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The *ROYAL CANADIAN AIR FORCE JOURNAL* is an official publication of the Commander Royal Canadian Air Force (RCAF) and is published quarterly. It is a forum for discussing concepts, issues and ideas that are both crucial and central to air and space power. The *Journal* is dedicated to disseminating the ideas and opinions of not only RCAF personnel, but also those civilians who have an interest in issues of air and space power. Articles may cover the scope of air-force doctrine, training, leadership, lessons learned and air-force operations: past, present or future. Submissions on related subjects such as ethics, technology and air-force history are also invited. This journal is therefore dedicated to the expression of mature professional thought on the art and science of air warfare and is central to the intellectual health of the RCAF. It serves as a vehicle for the continuing education and professional development of all ranks and personnel in the RCAF as well as members from other environments, employees of government agencies and academia concerned with air-force affairs.

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ROYAL CANADIAN AIR FORCE JOURNAL



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JOURNAL SECTIONS

ITEM	WORD LIMIT*	DETAILS
LETTERS TO THE EDITOR	50–250	Commentary on any portion of a previous <i>RCAFJ</i> .
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POINT/COUNTERPOINT	1500–2000	Forum to permit a specific issue of interest to the RCAF to be examined from two contrasting points of view.

* Exclusive of endnotes

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- The Senior Editor will notify contributors on the status of their submission. It may not be possible to publish all submissions.
- All text submissions must be digital, in Microsoft Word or rich text format. Files must not be password protected and must not contain macros. Files may be submitted by mail or email at the addresses provided below.
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- Authors should use *Oxford English* spelling. When required, reference notes should be endnotes rather than footnotes and formatted in Chicago style. For assistance refer to *The Chicago Manual of Style, 16th Edition* or Rawc Production Section at RAWCProd@forces.gc.ca
- Acronyms and abbreviations should be used sparingly:
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- For the Fall issue: **30 July**

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EDITOR'S MESSAGE

This fall's *Royal Canadian Air Force Journal (RCAFJ)* brings an impressive variety of articles that cover a lot of ground—from doctrine to history to current capabilities. All in, it shows the extensive range of topics that should be of interest to all Royal Canadian Air Force (RCAF) members.

The first article sets the tone for the RCAF's efforts to teach command and control through its Air Power Operations Course (APOC), Air Power Refresher Course (APRC), Operations Command and Control Course (OCCC) and Senior Command and Control Course (SCCC) offerings. *The Commander-Staff Dynamic: Understanding the Respective Roles and Responsibilities of the Commander and Staff in Military Operations*, by Dr. Caravaggio, examines the intricacies of this complex arrangement. As stated by Dr. Caravaggio, "a well-functioning commander-staff dynamic facilitates success in operations, while a dysfunctional dynamic only leads to squandered resources and opportunities." The article provides an understanding of this critical relationship to all with air power involvement—a must read for all RCAF members.

The second article, *Targeting, Air Intelligence and Strike Warfare Theory and Practice, Part I*, provides insights into the relationship between intelligence and air power applications and their unique qualities, quite different from those with other services. Dr. Ferris examines the historical relationships of intelligence and air power from World War I to the current day and their resulting implications.

The final set of articles was selected from APOC 1702 and demonstrates the students' understanding of air power. Taking a selected book, the students engage in an intellectual debate with the book's perspective and their understanding of air power. The articles, *Air Power Mastery and Air Power Applications in the Joint Domain* (Flight Lieutenant Lyddon – Royal Air Force), *Warden's "Five Strategic Rings" and Air Power During the Iraq War* (Squadron Leader Lawson – Royal Australian Air Force), and *Reflections on Air Power: Definitions, Aspects and Application* (Major Gray – RCAF), all provide valuable insight into how our future leaders think and perceive air power in today's environment.

All in all, a lot of ground is covered in this issue of the *RCAFJ*.

Enjoy the read.

Sic Itur Ad Astra



Lieutenant-Colonel Doug Moulton, CD, MBA
Senior Editor

Correction: A photo caption on page 9 of the Summer 2018 issue of the Royal Canadian Air Force Journal incorrectly identifies the military member depicted in the photo as Giulio Douhet. The Journal regrets the error.







THE COMMANDER-STAFF DYNAMIC:

UNDERSTANDING THE RESPECTIVE ROLES AND RESPONSIBILITIES OF THE COMMANDER AND STAFF IN MILITARY OPERATIONS

BASED IN PART ON THE LECTURES OF
GENERAL HELGE HANSEN AT THE CANADIAN
FORCES COLLEGE, TORONTO, CANADA

BY LIEUTENANT-COLONEL ANGELO N. CARAVAGGIO,
OMM, CD, PhD (RETIRED)

One of the strangest paradoxes of human behavior is that people accustomed to studied routine [military] must be capable of quick and decisive departure from that mind set to be repeatedly successful. Order must tend to chaos—indeed, teeter next to it with an exquisite sense of balance—in order to intuitively adapt, triumph and endure.¹

— Colonel L. W. Wilkerson,
Marine Corps War College

The effective use of combat forces in battle requires the coordinated interaction of thousands of personnel and machines in time and space against an assigned objective. The key to this interaction is intellectual rather than physical and occurs through a process that will be called the “commander-staff dynamic.” The commander-staff dynamic refers to the cognitive interaction between the commander and their staff that processes the multitude of concepts and information necessary to conduct military operations, regardless of environment. The elements of the commander-staff dynamic include the commander, their subordinate commanders, the staff and the leadership environment. Each element has a crucial role to play in generating situational awareness and a common intent, thereby ensuring coordinated action on the part of all units in the attainment of assigned objectives.

The measurable output of an effective commander-staff dynamic is operational tempo or the ability of the formation to carry out sustained combat operations against an equally determined foe who is also trying to achieve their own assigned objectives. A well-functioning commander-staff dynamic facilitates success in operations, while a dysfunctional dynamic only leads to squandered resources and opportunities. Understanding this crucial intellectual interaction between a commander and their staff is vital to understanding the planning and execution of military operations.

THE COMMANDER

Command has been defined as the “authority vested in an individual for the direction, coordination and control of military forces.”² Thomas Czerwinski, in his article “Command and Control at the Crossroads,” analysed the historical evolution of command systems over time from what he described as command-by-direction, to command-by-plan, to command-by-influence systems and concluded that only command-by-influence systems are likely to be consistently successful on the battlefield.³ The unique aspect of command is that although command is the responsibility of one person (i.e., the designated commander), the exercise of command today can only be accomplished through the interaction of many people.

In its purest form, the role of the commander is to first decide on a course of action, then allocate specific missions to each of the subordinate commanders along with the resources necessary to accomplish those missions. In accepting a command position, the commander accepts the additional burden of accountability to their superior for the outcome of their actions and those of their subordinates. This accountability can never be shared nor delegated.⁴

A commander exists as both a position and a person. The position has known duties and functions, and it exists within a larger military construct. A person with the appropriate skills and competencies is then appointed to realize the potential of the position. A commander is entrusted with the authority to direct, coordinate and control the military forces placed under their stewardship. The commander has the authority to issue lawful orders to those individuals under their command and expects in return professionalism, loyalty, cooperation and energy in the execution of those orders.

Commanders have the right to delegate to subordinate commanders a portion of their overall authority commensurate with the assigned mission. While a commander may hold a subordinate commander responsible for the successful completion of a mission, only the original commander remains responsible and accountable to their superior for the effective execution of that mission. “The tracing of accountability within a military chain of command is relatively straightforward”⁵ and lies with the respective commander at each level of command.

A distinction exists between command authority that is formally assigned and that which an individual earns through their personal credibility and professional competence. Formal authority explicitly gives commanders resources of people and materiel to accomplish the assigned mission. Personal authority, on the other hand, is that authority given informally to an individual by peers and subordinates.

Unlike formal authority, which is made explicitly through legal documentation, personal authority is held tacitly. It can only be earned over time. Personal authority cannot be formally designated and cannot be enshrined in rules or regulations. It emerges when an individual possesses and exhibits a combination of professional military and personal competencies that creates trust and results in effective leadership.⁶

Unlike command, leadership is not rank-, title- or function-specific. Any member of the military can display leadership qualities or characteristics at any time because the currency of leadership is influence, not power or formal authority. Three elements can be characterized as central to leadership: leadership is a process; leadership involves influence within a group context; and leadership is focused towards the attainment of a common objective or goal.⁷ Leadership is, therefore, for the purposes of this article, defined as “a process whereby an individual influences a group of individuals, for the attainment of a common goal.”⁸

In his book, *Leading the Charge*, General Anthony Zinni has added several corollaries to the exercise of leadership that are important to understand for effective, sustained leadership to exist. Leadership must be exercised in an ethical, moral and responsible way, such that the led feel good about what they are doing. In following, the led achieve pride, enjoyment and a sense of accomplishment in their mutual success. Leadership must be exercised in a manner that ensures strong, cohesive and well-functioning teams that exceed the sum of their parts. The success must bring respect and admiration for the group and the organization. Finally, the leadership must be exercised so that it brings success to the enterprise. Leadership that does not achieve the aim or gain the objective is pointless.⁹

Each commander will create the type of working environment within which they want to operate. Some commanders choose to be very directive, overseeing every detail of their planning and operations, while others are content to give general guidance and allow the staff to work out the details. Consequently, the attitude, confidence and fighting efficiency of the organization is significantly influenced and moulded by the personality and abilities of the commander as a leader, tactician and trainer. Given the time, opportunity and resources to train, the culture of the organization can become a reflection of the character of the commander.¹⁰

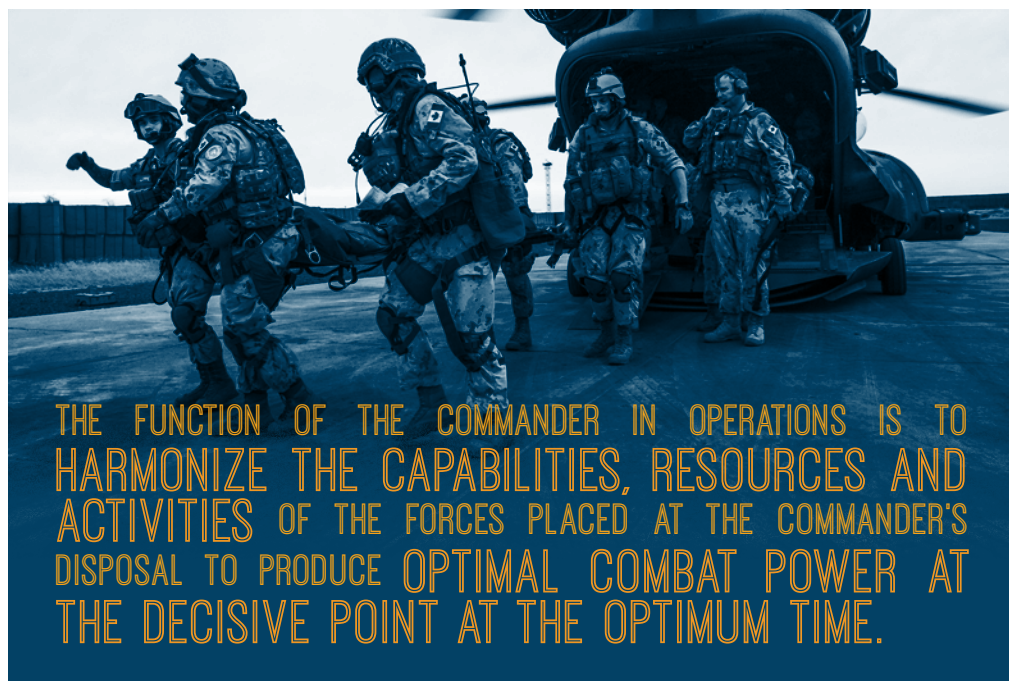
In operations, military commanders must make decisions in a climate of volatility, uncertainty, confusion and disorder where risk, violence, fear and danger are prevalent. Uncertainty remains an inevitable feature of command, yet decisiveness is viewed as a vital component of effective command. The commander's decision making may be further challenged by deficiencies in their own forces; poor equipment; and, sometimes, discontinuities among such factors as strategy, tactics, forces and the training or experience level of assigned forces. Whatever the challenges, the commander is expected to overcome them and, making the best use of the forces assigned, achieve mission success.¹¹

The function of the commander in operations is to harmonize the capabilities, resources and activities of the forces placed at the commander's disposal to produce optimal combat power at the decisive point at the optimum time.¹² A note about the distinction between harmonization and

synchronization: harmonization brings together different combat capabilities over time to create a desired effect; synchronization brings together different combat capabilities at one place at the same time. Typically, synchronization is more relevant at the tactical level, while harmonization is more relevant at the operational level. Both conditions are necessary for the effective execution of combat operations.

In the May 1940 German attack into France, harmonization and synchronization were critical to the success of the operation. The role of the German armies that attacked in the north through Belgium and Holland was to lure the French and British forces north. Moving north would pull these forces away from the main German attack, which was planned to take place in the south through the Ardennes Forest near Luxembourg. The attack in the north had to pull the Allied forces north before the attack in the south broke through.

The problem for the Germans was that the attack in the south moved much quicker than expected. If the Allies recognized that the main attack was through the Ardennes, they could have stopped the move of their forces north to meet this new threat in the south, which would have ruined the sequencing necessary for German success. The harmonization and synchronization of their actions in time and space were vital to the German breakthrough and eventual German success.



The harmonization/synchronization processes begin when a commander inherits a mission complete with tasks, objectives and conditions, the result of higher-level command planning and decisions. The commander, in turn, will set the initial conditions for assigned forces in the projected operation, including defining and assigning roles and the nature of the interactions that should and should not take place among the units of the formation. Failure to appropriately define the mission or crafting objectives that are not attainable is a failure of command and often results in mission failure.¹³ A key responsibility for the commander is establishing a clear mission statement and clearly defining the conditions for success for the mission or operation.

The functional task of the commander, therefore, is to balance the ways (operational design), ends (objectives) and means (resources) through the three functions of command, leadership and management. Through the command function, the commander initiates, designs, assesses, decides and guides the planning and execution processes to ensure operational success. Through the leadership function, the commander provides vision, persuades, negotiates and networks to achieve a shared vision of objectives and operational design. Through the management function, the commander measures, coordinates, deconflicts and controls with the aim of achieving the most economical use of assigned resources.¹⁴ (See Table 1.)

Balancing: “Ways” (Operational design) “Ends” (Objectives) “Means” (Resources)		
By: Command	By: Leadership	By: Management
Initiating Designing Assessing Deciding Directing Guiding	Vision Leading Persuading Negotiating Providing feedback Networking	Planning Measuring Coordinating Deconflicting Improving Controlling
Aim: Operational success in execution	Aim: Shared vision of objectives and operational design	Aim: Economical use of resources

Table 1. Functional considerations for the commander

In any command system, there is an inherent tension between centralized control and delegating authority; between a commander’s desire to have firm control of all aspects of an operation; and the initiative and latitude a commander is prepared to allow subordinates in achieving their assigned objectives. It is important, therefore, that commanders take the time to consider the leadership environment that they are setting up for themselves and their followers. Once the command environment has been established, it is important that the conditions of the environment not change (e.g., a subordinate commander is allowed to make a certain decision on one day but is then chastised for making the same decision the following day). Arbitrarily changing the leadership environment destroys trust and constrains initiative.

Most of the key command decisions are framed by trust and risk. Will the commander be a people-focused leader, delegating responsibility and decision-making authority to the outermost levels of the organization, or a tasks-oriented leader, overseeing all details and information while tightly holding decision-making authority? Will the commander retain all key decisions or delegate certain decisions to the chief of staff, deputy commander or subordinate commanders? What level of risk is the commander willing to accept in allowing others to make decisions on the commander’s behalf? Key decisions such as these establish the decision-making boundaries of the organization and help to create the intellectual environment within which the commander and staff operate.

THE STAFF

Military operations are, by their very nature, dynamic and complex. Military staffs evolved over time as a means of helping commanders manage the growing complexity of warfare. The function of the staff is to provide the commander and subordinate commanders with the information, recommendations and coordination required to allow the commander to make informed and timely decisions.¹⁵ The staff also supports the commander in coordinating the vast array of detail needed to conduct military operations. A consequence of the increased complexity of warfare is that the staff will come under enormous pressure that can cause it to fail, especially if the staff is not properly trained and led.

Today, most Western nations operate within a continental staff system led by a chief of staff (COS) or deputy commander. Each branch of the staff provides either assistance in a specific professional or technical area (e.g., engineers, personnel, finance) or is concerned with planning, coordinating and executing of operations. The COS is typically the knowledge manager of the staff and oversees the “battle rhythm” and the synchronization and coordination of staff activity. The COS will typically chair many of the key meetings in the headquarters to ensure consistency and focus for the various decision-making bodies in the planning process.

The efficient and effective command of an organization depends, to a significant extent, upon the relationships between the various senior leaders of the staff organization. Each has their duties to perform in controlling different components of the organization. The keys to effective staff coordination are understanding the commander’s intent as well as their colleagues strengths and abilities. Teamwork at all levels of the organization must be founded on mutual trust that starts at the top and permeates throughout every branch (see Table 2).

Role	Authority	Responsibility
Planning	Supports chain of command. NOT part of it.	Serves two masters: the commander as well as the formations and units of the command
Coordinating	No authority independent of the commander	
Supervising	Cannot say no without the commander's authority	
Executing tasks to support operations		

Table 2. Functional Considerations for the Staff

In conducting and planning operations, the staff officer has the dual responsibilities of advising the commander on the one hand and passing on the commander’s instructions on the other. Due to the nature of their work, staff officers become a conduit for and sometimes a filter of information up and down the chain of command. They frequently are exposed to or have information that the commander may or may not be aware of. The filtering of information, unintended or otherwise, can cause serious discontinuities in developing a common situational awareness and common intent between a commander and the staff. It is the prerogative of the commander to decide what information is or is not important.

When the commander decides on a course of action, the staff officer must be prepared to support it with complete loyalty, effectiveness and professionalism. The role of the staff becomes one of translating the commander's intentions and decisions into timely, complete and properly related actions on the part of each formation as well as staff units. These directives inform the elements of the force of their tasks or objectives and how the assets of the organization and accompanying forces will be coordinated in support. Resources or assets available are identified, boundaries and other control measures are deconflicted and contingency plans identified, if plans must be altered.

Due to the complexity of military operations, the training of skilled staff officers takes time. The payoff for having effective staff officers, however, is that they can quickly earn their commander's confidence and trust. This trust allows the commander to focus on the critical elements of the operation while the staff focuses on the details that will facilitate mission success. Commanders who trust their staffs usually allot considerable freedom to the staff in the execution of their responsibilities in support of the mission or operation.

The proper preparation and education of staff officers has become a forgotten task for many modern militaries. In fulfilling their role in support of the commander, it is important that staff officers remember that they are advisors to the commander and are not in the decision-making stream. As such, it is important that staff officers abide by a simple group of principles when interacting with and briefing their commanders:

- always present a sober assessment of the facts; no wishful thinking;
- state facts, assess facts and deduce conclusions;
- begin with a general description of the situation and then proceed to the essential information when presenting information to your commander;
- know the details for clarification;
- be prepared to present alternative options;
- do not offer personal views unless requested by a superior officer;
- only express personal concerns or doubts during the planning process;
- support your commander once the course of action or decision has been made; and
- be honest and loyal to your commander and the chain of command.

The importance of the last point cannot be overemphasized, since your commander will be making decisions and providing advice up and down the chain of command based on the information and advice provided by the staff.

Staffs are inherently conservative and often make recommendations based on consensus at the lowest common denominator. This phenomenon is not always advantageous for a commander in operations. Waiting for consensus and/or staff conservatism can impede the commander's ability to make bold, immediate or intuitive decisions, particularly if the decision is contrary to the recommendations of the staff. At various times, the staff officer is a negotiator, taskmaster and diplomat. At all times, the staff officer must be energetic and boldly strive towards mission accomplishment.¹⁶ A competent staff can often save even the most incompetent commander, but given the complexity of modern warfare, a commander is no longer likely to prevail without a competent staff.¹⁷

The organization's staff is not part of the chain of command. The staff supports the chain of command but has no authority independent of the commander. Therefore, all activities are undertaken on behalf of the commander.¹⁸ If a subordinate commander within the organization objects to direction that is being provided by a staff officer, the subordinate commander would address the issue through the chain of command to the superior commander and not normally through the staff.

COMMANDER-STAFF DYNAMIC

The commander and staff exist as a counterbalance to each other. The commander is the creator of military art. The commander's thinking must be unconstrained and creative in developing a solution to the military problem with which they are confronted or assigned. The commander's creative expression in conceptualizing their intent and concept of operations must then be balanced by the "rules-bound" decision-making military science of the staff.

An intellectual space exists between the commander and the staff, where the unique knowledge of each is shared and evaluated. In operations, information is generated from many sources, some available only to the commander, some available to the staff as well as other information which is available to both. The goal of the information sharing is to develop an understanding and interpretation of what the information means within the given situational context or operational environment. This sharing generates a common situational awareness between the commander and the staff about what is within the realm of the possible for conducting operations.

A common situational awareness allows for the formulation of a common intent and coordinated action. The importance of the interrelationship of these concepts cannot be understated. Without a common situational awareness and collective understanding of the commander's intent, the coordination and alignment of administrative, logistical and combat forces in support of the commander's overall plan become very difficult.¹⁹

An excellent example comes from the Japanese planning for their attack at Pearl Harbor on 7 December 1941. The chief planner of the concept of operations, Commander Minoru Genda, did not confine his thinking to the resources and capabilities that the Imperial Japanese Navy (IJN) possessed at that time in developing the plan. Instead, he began with the desired end state in mind and developed his plan accordingly. The concept of operations that he developed was beyond the IJN capability, both technically and operationally, to execute when the plan was developed. Genda decided what needed to be done, and when IJN capability was lacking, they developed a solution to each problem.²⁰

In the commander-staff dynamic, the commander considers such elements as tempo, synchronization, harmonization, synergy and risk in the formalization of their concept of operations. The staff then provides the sober assessment of the commander's concept of operations by applying military science. In applying military science, the staff considers such factors as time, space, forces and supplies to determine whether the commander's concept of operations is achievable given the resources and time available.

In the staff thinking process, adjectives such as directed, linear, rational, sequential, analytical, logical and mathematical are the norm (see Figure 1). Formal analysis (from the staff) balances creative expression (from the commander) to determine whether the concept of operations is achievable given the constraints and restraints imposed. Constant interaction between military art and military science is critical to mission success, which can only be achieved if a common situational awareness is first established between the commander and staff.

Information flows to the commander and staff from many sources, which can cause completely different opinions as to what is happening and what action needs to take place or can take place. The commander can receive information from a higher commander or headquarters, liaison officers sent to other formations or through personal visits to units. The staff receives inputs from many diverse sources, including the plethora of reports and returns, usually on the status of personnel, materiel

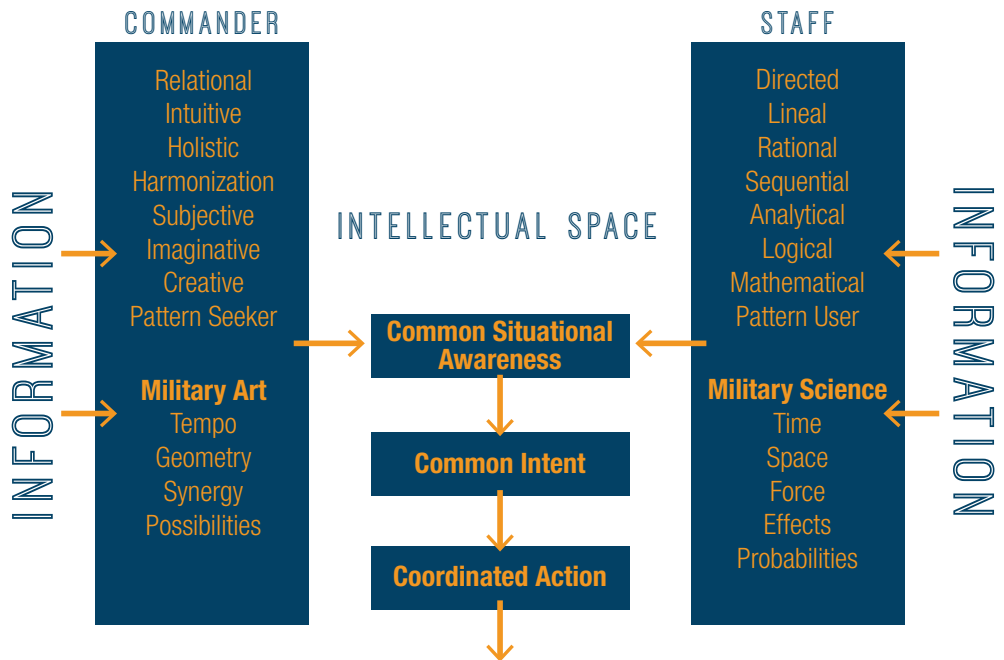


Figure 1. Commander-Staff Dynamic

and equipment that are typical in all military operations. Technology enhances the compiling and deciphering of all this information but cannot replace the intellectual exercise of answering the vital “so what does this all mean?” question in trying to plan future operations.

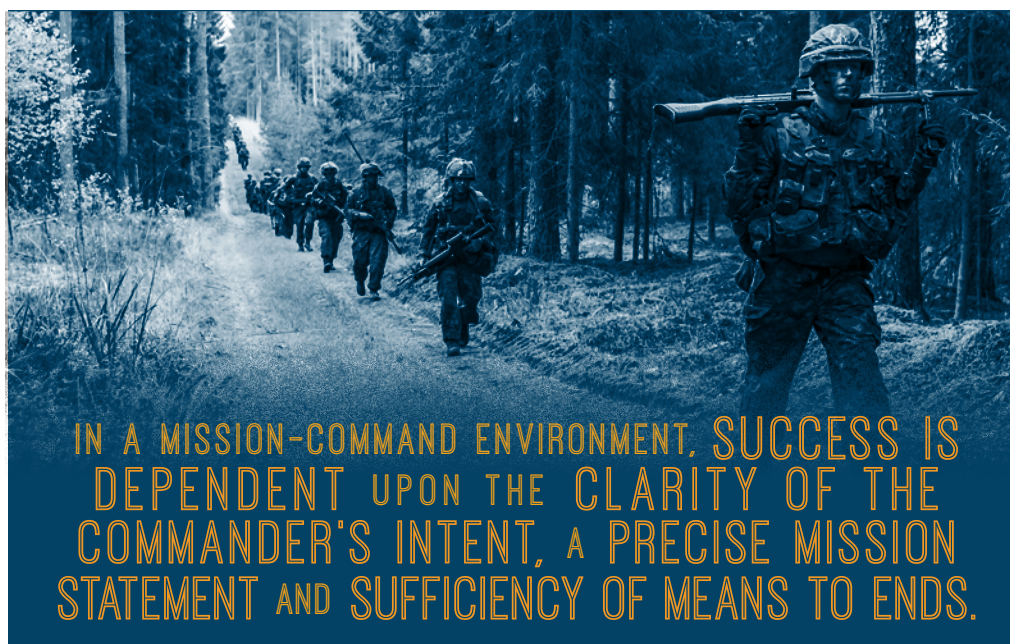
If the results of the military art and military science examination are not congruent, then a re-examination of the two elements is required to determine what is within the realm of the possible for future operations. For example, the commander’s concept of operations may have been too imaginative or aggressive and may not be supportable by the combat forces, time, technology or supplies available. On the other hand, the staff may have overestimated an opponent’s capabilities and, therefore, recommended a more conservative approach. In cases where they feel alterations need to be made to the commander’s intent, it is the responsibility of the staff to voice their doubts and prepare researched and viable alternatives. The outcome of this exchange between art and science, commander and staff, must be an agreed upon common situational awareness of what actions are within the realm of the possible, given all the constraints and restraints imposed. The common situational awareness facilitates a common intent which then enables coordinated action on behalf of all units.

Genda, a naval fighter pilot, designed the concept of operations for the Pearl Harbor attack around one fundamental assumption: he who controls and/or denies Pearl Harbor to the other side wins the war. Genda believed that bases and air power would win the war, not battleships. Consequently, the focus of the attack was the base and facilities at Pearl Harbor. The admiral executing the attack, Vice-Admiral Chuichi Nagumo, was a surface-fleet officer who believed in the supremacy of the battleship in naval warfare.

The initial attack of two waves was designed to establish air superiority over Pearl Harbor and deny the Americans the ability to hit back at the Japanese carriers. When it was reported that the

initial attack had sunk or severely damaged all of the United States' battleships, Nagumo decided that his task was done, and he did not order the follow-on attacks that were designed to destroy the facilities and infrastructure of Pearl Harbor itself. In this example, there was no common understanding, thus, no common intent between the intent of the plan and the person executing the plan. As a result, the Japanese lost their one true opportunity to eliminate the American ability to project power into the central Pacific area during 1942. Had the follow-on attacks been executed, the 1942 battles of Coral Sea, Midway and Guadalcanal would not have happened.

Most Western nations have adopted a formal planning process to facilitate planning and conducting operations. This planning process provides a structured, interrelated and logical sequencing to the thinking and planning within the organization. Different countries have different steps in the process, but all provide an iterative process from analysis to plan review and are applicable throughout the spectrum of operations planning. The planning process, however, is a means to an end, not an end. Critical, imaginative thinking and analysis are vital to a successful outcome.



Many modern Western militaries operate under a command concept referred to as “mission command.” In a mission-command environment, subordinate commanders are given a mission, told what to achieve, the level of risk the commander is willing to accept, specific resources, any control mechanisms necessary and a definition of what constitutes success. The subordinate commander is then free to figure out how to accomplish the mission within the given parameters.

In a mission-command environment, success is dependent upon the clarity of the commander's intent, a precise mission statement and sufficiency of means to ends. With this guidance, subordinate commanders work out their plans to fit the commander's intent.²¹ If the commander is satisfied that these subordinate plans can accomplish the desired results, they allow the subordinate commanders to fight their own battles. Once the operation is initiated, the experienced commander retains a secure hold over the key elements of the operation but also allows subordinate commanders the latitude to achieve their assigned missions.

Decision making in operations is a dynamic process. It involves many decisions that are interrelated and rarely independent. Decisions must be made in real time, which creates a state of fluid decision making on the part of opposing commanders as they try to exert their respective will on their foe. Continuous evaluation and assessment of information and the battlefield conditions on the part of the commander and staff are essential. Having the time needed to make decisions and being able to implement the corresponding action first is, therefore, crucial to success in operations.²²

Success in operations is dependent upon a formation's ability to generate and maintain operational tempo. Operational tempo is the rhythm or rate of activity in operations, relative to the enemy. Operational tempo is important because they who control the operational tempo retain the initiative and can dictate the where and when of operations. Operational tempo has three elements: speed of decision, speed of execution and speed with which a force transitions from one activity to another.

Common intent is the non-technical means of coordinating actions.²³ Common intent enables mission command. This common intent allows for the development of operations that will ensure unity of effort, thereby generating an operational tempo and decision cycle that will maintain the desired operational tempo. Achieving a quicker decision cycle than one's opponent will ensure that the commander will be able to dictate the combat tempo to the opponent despite the challenges encountered on the battlefield. The ability to seize and keep the initiative in battle by getting ahead of the opponent's decision cycle was, and still is, viewed as being of vital importance in operations.²⁴

In operations, a commander's focus is constantly shifting, as required, between future and current operations. An integral part of any commander-staff dynamic, therefore, is how changes are recognized and adjustments are made. The ability to recognize a need for change and the appropriateness and timeliness of the response are measures of the effectiveness and agility of the commander-staff dynamic within an organization. Adjustments may take the form of changes in roles and responsibilities or changes in rules and constraints. The professionalism and competence of the command-staff group, combined with the responsiveness of the command-and-control structure, have a profound effect on the degree of freedom of action or options available to the commander when considering ways to achieve their mission or change operations that are already underway.²⁵

Once the operation is initiated, there is a continuous process of situational assessment, decisions and modified direction as the commander and staff react to the unfolding situation on the battlefield. The function of the commander becomes one of inspiring, motivating and continuously assessing the situation, reacting where needed to ensure the successful completion of the current operation while contemplating the next moves.²⁶ The whole procedure of command and control demands situational awareness; clear-cut decisions; risk management; mutual confidence among the command team; and absolute brevity between the commander, subordinate commanders and the organization's staff.

The effectiveness of the commander-staff dynamic is a function of the competence, expertise and experience of the individual commanders and staff officers in generating a common cause and purpose for the mission that is understood by all.²⁷ The quality of execution is a function of how well individual tasks are performed and how well the individual actions are synchronized as well as the agility associated with execution. Success is ultimately dependent upon the speed, boldness and mental flexibility on the part of the individuals who are in the key leadership and staff positions.

THE JOINT ENVIRONMENT AND COMBINED DIMENSION

The joint environment presents many unique challenges when considering the commander-staff dynamic. The joint operational level is where the harmonization and synchronization of all

military capabilities occur. The effectiveness of a joint staff is very much a function of the education and understanding a staff officer has of their respective environment, first and foremost, and then a function of their understanding of the different capabilities of the other environments. The joint commander and joint staff officer must understand the capabilities that each environment brings to the table and must be able to analyse which capabilities from which environment will be the most effective in achieving the desired result in any given situation. The function of the joint commander is to harmonize/synchronize capabilities and effects across the assigned theatre, establish the operational objectives of the campaign, order a phased joint campaign plan and allocate tasks to the component commanders.

The component commander represents the execution level. Component commanders are usually single-environment components (e.g., army, navy, air force or special forces), and they employ combat power. Component commanders coordinate the execution of missions across the theatre, establish tactical objectives and coordinate with other components.

The combined dimension represents another level of complexity over and above the joint environment. Commanders and staff officers in the combined environment may be faced with competing obligations between the national interests of their own country versus multinational interests of participating nations. These discontinuities can easily cause a conflict of loyalties between the chains of command. In many cases, commanders and staff officers in multinational operations have two separate chains of command: a national one and one operating under the auspices of whatever organization or body sanctioned the action (e.g., United Nations, North Atlantic Treaty Organization [NATO], or coalition of the willing). These chains of command can cause friction and ethical dilemmas for staff officers and commanders as they wrestle with possible competing obligations of the two chains of command in attempting to achieve the stated aims of the operation or common cause.

Issues of trust between components and between nations can occur when contributing nations have disparities in professional competence and language as well as when national motives and national rivalries come into play. Coalition operations can easily generate an “us” and “them” culture if the commander is not careful. All nations will have their own distinct professional military culture and professional military competence which must be accepted and valued in the planning and conduct of operations.

Leaders/commanders must be aware that their leadership style is not necessarily understood in the same way by different nations. Commanders must also be cognizant that the professional cultural differences may affect such cognitive tasks as planning, problem detection, situational awareness, risk management and decision making. The key question for many Western-trained commanders is: “Is mission command possible?”

Commanders and leaders in coalition and multinational operations must possess abilities in mediation, conflict resolution, negotiation and cultural sensitivity. They must possess the character traits of patience, tolerance and flexibility. They must also possess a thorough understanding of the capabilities and weaknesses of each contributing nation and must be attuned to their national and political sensitivities. The role of the commander and staff leaders is to engender understanding and trust between everyone involved through relationship building.

Points of friction in coalition operations that impact both the commander and staff include disparate logistic capabilities, different doctrine and training standards as well as cultural practices. Friction points that impact operations include different rules of engagement, differences in language

and terminology as well as intelligence restrictions between nations that may impede the transfer of vital or necessary intelligence information. A commander may or may not have control over any of these issues but must take them into consideration and contend with them if they hope to be successful.

On the staff side, marginal component or joint competence in staff officers is often dealt with through a system of **bypasses**, where work or tasks are given to **competent** staff officers to **get the job done**. Acting in this manner can cause irreparable damage to issues of trust and loyalty. Dealing with the sensitivities of such actions, perceived or real, often becomes an afterthought, particularly if an organization is in the middle of an operation. The challenge for the coalition commander is to find meaningful missions commensurate with professional competence for each coalition partner.

The future battlefield will be an intellectual challenge to any future commander. Future commanders and staffs will be forced to rely less on predictive doctrine and more on professional education and training to analyse, plan and conduct operations in any future environment. The commander-staff dynamic is often mistakenly taken for granted in preparing for operations. Commanders need to seriously consider what type of intellectual space they want to create for themselves and their staffs in much the same way that they consider other operational factors, such as force structure, logistics and rules of engagement. An effective commander-staff dynamic is just as important to mission success as are the other elements of any modern military.

CONCLUSION

The interaction between a commander and their staff is a dynamic intellectual process that balances, in an environment of constant motion and uncertainty, the normally opposing forms of military art and military science. The effectiveness of the interaction is a function of the intellectual and leadership abilities of the commander, the competence of the personnel that make up the staff and the quality of the communication and understanding between them. Each has specific roles to play in designing and executing operations.

The roles are demanding enough when working within the environment of one's own military, but the process becomes increasingly complex when conducted in joint, combined and multinational environments. Achieving a quicker decision cycle than one's opponent is vital to a commander in maintaining the initiative in operations. Having the initiative allows the commander to dictate the tempo to the opponent despite the challenges encountered on the battlefield. Success is dependent on the successful interplay of the three critical elements of the commander-staff dynamic; a shared and mutually understood situational awareness, common intent and coordinated action towards the achievement of the assigned mission. Without these, there will not be success in operations.

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ABBREVIATIONS

COS	chief of staff
DND	Department of National Defence
IJN	Imperial Japanese Navy
NATO	North Atlantic Treaty Organization

NOTES

1. Colonel L. W. Wilkerson, "What Exactly is Jointness?" *Joint Forces Quarterly* (Summer 1997): 66–67.
2. Canada, Department of National Defence (DND), B-GL-300-003/FP-001, *Command in Land Operations* (Kingston: Directorate of Army Doctrine, 2007), 1-1.
3. Thomas Czerwinski, "Command and Control at the Crossroads," *Marine Corps Gazette* 79, no. 10 (October 1995).
4. Czerwinski, "Command and Control at the Crossroads," 1-6.
5. Canada, Privy Council Office, Commission of Inquiry, Somalia, 1995–1997," accessed June 26, 2018, <http://publications.gc.ca/site/eng/9.831108/publication.html>.
6. Ross Pigeau and Carol McCann, "Using the Command and Control Framework to Analyse Command Challenges" (Toronto: Defence Research and Development Canada, 2002), 4.
7. Peter Northouse, *Leadership: Theory and Practice*, 3rd ed. (Thousand Oakes: Sage Publications, 2004), 2–3.
8. Northouse, *Leadership*, 2–3.
9. General Tony Zinni and Tony Koltz, *Leading the Charge: Leadership Lessons from the Battlefield to the Boardroom* (New York: Palgrave Macmillan, 2009), 41–42.
10. B. L. Montgomery, *High Command in War* (Germany: 21 Army Group, 1945), 21.
11. Yoji Koda, "A Commander's Dilemma: Admiral Yamamoto," *Naval War College Review* 66, no. 4 (Autumn 1993): 63.
12. Canada, DND, B-GL-300-003/FP-001, *Command in Land Operations*, 2-19–2-23.
13. David S. Alberts and Richard E. Hayes, *Understanding Command and Control* (Washington: CCRP Publications, 2006), 33.
14. The traditional sequence ends-ways-means has been changed in NATO Comprehensive Operations Planning Directive into ends-means-ways, since the NATO Council uses the strategic assessment provided by Supreme Allied Commander Europe to establish the ends and the means by consensus among the nations and leaves the ways to the military to determine.
15. Kevin L. Smith, "The Bold and the Restless: Leadership and Staff Experience," *Marine Corps Gazette* 90 (May 2006): 59.

16. Smith, “Bold and the Restless”: 59.
17. John English, *The Canadian Army and the Normandy Campaign: A Study of Failure in High Command* (New York: Praeger, 1991), 90.
18. Canada, DND, B-GL-300-003/FP-001, *Command in Land Operations*, 3-2-3-3.
19. Montgomery, *High Command in War*, 8.
20. For a detailed account of the development of the concept of operations for the attack on Pearl Harbor, see Angelo Caravaggio, “‘Winning’ the Pacific War: The Masterful Strategy of Commander Minoru Genda,” *United States Naval War College Review* 67, no. 1 (Winter 2014): 85–118.
21. Alberts and Hayes, *Understanding Command and Control*, 36.
22. Peter Thunholm, “Planning Under Time Pressure: An Attempt Toward a Prescriptive Model of Military Tactical Decision Making,” in *How Professionals Make Decisions*, ed. Henry Montgomery, Raanan Lipshitz, and Berndt Brehmer (Mahwah: Lawrence Erlbaum Associates, 2005), 46.
23. Carol McCann and Ross Pigeau, “Redefining Command and Control,” in *The Human in Command: Exploring the Modern Military Experience*, ed. Carol McCann and Ross Pigeau (New York: Kluwer Academic, 2000), 172.
24. McCann and Pigeau, “Redefining Command and Control,” 172–73.
25. Alberts and Hayes, *Understanding Command and Control*, 43–44.
26. Alberts and Hayes, *Understanding Command and Control*, 35.
27. Alberts and Hayes, *Understanding Command and Control*, 157.



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TARGETING, AIR INTELLIGENCE AND STRIKE WARFARE: **THEORY AND PRACTICE, PART I**

BY JOHN FERRIS, PhD



Air power and intelligence each took off in 1914, and since then, they have flown together, developments in one driving the other. Intelligence aided military forces more than ever before. Air forces became a unique and powerful consumer and source of intelligence. They strengthened armies and navies, by serving as supporters or partners, and independently struck the distant bases of enemy power. The issue of how far air power could and should act independently, or interdependently, shaped its integration into strategy. Intelligence was essential to that process. The link between intelligence and air power involves hosts of technicalities and events, each hard to explain, all locked in shifting relationships. Both the whole and its parts seem divorced from intelligence, as it generally is understood—just like air power appears to be divorced from classical theories about war. In particular, air forces purport to treat intelligence for strategic or political purposes like other military services do, but this is not the case at the operational and tactical levels. Instead, air forces fuse these levels and the roles of intelligence, operations and command within them, especially through the process of targeting. The consequences of this claim are complex.

These practices emerged from the start of air power. By 1930, the Royal Air Force (RAF) divided intelligence into two forms: what “may be termed ‘Pure Intelligence’” on background issues, against that “which may be termed ‘Fighting Intelligence,’” for specific missions. The United States Army Air Force (USAAF) used the terms “War Department Intelligence” and “Combat Intelligence” in the same manner as the RAF had done with its two forms of intelligence.¹ Since this approach seems to disassociate strategy from action, both air intelligence and air power are easily depicted as being narrow, fixated on technology or targets. That depiction is false, but it does point to dangers and touches on truths which require more analysis than they have received. Air intelligence is distinct because air power is so. That distinctiveness complicates the theory and practice of strategy. Studying the link between air power and intelligence illustrates what can be done with both matters, what each enables or denies, how one drives the other, where they have gone and where they are going. It also illuminates the relationship between air power and strategy.

DARTS AND BOARDS

At the centre of this relationship lies “targeting.” The doctrine of the world’s dominant air force, the United States Air Force (USAF), makes that term almost a euphemism for strategy and any attack by air.

Targeting is the process of selecting and prioritizing targets and matching the appropriate response to them, considering operational requirements and capabilities. ... Targeting helps translate strategy into discrete actions against targets by linking ends, ways, means, and risks. It is a central component of Air Force operational art and design in the application of air power to create lethal and nonlethal effects. Strategy allows commanders to choose the best ways to attain desired outcomes. Strategy forms the plans and guidance that can be used to task specific air power capabilities through the tasking process. The processes of planning, tasking, targeting, and assessing effects provide a logical progression that forms the basis of decision-making and ensures consistency with the commander’s objectives and the end state.²

Conversely, Colin Gray, a leading analyst of air power, says that air personnel mistakenly think that “targeting is strategy,” which yields a dangerous tendency to see “the world as my dartboard.”³

This metaphor of dart and board is natural, but, misleading. More than for armies and navies, air power centres on “targets” and on “strike,” ideas similar to but broader than the concept of “fires,” which is prominent in the joint military doctrine of the United States.⁴ USAF doctrine rarely uses fires and does not describe the actions of air power through one specific term. Instead, USAF uses many terms for that purpose, one of which, “global strike,” refers to distant, precise, instantaneous and devastating air attack. Soldiers use the idea of fires to suggest support for armies, focused on tactical and operational issues, in which they incorporate air power. Air personnel define the actions of air power more expansively, so fusing tactical and strategic issues. They think globally while striking locally, using air power to support strategy rather than soldiers. Fires support forces. Strike destroys targets, whether acting interdependently with other arms or independently of them.

Strike does not fit conventional models about levels of war or intelligence. These models, reflecting the experiences of armies in great wars, characteristically fall in three categories: strategic, tactical and operational. Actually, they are better broken into four categories, including strike, a matter which generally is included in the other categories, especially tactical. That designation occurs in part because fire loosely overlaps with strike, but is also a tactical matter. In fact, as a whole, strike does not belong in any of these categories, but its parts belong in them all. Strike warfare, perhaps, is best conceptualized as overlapping with operations, while retaining distinct characteristics: it incorporates the tactical level; can work interdependently with armies and navies in their operations or independently of them; and when working independently, tends to suck the highest levels of decision making into the lowest plane of war. Strike offers a shortcut across what Gray calls the strategy bridge, which links the aims and means of policy. That shortcut attracts the unwary, but only the skillful may cross it. Even if strike is deemed to be a form of tactics, its relationship with intelligence demands distinct treatment. The tactical level of war addresses small forces in closed areas pursuing local aims. Strike, conversely, can involve direct and independent attacks by many sorts of weapons (artillery, aircraft, missiles) against distant targets, often for strategic purposes and sometimes without entering the operational plane or having any involvement in joint action. Strategy may work straight through strike or else via operations and tactics. Operations, and operational intelligence, exist only when forces are divided into formations, which move independently over big theatres, yet pursue the same strategic aim, such as when armies exceed one hundred regiments or land, sea and air forces act interdependently. When you need operations and operational intelligence, nothing else will do; however, they are often not required by air forces and sometimes not by navies or even armies.

Air forces do not love this model of levels of war, but phrase their differences from it carefully, for political reasons, such as supporting the idea of “jointness” and avoiding suspicions that, once again, air personnel plan to go their own way. Thus, USAF doctrine holds that “airpower operates in ways that are fundamentally different from other forms of military power.”⁵ It agrees that “warfare is typically divided into three levels: strategic, operational, and tactical,” but only because of the characteristics (and limitations) of surface “forms of military power.”

These divisions have arisen because traditional war constrained forces to engage force-on-force, on the surface, at the tactical level, allowing effects to aggregate up from that level to the level of campaigns and other major operations, and finally to the level directly affecting an adversary’s ability to wage war altogether. However, Airmen should not define a given level by the specific weapons used, or on the targets attacked, but on the level of desired effects one wishes to create. A given aircraft, dropping a given weapon, could conduct a “tactical,” “operational,” or “strategic” mission,

depending on the planned results. Given airpower's inherent flexibility, any tactical mission with a given aircraft dropping given weapons can deliver a mix of intended effects, at all levels, from tactical to strategic. ...

At the lowest end of the spectrum lies the tactical level of war, where individual battles and engagements are fought. While resulting effects may be described as operational or strategic, military *actions* occur almost entirely at the tactical level. Thus, even a global strike mission intended to produce a direct strategic effect on an adversary COG [centre of gravity] is ultimately a tactical action. To the Airman, the distinction between this level and higher levels of war is fairly clear-cut; Airmen tend not to fight large-scale battles (as surface forces use the term) but focus at the tactical level on individual engagements and "missions." The tactical level of air, space, and cyberspace warfare deals with how forces are employed, and the specifics of how engagements are conducted. Tactics are concerned with the unique employment of force, so application defines this level. In short, **the tactical level of war deals with HOW we fight.**⁶ [emphasis in original]

USAF doctrine defines levels of war by "the level of desired effects one wishes to create," whereas common usage refers to differences in process: between the scale of forces, time and space. That doctrine describes the actions of air power, even when used for the most strategic of purposes, as being "ultimately tactical." "Individual engagements and 'missions'" are launched against specific targets, though each act works within a broader campaign of actions. USAF doctrine holds that air forces act in a unique fashion at this tactical level by hitting distant targets. That doctrine



then must express what it views as a unique mode of exercising force, through concepts which USAF believed cannot describe that process. Indeed, conceptually speaking, air power is distinctive precisely because it does not fit the army's definition of levels of war. To square the circle, USAF doctrine first accepts certain terms that have been adopted at the joint-service level, then either abandons or implicitly redefines those concepts when describing what air power does. Finally, the doctrine explains those actions through service-specific terminology. This approach smuggles classic concepts about the independent strategic effect of air power into ideas about technical and tactical issues without admitting the fact. It muddles terms and, perhaps, concepts, so impeding analysis of basic issues. When the language of air power is written in the script of soldiers, many things are lost in translation. Conversely, the use of the term "strike" to describe "HOW we fight" or what USAF doctrine calls "ultimately a tactical action" of air power, sidesteps these difficulties and better describes the issues at hand. In particular, this terminology illuminates the relationship between intelligence and the weapons (foremost, aircraft) able to strike distant targets directly, embracing everything from fires to global strike and beyond.

AIR INTELLIGENCE

Understanding of the relationship between the tactical, operational and strategic levels of war is doubly confused because the experiences of armies with intelligence are taken to represent those of navies and air forces. Few scholars study intelligence for strike warfare, which rests on technologically based sources that are processed for matters like counter-battery fire or bomb damage assessment, because it is hard to fathom or, regarding nuclear target folders, remains classified. This topic falls between the cracks of the many disciplines of intelligence which serve it, along with other tasks. Many substitutions involved in this process approach it like engineers, with the strengths and



Four Royal Canadian Air Force CF188 Hornets sit on the runway in preparation for take-off during Exercise MAPLE FLAG 51 at 4 Wing, Cold Lake, Alberta, on June 13, 2018.

weaknesses characteristic of that profession. Particular problems emerge in war whenever strategy is understood just by multiplying two products of engineering, like air power and Jomini or air forces and technologically based forms of intelligence. The greatest practitioners of strike warfare, air forces, do not call this function “intelligence” but rather “targeting,” which is a fusion of many matters, including intelligence, that service the equivalent of operations and tactics for armies. Furthermore, academic and military analysts of intelligence handle strike or fires in different ways. Often, the former do not know that strike or fires exist, while the latter do not recognize that anything else does. Military personnel use all these forms of intelligence and weapons but do not treat them as parts of one whole because of sectional divisions between gunners, air personnel, naval aviators and space warriors. The whole is seen from the perspective of the parts (e.g., collectors, processors, gunners and air personnel) rather than as a topic in its own right, one which unifies predictive fire, air strikes, imagery, artillery, signals intelligence and military operations. Yet all of these officers, especially air personnel, see intelligence as a means to find targets rather than to guide operations.

AIR PERSONNEL ... TEND TO UNDERRATE THE IMPORTANCE OF KEY CONDITIONS OF WAR: FRICTION, UNCERTAINTY, CHANCE AND POLITICS.

The links—and the implied hierarchy—between intelligence on political and military matters (further divided into the strategic, operational and tactical spheres) work well for armies and navies, but this is not the case for air forces (including those mounted on aircraft carriers). For air forces, the key links are directly between (a) strategy and strike, with operations left out, often rightly and less justifiably but still frequently, especially in this age of the drone; and (b) politics and strike, with strategy left out. To sidestep these links between the strategic, operational and tactical levels shakes the implied hierarchy between them and, even more, the way intelligence serves air power and air power supports policy. Analysis of this issue explains the classic characteristics of the relationship between air intelligence, air power and strategy, ranging from a focus on targets and where and why it is good or bad; why effective actions of air power require the fusing of intelligence, operations, commanders and units; and why the highest political levels micromanage certain kinds of these “ultimately tactical” actions and so make themselves targeteers.

These characteristics are not problems, but conditions. Air power is the arm which has gained most from a key phenomenon in modern intelligence and communications: the ability to solve problems. As a result, air personnel encounter a dilemma: the ability to solve problems overshadows the need to endure conditions. That dilemma is particularly great when air personnel address issues of strategy, which are dominated by conditions. Air personnel are reluctant to recognize this dilemma. They are great problem solvers, which directs them to things which can be solved, and away from those which cannot. They overestimate their own capabilities, assuming that what they can do will achieve what they must do. Air personnel—technocratic, managerial, optimistic and self-confident—tend to underrate the importance of key conditions of war: friction, uncertainty, chance and politics. Even worse, they tend to treat conditions as problems. The failure to learn how to endure conditions multiplies the difficulty of doing so.

Intelligence and strike each enable the other to act in unique ways. Intelligence works differently for air forces than the other fighting environments because air power has distinct characteristics as a tool for strategy. For all such tools, problems arise when the functions of intelligence and operations

overlap within command, especially on issues involving net assessments, which centre on how to understand and shape an environment. In such cases, these two branches (G3 and G2 in the classic General Staff system, which hereafter will be termed “operations” and “intelligence”) must balance independence and interdependence, which never is easy to do. Intelligence, for example, sometimes is subordinate to operations, simply providing information and leaving the latter to assess the enemy and control net assessment. Better results occur when the two branches share the task of assessment: intelligence is the authority for analysing the enemy, and operations on matters pertaining to one’s forces. Each branch shapes the net assessments and both report directly to the commander.

Specific problems emerge for arms that strike distant targets independently, including those that block enemy attempts to do so (which is better conceptualized in tactical terms as offensive-defensive, rather than defence, even when the latter is the strategic role), like air defence or, to some degree, counter battery. Thus, USAF doctrine regards strike as being directed through targeting, which is not “the exclusive province of one type of specialty or division” but rather, “a command function” and multidisciplinary, including strategists, intelligence and operations officers, operators and lawyers. Within that fusion, targeteers with “specialized training in analyzing targets and developing targeting solutions to support the commander’s objectives” are distinct from other specialties and first among equals.⁷ By the standards of the general staff system, however, targeteers really are a specialized group, combining the functions of operations and technically based combat arms (parallel to artillery staffs). Targeteers have absorbed much of the roles of operations and intelligence. Within the fusion of targeting, targeteers have more power than do army and navy operations officers at the operational level and absorb some of their roles. Meanwhile, intelligence has less power in its classic functions as collector and analyst of information.

TARGETING

Targets are located not just through intelligence, but through its fusion with surveillance and reconnaissance (i.e., intelligence, surveillance and reconnaissance [ISR]). Intelligence officers receive material from standard sources, which they assess and give to targeteers, but they are not the only producers or analysts of data. Intelligence is not one body embracing all collectors and analysts and interacting as a block with all of operations at one doorway. Instead, intelligence is divided into many parts, which interact individually and in variable ways with not only each other but also the offices handling other functions throughout the whole process, which involves targeteers, intelligence officers and others. Following the pattern of artillery intelligence, dedicated and specialized means (such as radar intelligence or measurement and signature intelligence), which stand apart from most other sources of intelligence, collect key information for strike. These other sources are tacticized to acquire targets. All of these means collect and process massive amounts of data through automatic procedures, with human analysis occurring only at the end of the cycle where, classically, intelligence and operations most overlapped. All information is summarized in distinct forms, like target folders.

This process is best described as target acquisition for strike warfare (TASW), which, despite the connotations of the term, is not a purely technical or tactical function. Targeteers are the centre of both functions, target acquisition and targeting. Like artillery staff acquiring targets a century ago, they integrate the material generated by intelligence with other data, including that from ISR and specialized means and analyse the whole with particular, but partial, expertise. Reports from many sources of information often flow directly to targeteers for analysis rather than through intelligence. Many of the tasks assigned to targeteers would be handled by intelligence for armies and navies. In particular, assessment of the enemy and net assessment are central to targeteers even

more than they are for operations branches in classic general staffs. This situation may damage intelligence in a central area, though not if it retains the power to define the enemy.

TARGETING “IS INHERENTLY ESTIMATIVE AND ANTICIPATORY.”

USAF doctrine defines targeting as a combination of assessment and net assessment: “a systematic process of analyzing adversaries and enemies to determine critical vulnerabilities against which national capabilities can be applied to create specific desired effects that achieve objectives, taking into account operational requirements and capabilities.”⁸ Assessment “is much more than ‘battle damage’ or ‘combat assessment,’ as it has traditionally been presented—and more than just an intelligence function that takes place after execution has concluded.”⁹ These issues range

from simple things, such as whether to fire at a tank, to the most complex matters of strategy and intelligence. Targeting “is inherently estimative and anticipatory. Matching actions and effects to targets requires estimating and anticipating future outcomes.”¹⁰ Three of the five characteristics of targets—physical, environmental and temporal—are fairly simple. However, two—functional (what the target *does* and how it does it) and cognitive (how targets *think*, exercise control functions and otherwise process information)—are abstract. They “are often hard to discern because they most often cannot be directly observed. Reaching plausible conclusions can often entail speculation and much deductive and inductive reasoning.”¹¹ Doctrine fuses the lowest and highest levels of war within targeting, making targeteers responsible for the hardest tasks of strategy and national intelligence. These matters are fundamental to the means for judgement in using an effects-based approach to operations (EBAO). Contrary to common belief, this concept is not new, though admittedly more ambitious than previous ventures. Air forces often have attempted something like EBAO. It was fundamental to the Tivertonian variant of strategic bombing, especially as adopted by the USAAF, and to the Combined Bomber Offensive.¹² Some means to judge effect is unavoidable whenever you imagine that you can strike a system precisely and want to determine how best to do so—though systems are harder to degrade exactly as one intends, despite what doctrine suggests.

Here emerges a central problem for air power. Air personnel focus on precise strikes against vulnerable targets because they have a dart and long for a worthy foe. To strike an Achilles heel, however, you must know what is. Achieving that task is a complex matter of strategic intelligence. The record for success is mixed, especially when the issue involves net assessment as well as “functional” and “cognitive” targets, which are dogged by the greatest problems in intelligence, like ethnocentrism and mirror imaging. Success can occur only if strategic intelligence is treated seriously, and not necessarily even then. Targeting endangers that prospect. By integrating all levels of war for the purposes of strike, targeting increases the chances that successes on tactical and technical issues may be mistaken for those regarding strategy. In focusing on how to throw a dart, targeting runs the risks of searching for silver bullets, missing or misconstruing Achilles heels and entering an indecisive process of attrition.

TARGET ACQUISITION IN STRIKE WARFARE

Neither targeteers nor intelligence officers handle all of the information involved in strike. Instead, they do it together, each making essential but distinct contributions in an uneasy combination of cooperation and competition between offices and expertise. Intelligence, assisted by targeteers, provides all source analysis of the strategic and political levels as well as evidence from its different

disciplines. Targeteers, assisted by intelligence, analyse material on what soldiers would call operational and tactical levels, ISR and dedicated sources. If this process is successful, compared to classic general staffs, the functions of both operations and intelligence become transformed and, in some ways, fused. Air intelligence loses autonomy in some areas but gains new functions by directly enabling action as part of a system, serving as a trigger or lever.¹³ These outcomes are unavoidable in strike warfare and acceptable for intelligence and strategy, if handled correctly. But that outcome is easy to miss, and if not handled correctly, this fusion of levels of war and functions of command threatens danger. For example, intelligence loses control over its work and fails to do its job; targeteering seizes tasks it cannot do well and intelligence should handle; or intelligence becomes too tied to target acquisition, damaging its work for strategic intelligence—and perhaps strategy as well.

These problems are particular not to air power, but to strike. Not every function of air power involves strike, nor are air forces the latter's only vehicle. Air power is one link in the chain of intelligence and strike, with gunners the gods of the dawn and space the final frontier. Command, control, communications and intelligence (C3I), ISR; command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) [systems of intelligence and decision making]; and TASW (a means to guide force) shaped war and strategy over the past century. Command, control, communications, intelligence, surveillance and reconnaissance (C3ISR) was the natural product of war in the electronic age, as C4ISR is for the digital era. Another acronym will emerge for war in the time of space. Characteristically, these matters are treated as new and separate. In fact, they are old and interrelated. C3ISR and C4ISR combine signals- and data-processing technology; command as thought, process and action; the training of people; and individual and bureaucratic modes of learning. They shape operations and strike warfare the way that generals command, formations act, firepower hits and presidents act.

These matters, as parts and whole, have a history, which rarely is treated as a topic in its own right. Conventional ideas of this history begin with doctrine during the interwar years and move through air operations during the Second World War, AirLand Battle, the Gulf War of 1991 and the concept of the Revolution in Military Affairs to the present day.¹⁴ These matters merit attention, but so do others. Together, they drove the development of air power and intelligence. Fusion between C3I and ISR emerged with distant fire, but the range, destructiveness and accuracy of detection have changed. Information technology and precision weapons can damage a target more than could ISR and C3I in 1918, with inaccurate and short-range guns, yet the relationship is identical and natural. Strike and TASW are part of a long-standing phenomenon, one of the most important in the history of power and warfare over the past century.

THE BIRTH OF FIRE

The story starts with the First World War. The year 1914 witnessed a head-on collision between mass armies with novel characteristics: unprecedented force-to-space ratios, reinforcement capabilities and firepower; the General Staff system; and new modes of communication and intelligence, particularly radio, aerial reconnaissance, imagery and signals intelligence. This crash produced complex relations between command, weapons, forces and operations. The electronic age dawned on war, its effect more notable for intelligence and command than force. C3I problems declined faster than did those of action, as forces were dogged by high force-to-space ratios on narrow fronts, fire which killed but could not move and advance limited to the speed of heel or hoof. Operations often worked as planned, far more than ever before, but only if many things went right at once. That aim was harder to achieve than in 1940, when energy augmented electronics and forces were aided by mobile firepower, strike, radio and the internal-combustion engine.

For the first time, weapons equipped with directing systems regularly attacked objects that moved fast on the horizon or beyond the sight of their operators. Once predictive fire for artillery—the first step toward strike—became normal, C3ISR and TASW systems immediately emerged and rapidly matured. They also suited distant strike and manoeuvre warfare, though these practices remained immature, even at the armistice. Armies of the First World War were not dinosaurs; the most unwieldy organizations ever known became the most perfect meat-grinding machines ever seen, with high learning curves for all. Information and orders moved through cybernetic structures of speed and power. These structures rested on the integration of technology, which, while primitive by the standards of 2015, was leading edge in 1915. Those limits caused difficulties, but unlikely solutions emerged to unprecedented problems, driven by the imperative to support fire and the nature of systems for data processing and communications in the electronic age. Thus, to gather intelligence about enemy artillery and enable counter battery, awkward but effective machines were created to capture sound waves from microphones in different locations and represent them as lines on a chart for triangulation through sound ranging.

Intelligence was more powerful for strategy and operations than ever before—collected, processed and disseminated according to the classic General Staff system. Intelligence for fire took a different route. Systems of C3I and ISR filled the tactical needs of distant and predictive gunfire. Telephone links between commanders, gun turrets, range finders, spotters and plotters solved these problems on warships, which were more loosely coordinated by squadrons. On land, fire plans defined the actions of thousands of guns over 10-day periods, while thick connections of



Air combat system officers on board a CP140 Aurora patrol aircraft log in their observations during a reconnaissance mission as part of Operation IMPACT on January 1, 2017.

communications joined batteries as well as sound rangers, signals intelligence, imagery, spotting aircraft and commanders. Fire was guided through a fusion of sources and the roles of intelligence, operations and gunners. New forms of command held by officers of astonishingly junior rank directed unprecedented numbers of guns: colonels directed the firepower of corps and occasionally, army groups. By 1917, Commonwealth armies gave counter-battery staff officers the functions of modern targeteers, with survey sections handling artillery intelligence and counter-battery offices directing fire. Among the many new specialties for intelligence was artillery intelligence. Its men dominated the guidance of fire, or targeting, aided by conventional intelligence personnel within their ranks, whom the British named “artillery reconnaissance officers.” Relations between these different specialists within targeting offices were initially tense but became effective in combat. During combined operations, artillery intelligence cooperated with that produced by conventional intelligence for infantry, just as the two arms did. Specialist-artillery-intelligence sources also emerged, like sound ranging, flash spotting and forward observation officers at the front and in the air, who fused the functions of intelligence, operations, target acquisition and combat.¹⁵

Artillery intelligence was central to intelligence on the Western Front, guiding barrage and counter battery. It was technically effective but hard to use, given the nature of the trenches and weapons. On the attack, for example, artillery needed to detect and neutralize virtually every enemy fire position to enable a successful attack by infantry. This aim was hard to achieve, even with hundreds of rounds per target.

The French pioneered these systems to fuse intelligence and fire. Every army on the Western Front adopted them. The most flexible and powerful practitioner, the Canadian Corps, focused on the systematic collection of information from all sources; this information was intensely processed and analysed, displayed graphically for comprehension by users and pushed down to the lowest levels. Combining graphs, maps, pictures and text about the details of enemy battalions’ defences in 1915 and comparing aerial photographs to observation reports led, in 1917, to the practice of walking platoons through scale models of the ground they would attack and to the methodical sifting of data for artillery intelligence. In battle, the Survey Section and the Counter-Battery Office, sited side by side, controlled all Canadian intelligence and firepower, and maximized their value. Intelligence was processed rather than analysed, and fused with operations and command in targeting. The direction of fire was centralized during breakthrough, unleashed to subordinates in open phases and recovered when counterattack loomed. During attacks, intelligence overlapped with operations and absorbed some of its responsibilities, including the decision of whether attackers should advance or consolidate.¹⁶

The major role of air power in TASW was to support artillery, but specialist systems also emerged to guide airstrikes. By 1918, the London Air Defence Area (LADA) was a cybernetic structure that featured the sharpest system of intelligence and command yet known. Its signals, command and intelligence systems were identical—a virtual community on a party line. Officers carried not swords but headphones, marking the start of modern command. Early warning from

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signals intelligence and decent tactical information from ground observers reached commanders directly in real time. Counters placed on a squared map in an operations room represented all the information reported by thousands of observers over a 10,000 square mile (16,093 square kilometre) area 60 seconds before, letting the commander view the position of a raid at a glance. Experts filtered false material through cross reference before pieces were placed down. Intelligence was processed—rather than analysed—and fused with operations and command in targeting. Within one minute, LADA received and processed massive amounts of data, gave it to commanders and let them dispatch orders to 200 guns and 286 aircraft standing ready on the runway, which were in the air within two and a half to five minutes. At a moment's notice, each unit could switch from independent operations to fighting under LADA's order and back. This system had one limit: ground commanders could not contact airplanes in the air, which precluded economical operations or guided interceptions. Fighters flew on patrol lines at different altitudes, hoping one would encounter an intruder. Interception rates were low, bombers outgunned fighters; yet, by the end of the war, this system beat attackers and with radiotelephony provided to squadrons, was on the verge of conducting ground-directed interception of enemy bombers at 20,000 feet (6,096 metres). Lessons learned in 1918 shaped victory in 1940.¹⁷ Meanwhile, on the Western Front, the British exploited enemy systems to guide and command artillery so to degrade them. Signals intelligence, sent directly to units rather than through the channels of intelligence, operations and command, directed counter-battery fire onto enemy artillery and fighters onto German gun spotters, reducing by 10–20 per cent their time on registration. Perhaps 80 per cent of these German reports were solved in time to warn troops about to be bombed.¹⁸

However labour intensive and convoluted, stemming from heroic efforts to solve problems which bordered on the insurmountable, these C3I and ISR systems combined the leading edges of technique and technology as well as ever has been done. These systems solved some problems of intelligence through information processing, producing hosts of data that could be useful only if centralized, analysed as well as mathematized, and distributed to the men who moved and fired. These systems to direct fire fit modern definitions of targeting—indeed, they are where it began. These systems also were stronger than the weapons they supported. They made artillery as effective as possible, but that outcome just strengthened a weapon with limited range, accuracy and power, attacking the hardest targets in the world (turrets and trenches), through many exchanges against an enemy of equal capabilities. These fires simply sharpened the process of attrition by both sides at once, changing the margins rather than the nature of operations. Efforts at strike were ineffective or failures because of limits to aircraft and ordnance. However, these experiences generated key theories about air power (or, phrased more broadly, targeting and strike), which raised issues of dependence, interdependence and independence as well as how far to emphasize cooperation with other arms at the tactical or operational level, as opposed to the direct service of strategy. Soldiers and sailors saw air power as a supporting element in their arsenals—providing fire. Lord Tiverton and Hugh Trenchard emphasized different modes of independent strike and strategic bombing, while Giulio Douhet valued both that role and interaction with ground forces, especially through interdiction against an enemy's rear echelons.¹⁹

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ABBREVIATIONS

AFB	Air Force Base
C3I	command, control, communications and intelligence
C3ISR	command, control, communications, intelligence, surveillance and reconnaissance
C4ISR	command, control, communications, computers, intelligence, surveillance and reconnaissance
EBAO	effects-based approach to operations
ISR	intelligence, surveillance and reconnaissance
LADA	London Air Defence Area
RAF	Royal Air Force
TASW	target acquisition for strike warfare
USAAF	United States Army Air Force
USAF	United States Air Force

NOTES

1. “Handbook (Provisional) on the Air Defence of Great Britain,” *Air Defence of Great Britain*, 4.30, AIR 5/768, the National Archives, Kew, Richmond, Surrey, UK; and Brad William Gladman, *Intelligence and Anglo-American Air Support in World War Two: The Western Desert and Tunisia, 1940–43* (n.p.: Palgrave MacMillan, 2009), 11. USAAF’s parent service, the United States Army, also made this distinction but covered operational and tactical matters under the term “combat intelligence,” not just issues related to specific missions.

2. United States, USAF Doctrine, “Introduction to Targeting,” *Annex 3-60* (Maxwell Air Force Base [AFB]: Curtis E. Lemay Center, 12 January 2014), 3, accessed July 12, 2018, <http://www.doctrine.af.mil/Doctrine-Annexes/Annex-3-60-Targeting/>.

3. Colin S. Gray, *Strategy and History: Essays on Theory and Practice* (New York: Routledge, 2006), 77; and Colin. S. Gray, *Airpower for Strategic Effect* (Maxwell AFB: Air University Press, 2012), 294–95.

4. United States, Department of Defense, Joint Publication 3-09, *Joint Fire Support* (Joint Chiefs of Staff, 12 December 2014), accessed July 12, 2018, <https://www.hsdl.org/?abstract&did=761264>.

5. United States, USAF Doctrine, *Volume 3, Command*, (Maxwell AFB: Curtis E. Lemay Center), 7, accessed July 12, 2018, <http://www.doctrine.af.mil/Core-Doctrine/Vol-3-Command/>. For comparison, see Colin S. Gray, *Airpower for Strategic Effect*, 286–304, for the distinct nature of airpower, including strengths and weaknesses.

6. United States, USAF Doctrine, *Volume I, Basic Doctrine, Levels of War*, accessed July 12, 2018, <http://www.doctrine.af.mil/Core-Doctrine/Vol-1-Basic-Doctrine/>, 44–45.

7. United States, USAF Doctrine, *Annex 3-60, Introduction to Targeting*, 3, 6. For the role of intelligence, see Captain Jaylan Michael Haley, “An Evolution in Intelligence Doctrine: The Intelligence, Surveillance, and Reconnaissance Mission Type Order,” *Air & Space Power Journal* 26, no. 5 (September–October 2012): 33–48, accessed July 12, 2018, <http://www.airuniversity.af.mil/ASPJ/Display/Article/1160604/volume-26-issue-5-sep-oct-2012/>; and Captain Adam B. Young, “Employing Intelligence, Surveillance, and Reconnaissance: Organizing, Training, and Equipping to Get It Right,” *Air & Space Power Journal* 28, no. 1 (January–February 2014): 26–44, accessed July 12, 2018, <http://www.airuniversity.af.mil/ASPJ/Display/Article/1154751/volume-28-issue-1-jan-feb-2014/>.

8. United States, USAF Doctrine, *Annex 3-60, Introduction to Targeting*, 1–2.

9. United States, USAF Doctrine, *Annex 3-60, Introduction to Targeting*, 12.

10. United States, USAF Doctrine, *Annex 3-60, Introduction to Targeting*, 7.

11. United States, USAF Doctrine, *Annex 3-60, Introduction to Targeting*, 8.

12. Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914–1945* (Princeton, NJ: Princeton University Press, 2002).

13. Michael Herman, in *Intelligence Power in Peace and War* (Cambridge, UK: Cambridge University Press, 1996), recognizes this role.

14. For a good statement of such views, see Lt Col Paul J. Maykish, “C2 Rising: A Historical View of Our Critical Advantage,” *Air & Space Power Journal*, 28, no. 4 (July–August 2014): 26–55, accessed July 12, 2018, <http://www.airuniversity.af.mil/ASPJ/Display/Article/1154138/volume-28-issue-4-jul-aug-2014/>.

15. Roy MacLeod, “Sight and Sound on the Western Front: Surveyors, Scientists, and the ‘Battlefield Laboratory,’ 1915–1918,” *War & Society* 18, no. 1 (2000): 23–46; Sir Lawrence Bragg, H. H. Hemming, and A. H. Dowson, *Artillery Survey in the First World War* (London: Field Survey Association, 1971); Albert P. Palazzo, “The British Army’s Counter-Battery Staff Office and Control of the Enemy in World War 1,” *The Journal of Military History* 63, no. 1, (1999): 55–74; Peter Chasseaud, “Mapping the First World War: The Great War Through Maps From 1914–1918,” *British Journal for Military History* 1, no. 2 (London: Collins, 2013); and Terrence J. Finnegan, *Shooting the Front: Allied Aerial Reconnaissance in the First World War* (Gloucestershire, UK: The History Press, 2011).

16. J. E. Hahn, *The Intelligence Service Within the Canadian Corps 1914–1918* (Toronto: MacMillan, 1930); and Dan Jenkins, “Winning Trench Warfare, Battlefield Intelligence in the Canadian Corps, 1914–1918” (PhD dissertation, Carleton University, 1999).

17. John Ferris, “‘Airbandit!’: C3I and Strategic Air Defence during the First Battle of Britain, 1915–18,” in *Strategy and Intelligence: British Policy during the First World War*, ed. Michael Dockrill and David French (London: Hambledon Press, 1996).

18. John Ferris, ed., *The British Army and Signals Intelligence in The First World War* 8 (Gloucestershire: Army Records Society, 1992), 14–15, 85–114.

19. Biddle, *Rhetoric and Reality*.



AIR POWER MASTERY AND AIR POWER APPLICATIONS IN THE JOINT DOMAIN

BY FLIGHT LIEUTENANT
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Editor's note: This paper was written by a candidate attending the Air Power Operations Course in fulfilment of one of the requirements of the course of studies. The author's spelling conventions have been retained.

Air power, air mindedness¹ and the concept of air power mastery have become increasingly central to Western air force doctrine in recent years. Definitions of air power appear in the doctrinal documents of the North Atlantic Treaty Organization (NATO),² United Kingdom (UK), United States (US)³ and Canada, with the aim of providing a basic understanding of air power for those influencing and influenced by air operations. The recognition by Western militaries that effective operations are fought in a joint manner, often as part of a coalition, demands that those practising within the air domain continue to master their profession and contribute to the overall “proficiency, efficiency and effectiveness”⁴ of delivering air power effects on such operations. AP3000, *British Air and Space Power Doctrine* clearly outlines that “because the air environment pervades both the land and maritime environments, air power is absolutely essential in enabling genuinely joint, rather than separate land, air or sea campaigns to be conducted.”⁵ It is, therefore, essential that air power practitioners are able to articulate their knowledge and expertise at all levels within the joint domain. The British Ministry of Defence (MOD) was so convinced of the joint characteristics of air power that in 2013, UK air and space doctrine was transferred from an Air Command-sponsored document (AP3000) to one sponsored by Joint Forces Command (Joint Doctrine Publication [JDP] 0-30, *UK Air and Space Power*). This single act acknowledged the importance of including those from outside of the Royal Air Force (RAF) in doctrine related to delivering air power effects. The aim of JDP 0-30 is to “provide authoritative direction to the airmen, soldiers, sailors, marines and civilians charged with delivering UK military air and space capabilities” and to “explain air and space power to all those who use, or are influenced by, UK military air and space power.”⁶

EFFECTIVE OPERATIONS ARE FOUGHT IN A JOINT MANNER

This paper draws upon personal experience, reflections on air power-related learning and academic publications that have helped to shape the author's opinions of doctrine, theory and the application of air power effects. For the purposes of this paper, the definition of air power from B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine* is used, where air power is defined as “that element of military power applied within or from the air environment to achieve effects above, on, and below the surface of the Earth.”⁷ Consideration is also given to the strategic context that “air power is a necessary part of a more broadly based balanced defence capability constituted to realise a nation's vital interests.”⁸ For this paper, the term “air power” is used by the author; however, direct citations of source material may include the term “airpower,” and it is assumed that the two terms have the same definition.

In researching the modern application of air power and considering a personal perspective, *Airpower in Small Wars: Fighting Insurgents and Terrorists* by James S. Corum and Wray R. Johnson was utilised as a point of comparison. The book comprises a collection of essays on fighting insurgencies and terrorism with air power through the 20th and early 21st centuries and is supported by extensive research and insightful points for debate. Including analyses of not only Western air power experience but also that of nations such as South Africa and Egypt, the authors provide a balanced assessment of the application of air power from politically and culturally diverse operating

environments and, thereby, challenge long-held theories. One such belief that the authors question is that the effective use of RAF assets in the colonial air-policing role provided unequivocal evidence of success, independent of land forces. Corum and Johnson provide critical analysis of events, which suggests otherwise.⁹ Each case study is supported by extensive research from a broad spectrum of academic works, providing confirmation of the authors' ideas. In their conclusion, the authors draw together the 11 most-important common lessons learnt by analysing the historical episodes, which provides a comprehensive reference list for air power professionals and clear comparisons between the application of air power in counter-insurgency operations and the role of air power in conventional warfare. The book proved key in supporting the ideas presented in this paper, particularly when considering the importance of viewing air power as a vital part of joint operations.

THE EFFECTIVE APPLICATION
OF AIR POWER RELIES ON
AIR POWER PRACTITIONERS
UNDERSTANDING NOT ONLY
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THE AIR CAMPAIGN

Air forces rely heavily upon technology and technical expertise to operate efficiently, and as a result, it is easy for personnel at a tactical level to become focused only upon the capabilities of the system or air platform that they immediately operate or support. The effective application of air power relies on air power practitioners understanding not only how to operate within their own area of expertise but also knowing how to fight the air campaign. This requires a transition from the “technical mastery” level, essential for continued routine activity, to the “professional mastery” domain.¹⁰ Whilst pursuing air power mastery, the balance must be found between effectively analysing the lessons of past operations, adapting to the current or evolving operational environment as well as embracing new technologies and concepts to deliver the most potent air effect.

At the operational level, the requirement to think critically and imaginatively about how best to employ air power across the full spectrum of military operations is essential. Regardless of personal experience, in a joint or coalition environment, an operator can easily become the sole subject matter expert and be expected to advise land and maritime components on all air power-related issues. Indeed, within the Canadian Armed Forces, the Royal Canadian Air Force (RCAF) is responsible for all air assets and associated effects, so “support to joint operations and the civil power is fundamental and essential.”¹¹

Further to the technical and tactical perspectives being developed into a professional air-oriented one, air power practitioners must be encouraged to consider an effects-based approach that supports the land and maritime components. Early air power theorists suggested that air assets alone could effectively bring about strategic success and that land and maritime forces would become “secondary and subordinate” to the air element.¹² It has been demonstrated in the British Malaya campaign and other such operations through the 20th and early 21st centuries that air power effects in counter-insurgency operations must be coupled with land and political components to be truly successful.¹³

Indeed, “if one element must be singled out as the key [to operational success], it is the integration of the civil and military dimensions into a unitary counter-insurgency whole,”¹⁴ demonstrating that air power activity during such operations should be synergistic and supportive of the higher political intent. That is not to say that air power does not play a vital role in such operations but that “airpower was not regarded as subordinate or superior; rather it was regarded as a partner or colleague.”¹⁵ Despite these experiences, the USAF was slow to learn the lessons of its British counterpart. Indeed, after their own involvement in the Greek civil war and Huk insurgency in the Philippines, US air power theorists believed that the conventional effects employed “only when each had taken on a distinctively conventional flavor”¹⁶ would subsequently be effective in future insurgency operations. It was not until 2004–5, during a failing US campaign in Iraq, that General Petraeus developed a counter-insurgency manual, based heavily on the lessons learnt in Malaya.¹⁷



A CH146 Griffon helicopter flies over the desert during Operation IMPACT on September 27, 2017.

Many lessons drawn from counter-insurgency operations can, however, be carried across to conventional warfare. Firstly, the requirement for a comprehensive strategy is common across the spectrum of warfare, where strategy is defined as “the allocation of military, political, economic and other resources to attain a political goal.”¹⁸ Furthermore, Corum and Johnson make a compelling argument for the employment of air power as part of a joint military venture, rather than an independent entity, stating “from a military point of view, combating insurgents ... is even more complex than fighting a conventional war and requires a broader understanding of jointness.”¹⁹ It cannot be assumed, however, that all conventional means can be applied to small wars, or even that the specific lessons of a previous counter-insurgency operation can be transferred directly to the next; “an air force should not, therefore, be structured to fight the last war.”²⁰

Following personal reflection and research of UK and Canadian military doctrine, it can be concluded that to harness “the intellectual potential found in [the RCAF’s] most valuable assets—its people,”²¹ personnel must be encouraged to first focus up and out of their tactical environment, to embrace concepts at the operational and strategic levels, to indulge in academic study and to debate emerging air power theories. Drawing the paper to a close, the author proposes that an alternative definition of air power is the ability “to consistently deliver an air effect where and when required, via an appropriate mechanism in the most efficient manner, whilst taking into account financial,

legal, manning and technological constraints; adapting to the operating environment; and applying the lessons of the past.” The pursuit of air power mastery is, arguably, a continuous journey rather than a destination and, as such, the focus upon “career-long professional development”²² is essential to maintain vital academic momentum to evolve air power theorists for the future.

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ABBREVIATIONS

DND	Department of National Defence
JDP	Joint Doctrine Publication
MOD	Ministry of Defence
NATO	North Atlantic Treaty Organization
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
UK	United Kingdom
US	United States
USAF	United States Air Force

NOTES

1. US, United States Air Force (USAF), “Airmindedness,” in *United States Air Force Basic Doctrine*, vol. 1 (Maxwell Air Force Base, AL: Curtis E. Lemay Center, 2015), accessed May 2, 2018, <http://www.doctrine.af.mil/Core-Doctrine/Vol-1-Basic-Doctrine/>.

2. NATO, Allied Joint Publication-3.3, *Allied Joint Doctrine for Air and Space Operations*, Edition B, Version 1 (Brussels: NATO Standardization Office, 2016), LEX-5.

3. US, USAF, “Airpower,” in *United States Air Force Basic Doctrine*. See link in note 1.

4. Sanu Kainikara, “Professional Mastery and Air Power Education,” *Royal Canadian Air Force Journal* 3, no. 4 (Fall 2014): 51, accessed May 2, 2018, <http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/archives.page>.

5. Ministry of Defence (MOD), AP3000, *British Air and Space Power Doctrine* 4th ed. (Shrivenham, UK: Centre for Air Power Studies, 2009), 7.

6. MOD, JDP-030, *UK Air and Space Doctrine* (Shrivenham, UK: Development Concepts and Doctrine Centre, 2013), 6.

7. Canada, Department of National Defence (DND), B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 3rd ed. (Ottawa: Minister of National Defence, 2016), 14.

8. Peter Gray, "Balanced Air Power in an Age of Austerity: The Leadership Challenge." *Air Power Review*, 14, no. 2 (2011): 20.
9. James S. Corum and Wray R. Johnson, *Airpower in Small Wars: Fighting Insurgents and Terrorists* (Lawrence, KS: University Press, 2003), 86.
10. Kainikara, "Professional Mastery and Air Power Education," 49.
11. Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 41.
12. John Alexander, "The End of Air Power History and the Last Airman?: Air Power, Liberal Democracy and the British Way of War," *Air Power Review* 14, no. 2 (2011): 58.
13. Alexander, "End of Air Power History," 58.
14. Corum and Johnson, *Airpower in Small Wars*, 215.
15. Corum and Johnson, *Airpower in Small Wars*, 215.
16. Corum and Johnson, *Airpower in Small Wars*, 137.
17. Alexander, "End of Air Power History," 60.
18. Corum and Johnson, *Airpower in Small Wars*, 426.
19. Corum and Johnson, *Airpower in Small Wars*, 433.
20. David Glasson, "'Big War' Air Power for 'Small War' Operations," *Royal Canadian Air Force Journal* 3, no. 1 (Winter 2014): 24, accessed May 2, 2018, <http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/archives.page>.
21. Brad Gladman et al., "Professional Airpower Mastery and the Royal Canadian Air Force: Rethinking Airpower Education and Professional Development," *Royal Canadian Air Force Journal* 5, no. 1 (Winter 2016): 19, accessed May 2, 2018, <http://w08-ttn-vmweb01/CFAWC/en/elibrary/journal/issue.asp?ID=36>.
22. Gladman et al., "Professional Airpower Mastery," 19.

A map of Iraq with a teal horizontal band across the center. Overlaid on the map are three concentric circles in teal and blue. The text is centered within these circles.

WARDEN'S “FIVE STRATEGIC RINGS” AND AIR POWER DURING THE IRAQ WAR

BY SQUADRON LEADER ADAM LAWSON

Saudi
Arabia

Editor's note: This paper was written by a candidate attending the Air Power Operations Course in fulfilment of one of the requirements of the course of studies. The author's spelling conventions have been retained.

The purpose of this article is to discuss air power considerations generated on the Air Power Operations Course at the Canadian Forces Aerospace Warfare Centre. The article defines air power and the concepts of strategic, interdiction and tactical air power effects. It compares these definitions for air power effect against three critical principles of war (selection and maintenance of the aim, concentration of force, and offensive action) and assesses their relevance to Warden's "five strategic rings." Finally, these air power concepts are compared to the thesis and ideas discussed in Richard P. Hallion's book *Storm over Iraq: Air Power and the Gulf War* to provide an assessment on the validity of these ideas in enabling decisive warfighting effects.

The Royal Australian Air Force's (RAAF's) *Air Power Manual* states that there is no universally agreed-upon definition of air power. It contends that there are numerous contextual definitions of air power used by nations and military forces that are relevant and appropriate to their specific circumstances and purpose.¹ The RAAF defines air power as the "ability of a nation to assert its will by projecting military power in, through and from the air domain."² While retaining many similarities to the RAAF definition, the Royal Canadian Air Force (RCAF) takes a less direct approach in the use of air power to assert national will. It defines air power as the "element of military power applied within or from the air environment to achieve effects above, on, and below the surface of the Earth."³ While complementary to both RAAF and RCAF doctrines, the United States Air Force (USAF) definition also includes references to space and cyberspace and focuses on objectives vice effects. It states that air power is "the ability to project military power or influence through the control and exploitation of air, space and cyberspace to achieve strategic, operational and tactical objectives."⁴ Such differences in the definitions are not limited to military forces. Colin S. Gray borrows from the work by Brigadier General Billy Mitchell in providing a broad definition of air power as "the ability to do something in the air."⁵ Given such differences, what then will be the definition used for this article?

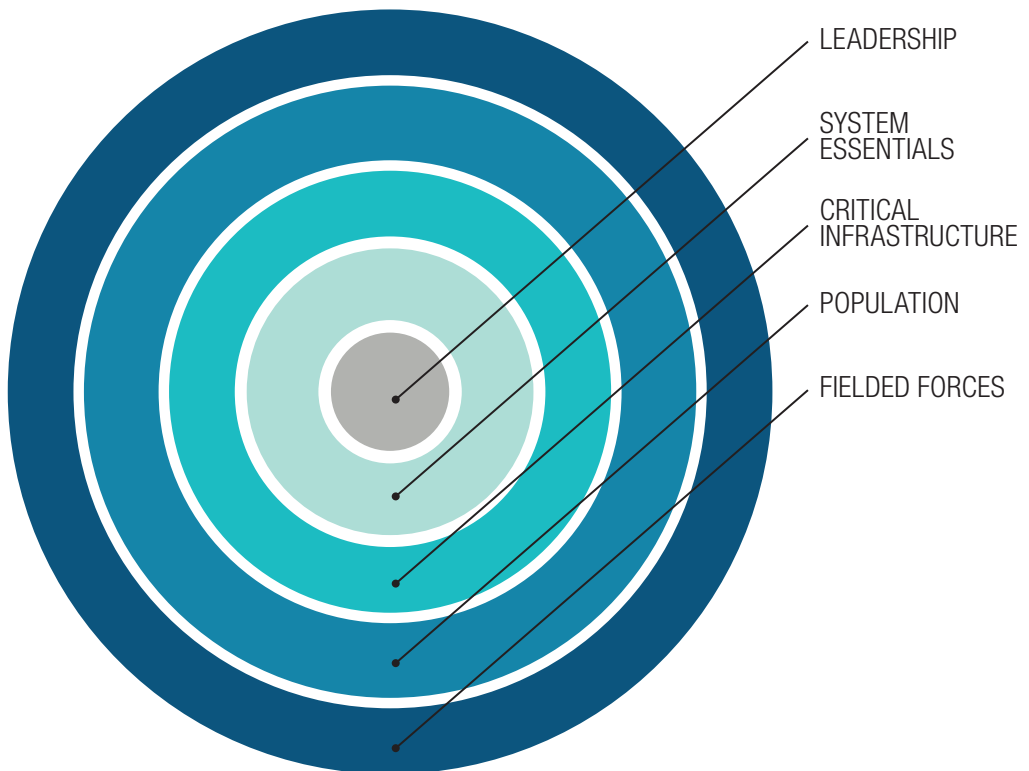
The RAAF *Air Power Manual* discounts any definition based on the work of Mitchell as being too simplistic to fully explain the nuances of air power.⁶ If we discount the definition provided by Gray, then there are many similarities in the remaining definitions. All discuss the concept of "military power" and the employment of such power in a "domain or environment" to achieve an "effect or objective." While the USAF definition includes references to space and cyberspace, these will not be included; in much the same way as "air forces" were initially residual in early armies and navies, this USAF grouping is likely one of convenience rather than robust doctrinal conceptualisation, given the applicability of space and cyberspace across the air, land and sea domains. As such, air power for this purpose is defined as the "the ability to project military power within or from the air domain to achieve an effect."

What, then, is an "effect" in the context of air power? If we consider the air power roles that relate to the warfighting function of force application, these can be further refined to the concepts of control of the air and strike.⁷ David R. Mets defines three important words which relate to force application and, in particular, strike—strategic, interdiction and tactical—which will be collectively defined as "effects." Strategic effect was defined as the employment of air power intended to achieve independent results by destroying vital centres in the enemy's homeland. Interdiction was defined as operations against the movement of personnel and material to and from the battlefield, or laterally across the battlefield. Finally, tactical effects were defined as those efforts directly associated with the

battle on the surface though not necessarily against enemy units in contact with our own ground forces.⁸ The definitions of strategic, interdiction and tactical are important in understanding the contribution of air power in achieving decisive warfighting effects. Indeed, the RAAF *Air Power Manual* states that the effects created by air power must complement the effects created by other military services and elements of national power (“joint effects”).⁹ How, then, do these relate to the application of air power to achieve decisive joint warfighting effects?

Firstly, the principles of war provide a framework to describe the mechanism for achieving decisive warfighting effects. The principles of war provide fundamental guidelines for military action.¹⁰ Three key principles stand out: the selection and maintenance of the aim, concentration of force and offensive action. A clear aim focuses the effort of disparate elements of national power to achieve the desired objective.¹¹ Concentration of force enables forces to combine quickly to deliver decisive warfighting effects when or where required.¹² Offensive action provides initiative and freedom of action by compelling opposing forces to be reactive.¹³

Secondly, the concepts provided by Warden’s five strategic rings provides a framework to apply air power effects. Warden emphasised identifying centres of gravity and structuring an air campaign to destroy them. He argued that air warfare was a mirror of ground warfare: defensive operations were more difficult than offensive operations. Further, he recognised that air power was able to wage war from the “inside out” by targeting centres of gravity within the five strategic rings: simultaneous attacks against a nation’s leadership (innermost target); key production; infrastructure; a population’s support for its government; and fielded military forces (outermost shell).¹⁴ Further, Warden believed that air superiority was a prerequisite for victory from which other air effects could be achieved.¹⁵



John Warden's Five Strategic Rings

So how do these ideas coalesce with regard to applying air power to achieve decisive warfighting effects? To be fully decisive, air power must be employed in a manner that is consistent with the efforts of other elements of national power. For high-end warfighting, these other elements are likely confined to land, naval, space and cyberspace domains rather than those generated by other non-military government agencies. Therefore, air power complements these military elements of national power in achieving objectives by waging war from the “inside out” against the strategic rings. Equally, land and naval domains complement air power by waging war from the “outside in” against these same objectives. Finally, space and cyber operate across all strategic rings. The integration of these domains is symbiotic in aligning to the principles of war: the strategic aim must be consistent across all warfighting domains; joint action concentrates force and allows simultaneous effects across or within the strategic rings; and finally, offensive action across all (or even if limited to a single domain) provides initiative and freedom of action for all other domains. If we consider these against the “strategic rings” theory and definitions by Mets, then we can generate a template for the delivery of air power that complements the other military elements of national power in achieving decisive warfighting effect: achieving and maintaining air superiority; identifying and targeting enemy centres of gravity via strategic effect; destroying an opposing force’s ability to resupply land forces via interdiction; as well as supporting land or naval forces through tactical effects (such as close air support).

AIR POWER DOCTRINE AFTER THE SECOND WORLD WAR ESTABLISHED THREE PRIORITIES FOR AIR MISSIONS, OF WHICH AIR SUPERIORITY WAS THE UPPERMOST.



So how do these concepts compare with the thesis and ideas discussed in *Storm over Iraq: Air Power and the Gulf War*? In this book, Hallion explores the legacy of air power from its genesis on the Western Front in the First World War through major conflicts to Vietnam. He argues that the impact of Vietnam on the American military was dramatic: “ineptly conceived and badly run”¹⁶ and characterised by “disorganization, terrible planning and insight, and inability to achieve a goal.”¹⁷ He concludes that Vietnam was a catalyst for developing and employing air power within USAF, enabling fundamental reforms to doctrine, leadership and, in particular, the full realisation of the potential of air power through technological advancement.¹⁸ Hallion describes this evolution using

examples from the Arab–Israeli wars and American actions in Iran, Libya, Beirut, Grenada and Panama that illustrate how the United States rebuilt and then employed air power after Vietnam.¹⁹ Hallion concludes by discussing the background to the Gulf War and the strategic, operational and tactical employment of air power during the campaign in detail, highlighting the devastating impact of air power on Iraqi forces.²⁰

In framing the military issues of the Iraq war, Hallion describes a number of implications that are aligned with the delivery of air power to achieve decisive warfighting effects. First, the necessity of control of the air was reinforced from the earliest implementation of air power post–First World War, where Hallion contends that “without control of the skies, an air force cannot profitably fulfil any other mission ... and no other form of military power—land or sea—can perform effectively either. Control of the skies is critical, and is necessarily the single most important mission of air power.”²¹ This is a powerful contention that has proven true throughout the history of conflict since air power’s inception. Arguably, the heavy losses by Royal Air Force Bomber Command in its strategic bombing campaign in the Second World War would have been mitigated by the availability of fighter escort. Indeed, the development of air power doctrine after the Second World War established three priorities for air missions, of which air superiority was the uppermost.²² Its importance was reinforced again in the 1967 Middle East War, the 1973 Yom Kippur War and, finally, during the Bekaa Valley air campaign,²³ and it was also critical during the Iraq war, which Hallion contends “reaffirmed the importance of gaining and holding air superiority.”²⁴

Second, the importance of strategic air attack was reinforced during the planning for the Iraq war, ultimately with devastating results.²⁵ Such devastation was characterised by the fact that:

minutes after H-Hour, the lights went off in Baghdad, and did not come on again until well after the ceasefire. Within a few more hours, communications ... had been transformed into rubble. Eventually, by the end of the second week, with even the backup communications systems disrupted, Saddam Hussein was reduced to sending orders from Baghdad to Kuwait by messenger; the trip took at least 48 hours. ... Within an hour the integrated air defense network had collapsed; [surface-to-air missile] sites and interceptor airfields were no longer under centralized control. Radar sites were destroyed or intimidated. Sector control stations were blasted into rubble. Antiaircraft forces were operating on their own, without broader information or support. Within several hours, attacks had left key Iraqi airfields with cratered runways, taxiways, and ramps. Below, the Iraqi air force remained in its bunkers, soon to be its tombs. Known facilities for the research and manufacture of weapons of mass destruction had been destroyed or rendered unusable.²⁶

Essentially, strategic air attack had realised its potential through technological advances and had induced strategic paralysis on Iraqi forces.

Third, the war highlighted the importance of interdiction. Having gained air superiority and induced strategic paralysis, air interdiction destroyed Iraqi transport into the Kuwait theatre of operations, totally disrupting the flow of supplies and some key communications between Iraq and Kuwait.²⁷ Hallion contends that “by the third week of the war, transport south from Baghdad was so badly damaged that the amount of supplies getting to Basra—the major transshipment point for the Iraqi army in Iraq—was far below the amount necessary to maintain any sort of meaningful combat effectiveness.”²⁸ The effect on Iraqi forces was profound: when land forces began their ground assault, they found surrendering Iraqi forces “were starving; air had cut their supplies of

food and water to nothing, and most were infested with lice, covered with sores, sick, demoralised or in shock from the constant scream of jets and blast of bombs.”²⁹

Finally, tactical air effects enabled land forces to rapidly achieve their objectives at reduced risk and with limited resistance. The telling point: offensive operations ceased at midnight on G+4.³⁰ Hallion concludes that tactical effects inflicted operational paralysis upon the Iraqi soldiers, reducing military effectiveness of Iraqi armoured and infantry divisions to less than 50 per cent for tactical echelons, roughly 70 per cent for operational echelons and 80 per cent for theatre-echelon forces within a month.³¹

Clearly, the stated template for delivering air power as part of an integrated military force to achieve decisive warfighting effects was validated conclusively by the Iraq war and, arguably, in other conflicts since air power's inception—albeit with different lessons and levels of effectiveness. Hallion concluded that as a result of the Iraq war, “air power has clearly proven its ability not merely to be decisive in war—after all, it had demonstrated decisiveness in the Second World War and, to a degree, as early as the First World War—but to be the determinant of victory in war.”³² I disagree with Hallion's conclusion that air power was the “determinant” in the coalition's victory and contend this is simply reflective of Hallion's advocacy of air power. Yes, air power played a crucial and decisive role in the conflict, but it did so as part of the wider joint effort with land and maritime forces. Ultimately, coalition forces achieved overmatch against Iraqi forces, a contention supported by Daryl G. Press in his article “The Myth of Air Power in the Persian Gulf War and the Future of Warfare.”³³ While I also disagree with the contention by Press that air power was not decisive during the Iraq war as well as with his argument that it will likely not be decisive in future offensive operations to take enemy-controlled territory, he raised some salient points on the effect of coalition training, technical superiority, tactical and operational surprise as well as Western tactics in achieving victory.³⁴ Although these were undoubtedly key factors in determining the outcome, when combined with air power effects, they most likely simply reduced the “cost” of the Iraq war in terms of personnel and resources.

Rather, I contend that the key lesson from the Iraq war lies in applying the three key principles of war (selection and maintenance of the aim, concentration of force and offensive action) and the template for delivering air power in conjunction with other elements of national power. From the First World War to the Second World War and the Arab–Israeli conflicts, the predominant success of the victorious forces in these conflicts stands out in comparison to the performance of “losing” forces in unsuccessful conflicts, the most notable of which was defined by the failure of the United States and allied nations in the Vietnam war. While it can be argued that technology limited the ability of air power in assisting land and maritime forces in achieving a decisive (and timely) victory in both World Wars, time and again in the Arab–Israeli conflicts, Israeli forces—having established air superiority—went on to devastate opposition land forces with air strikes and combined air-land warfare.³⁵ Even in less successful conflicts such as Vietnam and the Yom Kippur war, the experiences compelled the West to invest in technology, training and tactics that in subsequent conflicts permitted integrated assaults,³⁶ the results of which were seen with great effect in the Bekaa Valley and Iraq. As the ability of the air domain to create an overmatch against opposition forces (in conjunction with traditional land and maritime domains) is diminished, new domains (such as space and cyberspace), together with the other elements of national power, will be leveraged to create this overmatch. Ultimately, it is the concurrent employment of all these domains together that will continue to enable decisive warfighting effects. While air power has but a part in this process, by using it in conjunction with the principles of war, Warden's strategic rings and the four key air power outcomes (air superiority, strategic effect, interdiction and tactical effect), decisive warfighting effects can be achieved.

In summary, air power may be defined as “the ability to project military power within or from the air domain to achieve an effect.” Such effects may be defined as strategic, interdiction and tactical. In combination with the principles of war and Warden’s five strategic rings, we can generate a template for delivering air power, which complements the other military elements of national power in achieving decisive warfighting effect: first, through achieving and maintaining air superiority; second, through identifying and targeting enemy centres of gravity via strategic effect; third, through destroying an opposing force’s ability to resupply land forces via interdiction; and fourth, through supporting land or naval forces through tactical effects. Essentially, in a joint force, air power wages war from the “inside out” against the strategic rings; land and naval domains complement air power by waging war from the “outside in” against these same objectives, and, finally, space and cyber operate across all strategic rings to achieve decisive warfighting effects.

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ABBREVIATIONS

DND	Department of National Defence
RAAF	Royal Australian Air Force
RCAF	Royal Canadian Air Force
USAF	United States Air Force

NOTES

1. Australia, RAAF, Australian Air Publication (AAP) 1000-D, *The Air Power Manual*, 6th ed. (2013), 122.
2. Australia, RAAF, *Air Power Manual*, 122.
3. Canada, Department of National Defence (DND), B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 3rd ed. (2016), 1, accessed July 4, 2018, <http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/aerospace-doctrine.page>.
4. United States, Department of Defense, *Basic Doctrine: Volume One* (2015), 25, accessed July 4, 2018, <http://www.doctrine.af.mil/Core-Doctrine/Vol-1-Basic-Doctrine/>.
5. Colin S. Gray, *Airpower for Strategic Effect* (Maxwell Air Force Base: Alabama Air University Press, 2012), 9.
6. Australia, RAAF, *Air Power Manual*, 122.
7. Australia, RAAF, *Air Power Manual*, 46.
8. David R. Mets, *The Air Campaign: John Warden and the Classical Air Power Theorists* (Maxwell Air Force Base: Air University Press, 1999), 7.

9. Australia, RAAF, *Air Power Manual*, 31.

10. Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 13–14.

11. Australia, RAAF, *Air Power Manual*, 24–26.

12. Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 14.

13. Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 13.

See also Australia, RAAF, *Air Power Manual*, 152–53.

14. Richard P. Hallion, *Storm over Iraq: Air Power and Gulf War* (Washington, D.C.: Smithsonian Institution, 1992), 116–17.

15. Mets, *The Air Campaign*, 59.

16. Hallion, *Storm over Iraq*, 18.

17. Hallion, *Storm over Iraq*, 85.

18. Hallion, *Storm over Iraq*, 115–20 and 275–317.

19. Hallion, *Storm over Iraq*, 24–26, 58–62, 94–109 and 113–15.

20. Hallion, *Storm over Iraq*, 121–201.

21. Hallion, *Storm over Iraq*, 5.

22. Hallion, *Storm over Iraq*, 13.

23. Hallion, *Storm over Iraq*, 24–26, 58–62 and 97–99.

24. Hallion, *Storm over Iraq*, 243.

25. Hallion, *Storm over Iraq*, 144.

26. Hallion, *Storm over Iraq*, 176.

27. Hallion, *Storm over Iraq*, 193.

28. Hallion, *Storm over Iraq*, 193.

29. Hallion, *Storm over Iraq*, 232.

30. Hallion, *Storm over Iraq*, 237. G+4 refers to the fourth day after ground operations began.

31. Hallion, *Storm over Iraq*, 217.

32. Hallion, *Storm over Iraq*, 264.

33. Daryl G. Press, “The Myth of Air Power in the Persian Gulf War and the Future of Warfare,” *International Security* 2, no. 26 (Fall 2001): 7.

34. Press, “Myth of Air Power,” 8.

35. Hallion, *Storm over Iraq*, 25.

36. Hallion, *Storm over Iraq*, 62.



REFLECTIONS ON AIR POWER

DEFINITIONS, ASPECTS
AND APPLICATION

BY MAJOR ANNE GRAY

Editor's note: This paper was written by a candidate attending the Air Power Operations Course in fulfilment of one of the requirements of the course of studies.

THOUGHTS ON DEFINITIONS OF AIR POWER

To define air power, it makes sense to begin with the *Royal Canadian Air Force Doctrine* definition: "Air power is that element of military power applied within or from the air environment to achieve effects above, on, and below the surface of the Earth."¹ This definition is slightly more specific than that offered by Brigadier General William Mitchell in *Winged Defense*: "Air power is the ability to do something in or through the air."² However, I think that there is merit in further specifying the definition of air power. Along those lines, I agree with the sentiment offered by Mathew Preston in his article "Air Power Theory and Force Classification," wherein he suggests that "it does little for air power theorists to define air power simply as something done from the air. This creates a definition so broad that it makes thinking about the issue too abstract."³ Instead, he suggests that air power be defined as "the ability of an air force to employ its power ... in a specific area and over a specific amount of time in order to defeat an enemy or achieve a goal."⁴ After reading more about this subject, I feel that this definition comes closer to the target than our current Royal Canadian Air Force (RCAF) doctrine definition. It is particularly important in an RCAF context, given our limited size and lack of certain capabilities, that we work with a definition of air power that allows for success without the requirement for persistence over an indefinite period of time as implied by Mitchell's definition. In my opinion, it is sufficient to define air power as the ability to assert one's will in the air within in a defined area and for a long enough period to achieve one's goal.

THOUGHTS ON FLEXIBILITY

We often hear that flexibility is the key to air power, but what does that mean? I have often considered it to be simply a maxim for the ability to rapidly deploy air assets to meet objectives across the globe. Air power is flexible and versatile because it can be used to achieve effects in the air, on the ground and on the sea and because it can be retasked quickly and efficiently. While all of that is certainly true, I have come to appreciate that flexibility and versatility in air power actually have broader applications. One of the realizations I have reached during this course is that perhaps the more important aspect of flexibility and versatility is the ability to rapidly adopt and implement new ideas and tactics into practice. Unlike what I have seen in the land and maritime environments, the air environment is one in which innovation and creative thinking are encouraged and allowed to flourish. It is even spelled out in our doctrine: "Success [in air power] requires the ability to alter plans to take advantage of opportunities or to counter difficulties."⁵ This ability to alter plans permeates air power doctrine as well as our strategy, tactics and procedures and the technology in our platforms. As an example, during the Second World War, the Royal Air Force (RAF) was able to very rapidly integrate radar technology into the tactics of defensive counter-air operations in England. This flexibility and versatility to respond to a new idea and technology played a key role in the defence of England from German bomber attacks: "It was radar, even more than the pluck of the dashing RAF pilots, that tipped the scales in England's favour in the Battle of Britain."⁶ Prior to the readings and discussions that took place during this course, I had not thought about how integral flexibility and versatility are to the application of air power.

THOUGHTS ON AIR SUPERIORITY

Prior to this course, I knew that to have the freedom of movement to enact air power effects, it is vital that friendly forces acquire and maintain air superiority. That said, initially, I considered

air superiority to be largely a question of having the superior fighter force. If “the first mission of an air force is to defeat or neutralize the enemy air force so friendly operations on land, sea and in the air can proceed unhindered,”⁷ then it naturally leads one to think that air superiority is mostly about having the preponderance of fighters in the contested space. My understanding of this concept has now changed significantly as a result of this course. One of the concepts we addressed repeatedly in lectures, readings and discussions has been the vitality of robust command and control (C2) for maintaining air superiority. While I still believe that a capable fighter force plays an important role in achieving air superiority in a contested environment, I now also believe that maintaining air superiority is equally about owning the C2 of the air space. In short, a superior fighter force without effective C2 dominance is useless. We can again look to the Battle of Britain as an excellent example. RAF fighters were outnumbered by the Luftwaffe force; however, effective radar and a C2 structure that allowed for rapid passage of information to the chain of command to scramble fighters in response to German incursions saved the RAF from having to maintain a constant airborne presence. Air superiority can be maintained by having C2 dominance. It is through the lens of my hereto discussed thoughts on air power, flexibility and air superiority that I read and assessed *MacArthur’s Airman* written by Thomas E. Griffith Jr.

IN SHORT,
A SUPERIOR
FIGHTER FORCE
WITHOUT
EFFECTIVE
C2 DOMINANCE
IS USELESS.

MACARTHUR’S AIRMAN – APPLICATION OF AIR POWER



General George C. Kenney

General George C. Kenney was the air commander in the Southwest Pacific theatre under the command of General Douglas MacArthur from July 1942 until the end of the war. As air commander, Kenney contributed “operational skill, intellectual flexibility, and technical innovations that had made air power a crucial part of the Allied victory.”⁸ *MacArthur’s Airman: General George C. Kenney and the War in the Southwest Pacific* chronicles Kenney’s life, professional development and contributions to the Allied efforts in the Southwest Pacific theatre. Griffith describes Kenney as a staunch proponent of air power in the application of military power who had seen first hand “the difficulty of carrying out missions without air superiority in the skies over Western Europe in World War I and continued to

believe that this was an absolutely vital first step in modern warfare.”⁹ Further, Griffith explains that Kenney strongly believed “the first aim of an air commander was to gain the unimpeded use of the air space: in short, to control the air.”¹⁰ While I do not fully agree with Kenney’s assessment that total air domination is required to enable operations on the ground, it is important to understand his thinking in order to provide context for operations under his command.

Central to Kenney’s employment of air power was his willingness to embrace new ideas and tactics to adapt to changing conditions. Griffith goes so far as to state, “Kenney’s mental agility and willingness to sponsor innovations are the hallmarks of his command.”¹¹ Prior to Kenney taking command in the Southwest Pacific theatre, the air forces there had focused largely on the traditional use of high-altitude bombing tactics in a close-air-support role. Recognizing that this tactic posed significant problems for the fleet, both in terms of the number of assets required and the inaccuracy of striking targets from those heights, his “focus on improving methods and a willingness to jettison established routines”¹² allowed for the flexibility necessary to change tactics mid-conflict. Under his command, the Allied forces adopted new low-altitude tactics and integrated new munitions to take advantage of Allied intelligence on Japanese movements to cut off the battle areas of New Guinea during the last half of 1942.¹³ Recognizing the vitality of flexibility and versatility in air power, Kenney “created an atmosphere within his organization that allowed creative thinking to flourish.”¹⁴ It appears that Kenney would agree with the RCAF doctrine’s focus on flexibility being an important facet of air power.

CONCLUSION

In terms of gaining air superiority, Kenney felt that air power should be primarily “to reduce, if not eliminate, the enemy’s ability to interfere [from the air] with friendly operations.”¹⁵ While traditional definitions of air power focus on the totality of air domination being a central aspect, other definitions—such as that proposed by Preston—limit the necessity of air superiority to a defined time period. It seems that Kenney may have been a proponent of the former vice the latter definition. As previously explained, I prefer a definition of air power that limits the requirement to hold air superiority to a limited time and space. In fairness, I think Preston is correct in his assessment that air power “has yet to reach maturity and is constantly changing due to technological advancements, which are much more influential in air power than any other dimension of warfare.”¹⁶ For this reason, the debate surrounding a precise definition of air power is likely to continue to evolve. I expect my own definition will also continue to change as I read further literature on the subject.

Major Anne Gray is an aerospace engineering officer who has experience in maintenance operations at 12 Wing, served as a specialist engineer in Human Factors Engineering with the Directorate of Technical Airworthiness and as the liaison officer to the in-service support contractor on the CH149 Cormorant programme. She also served as a senior duty operations officer on Operation IMPACT. She is currently the Secretariat Maintenance Lead for the Fixed-Wing Search and Rescue Replacement Project.

ABBREVIATIONS

C2	command and control
DND	Department of National Defence
RAF	Royal Air Force
RCAF	Royal Canadian Air Force

NOTES

1. Canada, Department of National Defence (DND), B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 3rd ed. (Astra, ON: Canadian Forces Aerospace Warfare Centre, November 2016), 1.
2. William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military* (Tuscaloosa, AL: University of Alabama Press, 1925), 3.
3. Mathew Preston, “Air Power Theory and Force Classification,” *The Royal Canadian Air Force Journal* 5, no. 3 (Summer 2016): 37, accessed April 23, 2018, <http://w08-ttn-vmweb01/Rawc/en/elibrary/journal/issue.asp?ID=38>.
4. Preston, “Air Power Theory and Force,” 32.
5. Canada, DND, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, 14.
6. Tony Long, “Feb. 26, 1935: Radar, The Invention that Saved Britain,” *Wired*, February 26, 2008, accessed April 23, 2018, <https://www.wired.com/2008/02/dayintech-0226/>.
7. Colonel Philip S. Meilinger, *10 Propositions Regarding Air Power* (Washington, DC: Air Force History and Museums Program, 1995), 3.
8. Thomas E. Griffith Jr., *MacArthur’s Airman: General George C. Kenney and the War in the Southwest Pacific* (n.p.: University Press of Kansas, 1998), xi.
9. Griffith, *MacArthur’s Airman*, 234.
10. Griffith, *MacArthur’s Airman*, xiii.
11. Griffith, *MacArthur’s Airman*, xiii.
12. Griffith, *MacArthur’s Airman*, 237.
13. Griffith, *MacArthur’s Airman*, 236.
14. Griffith, *MacArthur’s Airman*, 237.
15. Griffith, *MacArthur’s Airman*, xiii.
16. Preston, “Air Power Theory and Force,” 38.

**POINTS OF
INTEREST**

THE VOICE OF WAR

BY SERGEANT IAN DANIELS, CD



Thankfully everyone in my crew made it home alive. We fought together, cried together and bled together. I saw a postcard once that read, “You haven’t really lived until you’ve nearly died.”¹ I understand this now, having fought the war on terror in Afghanistan. There are images locked deep inside that occasionally creep up like a slow-moving shadow. That darkness can take you in, but it won’t easily let you out. Forever in my head is an innocent voice, “You were doing what you had to do, it was war for Christ’s sakes!”

It’s 2011; to date 154 Canadian Armed Forces members have been killed; the remainder are battle weary from 10 years of heavy fighting.² This was my first deployment to Afghanistan. I’d been to Bosnia, but this was my first conflict with active enemy engagements. I was incredibly excited! As a helicopter flight engineer, my primary role was door gunning to suppress enemy fire when landing on insurgent objectives. The privilege of serving in that role came with emotional scars, and much like the medals awarded for service, they are a constant reminder of where you’ve been.

I remember vividly my first flights through the Registan desert. The sand is a brilliant copper red, radiating dry 40-degree heat. It’s February but hot enough that the air tastes like a wet bag of potatoes. It’s heavy with dust and sand that fill your nose until you can barely breathe. Sitting in the open cabin door is blinding, and communicating what is happening on the ground is mostly guess work, like trying to describe the movement of boats in a harbour surrounded by dense fog!

Our first few missions are live-fire gunning through a large valley. We always flew two passes to ensure that the valley was clear, that no other units are operating in the area and that none of the local population is present. Once clear, targets are identified, and we practice firing the machine gun from a moving helicopter. Hundreds of rounds are put on each target to hone us, keeping us safe from the enemy in actual gunfights. The splash of bullets impacting the ground is easily identified for accuracy, like throwing a handful of rocks from a bridge into the river below.

It’s been a long day, everyone on board, myself included, is dehydrated and looking forward to rest. Time for one more pass. I fire my gun; there’s the splash. And in that moment, I’m faced with the most horrific image I’ve ever seen: a group of children runs out from behind a sand dune near the target. Splash, splash, the rounds that have left the gun fall all around them. “Check fire!” I scream! They are still running; some are falling in the sand, trying to flee. My heart stopped. I heard no sounds, no running helicopter, no gun fire, just eerie silence. “Scan and breathe!,” I tell myself, a tactical exercise to regain focus in a life-and-death situation.³ I start to breathe, but all I can focus on is that image. To this day, I can picture every single minute detail.

Every day I ask myself, “what did I do wrong?” Months of post-deployment therapy, years of introspection, but nothing will ever change that horrific nightmare. I will never completely understand that day; I simply try to stay out of that lonely shadow. Though the voice will never erase the emotional scars of war, it’s a tiny piece of comfort in an otherwise chaotic space; “It was war for Christ’s sakes!”

This is just one of the many stories I could share from my experience in the skies of Afghanistan. There are some Canadians who served in that war who are currently suffering from post-traumatic stress disorder (PTSD). There are others, like myself, who are not but who are faced with a constant reminder of the tragic events that make up our battle scars. For approximately four years, the Canadian Air Wing in Afghanistan maintained a 450-person-strong commitment.⁴ Many with stories similar to mine share a camaraderie that promotes both mental well-being and pride in the Royal Canadian Air Force.

Sergeant Ian Daniels, a flight engineer, is a current operations non-commissioned member and flight instructor at 403 Helicopter Operational Training Squadron in Gagetown, New Brunswick. With several tours with Canadian Special Operations Forces Command, as both an aviation systems technician and flight engineer, Sergeant Daniels has had some unique experiences, including flying Russian helicopters, Mi-17s, in Afghanistan in support of Special Operations Task Force 58.

NOTES

1. From a postcard purchased in Afghanistan, February 2011.
2. "Canada in Afghanistan – Fallen Canadian Armed Forces Members," Canada, Veterans Affairs Canada, accessed April 3, 2018, www.veterans.gc.ca/eng/remembrance/history/canadian-armed-forces/afghanistan-remembered/fallen?filterYr=2011.
3. Lieutenant Colonel Dave Grossman with Loren W. Christensen, *On Combat: The Psychology and Physiology of Deadly Conflict in War and in Peace* (n.p.: Warrior Science Publications, 2008), 39–43.
4. "Royal Canadian Air Force," William March, Historica Canada, accessed April 3, 2018, <http://thecanadianencyclopedia.ca/en/article/royal-canadian-air-force/>.

**PUSHING THE
ENVELOPE**

“THEY TOIL WITHOUT GLORY”

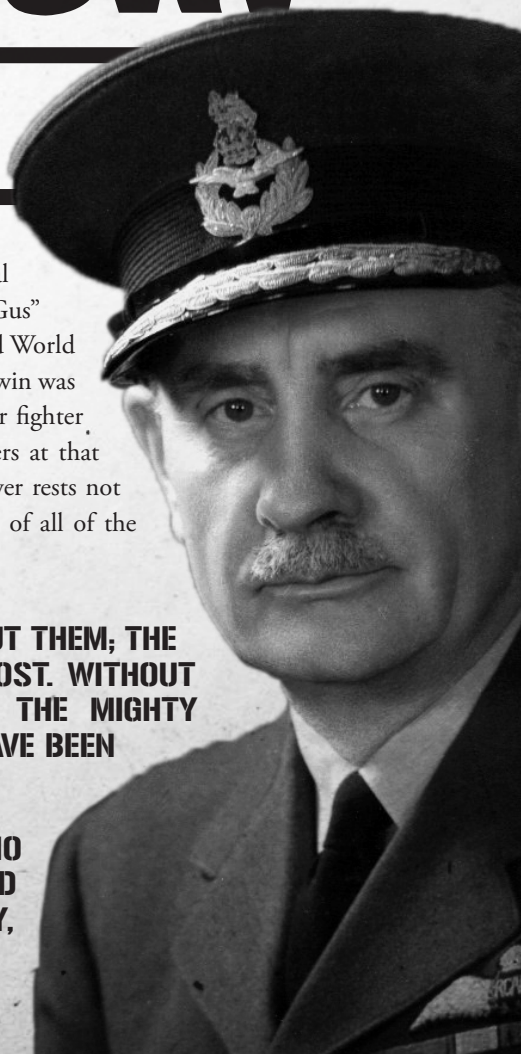
**HONOUR-BEARING
STATUS FOR
NON-FLYING UNITS**

**BY COLONEL J. A. A. DIENING (RETIRED),
OMM, CD, P.ENG, BENG
AND MAJOR W. A. MARCH, CD, MA**

The title of this article is taken from a Canadian Broadcasting Corporation radio broadcast given by Royal Canadian Air Force (RCAF) Air Marshal Harold “Gus” Edwards on 20 July 1942. It was the height of the Second World War and, at that point in the conflict, who was going to win was still up for grabs. Edwards, a decorated First World War fighter pilot and in charge of the RCAF Overseas Headquarters at that time, reminded one and all that the “power” in air power rests not only on the shoulders of aircrew but also on the backs of all of the support personnel. As he so eloquently put it:

**WITHOUT THEM, WE SHOULD FAIL. WITHOUT THEM, THE
BATTLE OF BRITAIN WOULD HAVE BEEN LOST. WITHOUT
THEM (AND I SAY THIS DELIBERATELY) THE MIGHTY
ISLAND [ENGLAND] MIGHT, LONG SINCE, HAVE BEEN
BATTERED TO ITS KNEES.**

**BUT THANK GOD WE HAD THEM. THEY (NO
LESS THAN THE MEN IN THE AIR) HELPED
SEND THE LUFTWAFFE BACK INTO GERMANY,
TO LICK ITS WOUNDS.¹**



Edwards understood that “an air force is a team—a team in which each section is interdependent on the other.”² Yet, as of today, honour-bearing status—the right to colours and battle honours (BHs)—is restricted to operational flying units. Perhaps this should change.

The Canadian approach to granting honour-bearing status is rooted in its historical association with the armed forces of Great Britain. It is predominantly predicated on the traditions of the British Army and centred on a battalion, or regiment, engaged in physical combat with the enemy. The Royal Air Force (RAF) did not issue colours/BHs until after the Second World War and, for the most part, it followed the principles laid down by the British Army, with squadrons taking the place of battalions. The years-of-service criterion was instituted to acknowledge the fluidity of a squadron’s existence, as it may be stood-up/down as required due to national requirements. With minor exceptions, the RCAF adopted the same approach as the RAF. On 10 April 1958, Her Majesty approved the awarding of colours to a flying squadron for a minimum of 25 years of accumulative service.³

COLOURS ARE A UNIT’S MOST PRIZED POSSESSION



Why are colours important to a unit? Canadian Armed Forces (CAF) doctrine puts it eloquently, “Colours are a unit’s most prized possession. ... Historically, Colours marked and provided a rallying point for army regiments in the line of battle. Today, they are no longer carried in action or held by a unit in a theatre of war. They continue, however, as visible symbols of pride, honour and devotion to Sovereign and country.”⁴ Blessed by the Chaplain General, or designated officiant, “Colours are sanctified and devoted to service as symbols of honour and duty; all members of the unit, regardless of classification, rededicate themselves to constancy in the maintenance of these qualities.”⁵ In short, colours are the heart and soul of a unit, a concrete link to those who have served before and a source of great pride and professionalism.

At present, in Canada, “colours may only be presented to combatant or potentially combatant navy and air force higher formations; army and air force units organized and roled [*sic*] to stand in the line of battle; and the Royal Military Colleges of Canada, which are treated for these purposes as if they were an infantry battalion.”⁶ The same document defines a combatant unit as “Her Majesty’s Canadian (HMC) ships, The Royal Regiment of Canadian Artillery (Artillery Branch), the Military Engineer Branch as a whole, armour and infantry regiments, and operational flying squadrons, i.e. those units whose functional purpose is to close with and conquer, neutralize or destroy the enemy as an effective fighting force.”⁷ With respect to the RCAF, “air squadrons are only authorized the issue of a Standard after 25 years [*sic*] (continuous or aggregate) service.”⁸

The RCAF criteria for honour-bearing status seem relatively straightforward: a minimum of 25 years' honourable service, be an operational flying unit and be a combatant unit. However, if we take an objective look at these criteria, using 8 Air Maintenance Squadron (8 AMS) at 8 Wing Trenton as an example, then application of the criteria, in an air force / air power context, is overly restrictive.

Formed as part of an Air Force-wide reorganization on 1 April 1993, 8 AMS primarily supported the CC115 Buffalo, CC130 Hercules, CC137 Boeing 707, CH113 Labrador and CH135 Twin Huey fleets for both domestic and deployed operations from a first- and second-line maintenance point of view. With the introduction of the CC130J and standing-up of squadron maintenance at 8 Wing commencing in 2010, the unit focused on CC130 second-line maintenance, while concurrently supporting other fleets in various second-line maintenance tasks. Throughout its existence, 8 AMS has been called upon to fulfil its mission throughout Canada and the world, in some of the harshest environments. Without the participation of 8 AMS personnel, the air mobility capability of the RCAF would be severely compromised. An integral element of the RCAF, 8 AMS recently passed the 25 years of honourable service benchmark (1 April 2018).

8 AMS is **not** an operational flying unit, but it **is** an operational unit. Its status as a unit rests upon the Ministerial Organization Order that stood-up 8 AMS in 1993. A unit focused on “operations”—defined as “the carrying out of service, training, or administrative military missions; the process of carrying out combat (and non-combat) military actions”⁹—

is an operational unit. Operational is often confused with “deployed” or “combat,” but this is clearly not the case. And even if one were to place the emphasis on deployed (i.e., outside of Canada) and combat, it should also be noted that of the 11,962 Canadian air force personnel who deployed to south-west Asia from 2003 to 2011, 1,433 were from 8 AMS.¹⁰ In the same time period, the largest number of personnel, inclusive of maintenance support personnel, deployed by an operational flying squadron was 734. To reiterate, 8 AMS **is** an operational unit.



8 Air Maintenance Squadron flag.

So the crux of this particular criterion is that 8 AMS does not fly aircraft. However, it could be argued that, barring the institution of major organizational changes, without 8 AMS a number of RCAF air mobility squadrons would not be “flying” units as well ... at least not for long. Indeed, the very definition of a “flying” unit may need to be examined from a historical (446 and 447 Surface-to-Air Missile Squadrons) and future (unmanned aircraft system [UAS]) perspective.

Finally, limiting honour-bearing status to a flying squadron goes against the holistic, team approach that the RCAF fosters. A careful reading of Chapter 4 of *Air Force Vectors*, wherein the *Agile*, *Integrated*, *Reach* and *Power* elements of AIRPower are described, places the emphasis on people, training and leadership rather than platforms.¹¹ With this in mind, 8 AMS is as worthy to be an honour-bearing unit as a flying squadron.

Is 8 AMS a combatant unit? Defining what constitutes a combatant unit in the age of cyber warfare and drone strikes is difficult. The ability to “conquer, neutralize or destroy the enemy as an effective fighting force”¹² may not actually require a deployment, being placed in harm's way or actual combat. The RCAF has recognized this shift in approaches to warfighting by recognizing the “growing importance of non-kinetic air power capabilities.”¹³ In the future, would it be more

logical to grant honour-bearing status to a UAS/cyber unit in Canada that directly impacts an enemy than it is to do the same for a non-flying unit whose deployment, sometimes to areas that place them under fire, is critical to fielded air power?

Lastly, it should be remembered that CAF, and the RCAF, has not always applied the combatant criterion evenly. As noted above, the Royal Military Colleges of Canada, educational/training units, have honour-bearing status. As well, 103 Search and Rescue Squadron, with no combatant role, has honour-bearing status by virtue of being an operational unit that flies.

In many ways, the issue is emotional and cultural rather than practical. The RCAF's concept of what constitutes a "warrior" focuses entirely on aircrew. These individuals have always been the pointy end of an air force. Technology and 21st century warfare are shifting this cultural paradigm and eroding the special status that aircrew, and by extension flying squadrons, have had. The Royal Canadian Navy, with its traditional focus on ships, broke a similar paradigm when it obtained approval for Fleet Diving Units to be granted honour-bearing status.

Perhaps a way to resolve the issue is through more careful delineation of theatre-level and "battle" BHs. An honour-bearing, non-flying unit, and perhaps a unit engaged from Canada, could be allocated a theatre-level BH, while a flying squadron engaged in kinetic combat during a designated "battle" could be granted a "battle" BH in addition to theatre-level recognition. For example, while both 427 Tactical Helicopter Squadron (427 Tac Hel Sqn)¹⁴ and 8 AMS could be granted an "Afghanistan" theatre-level BH, only 427 Tac Hel Sqn would be considered for an additional BH after participating in an actual battle while in theatre. This seems like a logical approach, given the fact that 427 Tac Hel Sqn earned a theatre-level "Afghanistan" BH by deploying 45 personnel, while the deployment of almost 1,500 8 AMS personnel did not.

The RCAF's traditions and culture are important but not sacrosanct. In many ways, they need to be as flexible and adaptive as the organization they define. The current guidelines for granting honour-bearing status no longer meet the requirements of a 21st century RCAF. Non-flying units, such as 8 AMS, are vital components of the RCAF's operational capability. They are key elements of the air force's ability to make good on its AIRPower goals. Through its dedicated service, operational focus and contributions to the RCAF's combat capability, 8 AMS has earned the right to be granted honour-bearing status, and there may be more units out there with a similar history that may be so entitled. At the end of the day, it is more important that RCAF units, flying and non-flying, are recognized for their exemplary dedication and conduct than to perpetuate outdated cultural norms. As Air Marshal Edwards wrote so many years ago, you do not "read about ... ground crew in the stories that were headlined all over the world because: **THEY TOIL WITHOUT GLORY.**"¹⁵ It's time we gave them their due.

Colonel Joep Diening, (Retired), OMM, CD, P.Eng, BEng served in the Canadian Forces for 31 years. After graduating from the Royal Military College in 1973, he flew operationally as an air navigator on 404 and 405 Maritime Patrol Squadrons. Reclassifying to the aerospace engineering occupation in 1981, he served in various operational field positions with the Base Aircraft Maintenance Engineering Organization and 8 AMS, Trenton. Command positions included detachment commander; Maritime Command Detachment Frobisher Bay; Commanding Officer 8 AMS; and for the North Atlantic Treaty Organization, Commander Multinational Air Movements Detachment Rimini, Italy.

Major Bill March, a maritime air combat systems officer, has spent over 41 years in uniform. He is currently a member of the Air Reserve, serving as the RCAF Historian within the Directorate of RCAF History and Heritage.

ABBREVIATIONS

8 AMS	8 Air Maintenance Squadron
427 Tac Hel Sqdn	427 Tactical Helicopter Squadron
AIRPower	agile, integrated, reach and power
BH	battle honour
CAF	Canadian Armed Forces
DND	Department of National Defence
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
UAS	unmanned aircraft system

NOTES

1. Suzanne K. Edwards, *Gus: From Trapper Boy to Air Marshal* (Renfrew, ON: General Store Publishing House, 2007), 212.

2. Edwards, *Gus*, 213.

3. For a full explanation see Canada, Department of National Defence (DND), A-AD-267-000/AF-004, *The Insignia and Lineages of the Canadian Forces*, Vol. 4, *Operational Flying Squadrons* (Ottawa: DND Canada, 2000), accessed March 9, 2018, <http://www.cmp-cpm.forces.gc.ca/dhh-dhp/his/ol-lo/vol-tom-4/doc/ofs-cao.pdf>.

4. Canada, DND, A-AD-200-000/AG-000, *The Heritage Structure of the Canadian Armed Forces*, 2008-05-15, 5-1-1, accessed March 9, 2018, <http://cmp-cpm.mil.ca/en/honours-history/publications-history/heritage-structure-caf.page>.

5. Canada, DND, A-AD-200-000/AG-000, *Heritage Structure of the Canadian Armed Forces*, 5-1-1.

6. Canada, DND, A-AD-200-000/AG-000, *Heritage Structure of the Canadian Armed Forces*, 5-1-2.

7. Canada, DND, A-AD-200-000/AG-000, *Heritage Structure of the Canadian Armed Forces*, 3-2-3. The same paragraph goes into additional detail with respect to non-honour-bearing units “inadvertently” engaging in combat operations: “Other units may, through happenstance, find themselves involved in battle and for reasons of personal protection, be called upon to fight. Nevertheless, non-combatant units and their sub-units operating independently, operating as part of a formation, or attached to or in support of a combatant unit cannot gain battle honours for themselves or their parent unit.”

8. Canada, DND, A-AD-200-000/AG-000, *Heritage Structure of the Canadian Armed Forces*, 3-2-13.

9. *Defence Terminology Bank* record 27068.

10. These numbers were generated by 1 Canadian Air Division, A1 Personnel, in support of the submission for theatre-level BH for South-west Asia in 2013. A copy is held by RCAF History and Heritage, Canadian Forces Aerospace Warfare Centre, 8 Wing Trenton.

11. Canada, DND, A-AG-007-000/AF-008, *Air Force Vectors*, abridged version (Ottawa: Director General Air Force Development, 2014), Chapter 4, accessed March 9, 2018, http://publications.gc.ca/collections/collection_2014/mdn-dnd/D2-300-1-2014-eng.pdf.

12. Canada, DND, A-AD-200-000/AG-000, *Heritage Structure of the Canadian Armed Forces*, 3-2-3.

13. Canada, DND, A-AG-007-000/AF-008, *Air Force Vectors*, 8.

14. 427 Tac Hel Sqn was renamed 427 Special Operations Aviation Squadron on 17 June 2009.

15. Edwards, *Gus*, 215.