, p. 46.