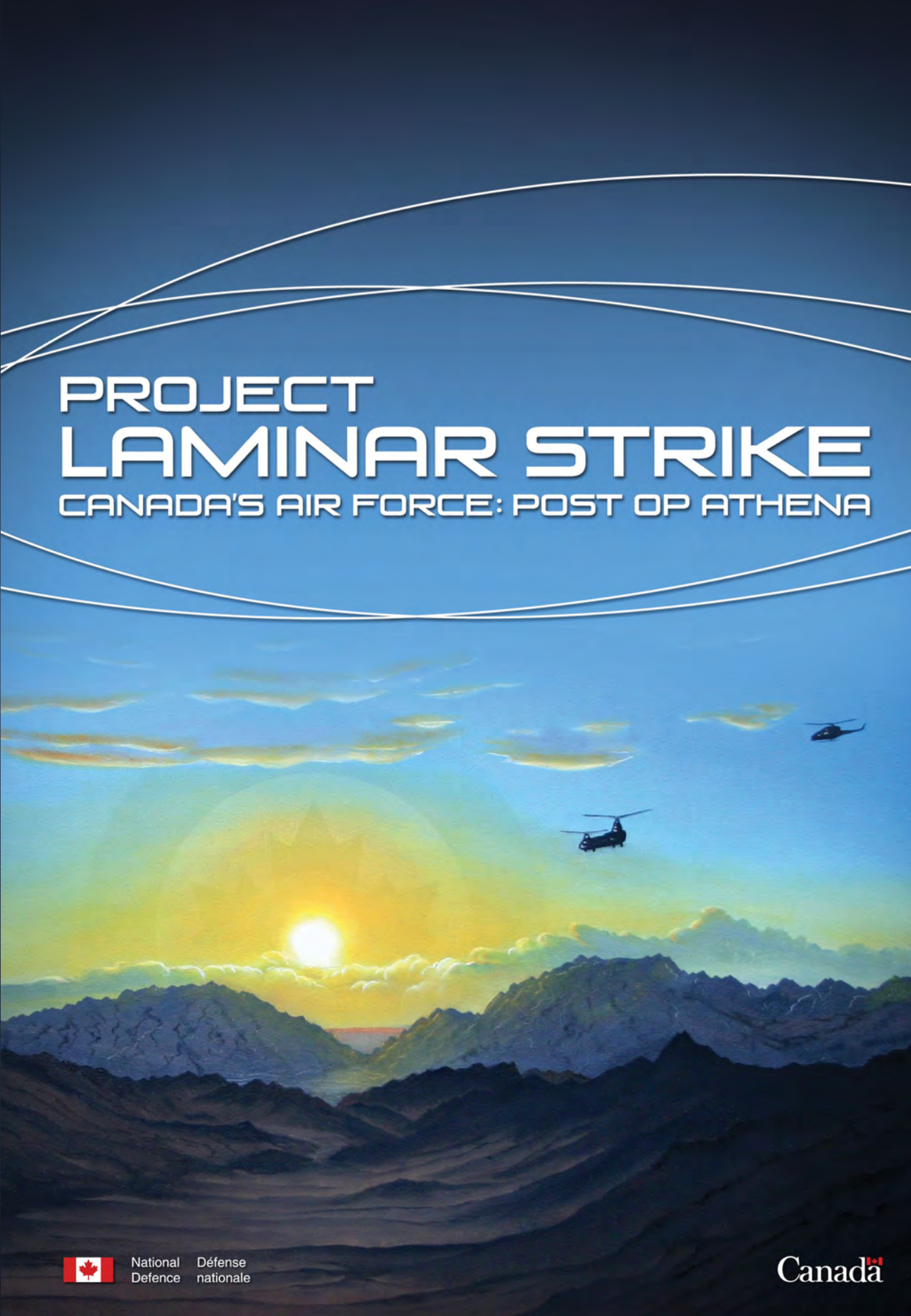
PROJECT
LAMINAR STRIKE
CANADA'S AIR FORCE: POST OP ATHENA



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FOREWORD

The Joint Task Force-Afghanistan (JTF-Afg) Air Wing was first deployed to Kandahar Airfield (KAF) in December 2008. My rotation of the JTF-Afg Air Wing started its "road to war" pre-deployment training on 3 April 2009 and was deployed to KAF for a 10-month tour extending from November 2009 to September 2010. We learned a great deal during the 17-month commitment, during which we undeniably raised the bar for the application of air power in support of the North Atlantic Treaty Organization (NATO) and the Canadian contingent. *Project Laminar Strike* is our way of giving back to the Air Force by compiling the knowledge that we acquired throughout our tour of duty in a theatre of war.

JTF-Afg Air Wing is composed of three distinct military flying units, a contracted helicopter airlift detachment, and a headquarters (HQ). The Air Wing was preceded by the theatre support element (TSE), which has been supporting the Canadian mission in Afghanistan since 2002. The TSE is now a JTF-Afg Air Wing unit and has since been renamed Task Force (TF) Canuck. The TF Canuck Tactical Airlift Unit (TAU) operates three CC130 Hercules from two locations: the TSE staging base in the Middle East and KAF. The Canadian Heron Unmanned Aerial Vehicle (UAV) Detachment (CHUD), now named TF Erebus, operates three CU170 Heron air vehicles, which are contracted through McDonald, Dettwiler and Associates. The Canadian Helicopter Force (Afghanistan), which alternates between TF Freedom (408 Tactical Helicopter Squadron) and TF Faucon (430 Escadron tactique d'hélicoptères), operates six CH147D Chinook and eight CH146B armed Griffon helicopters. Finally, the Canadian Contracted Air Transport (CCAT) Unit provides cargo airlift throughout the theatre area of operations (AO); CCAT operates four Mi8 Hip and two KA32 Kamov helicopters. The Air Wing HQ, located in KAF, is small, composed of 34 members, including the 12-person Tactical Air Intelligence Section.

In honour of the 100th anniversary of powered flight in Canada (1909–2009), the JTF-Afg Air Wing was renamed TF Silver Dart, which is comprised of approximately 450 personnel. It may not be the biggest air wing in the Canadian Air Force, but it is certainly the most versatile.

Drawn from across the Air Force, the members of TF Silver Dart make this organization unique. The Air Wing HQ's 34 personnel come from a variety of backgrounds and specialties; thus bringing a significant breadth and cross section of experience to TF Silver Dart. I therefore had immediate access to approximately 17 different Air Force specialties, including: aerospace engineers; tactical helicopter aviators; CC150 Polaris, CC177 Globemaster III and CC130 Hercules transport pilots; a CF188 fighter pilot; a long-range patrol sensor operator; a CP140 Aurora long-range patrol pilot; several training pilots; logisticians; aerospace controllers (AeC); air combat systems operators; information management (IM) and computer information systems (IS) officers; a former Sperwer Tactical UAV detachment commander; and, last but not least, a team of intelligence analysts, briefers, and collators. By tapping into this extensive experience and fantastic potential within TF Silver Dart, and by drawing upon the lessons learned throughout our tour, we have harvested initiative and creativity in the form of a project that we have named *Laminar Strike*.

Laminar Strike is a consolidated, collaborative project. It is a collection of the lessons learned from our extended tour in Afghanistan as we modified our capabilities to match the evolving and ever-dynamic counter-insurgency (COIN) campaign. Canada's Air Force did not disappoint! *Laminar Strike* is special because it is a guiding project from the tactical viewpoint that is unique to TF Silver Dart personnel. They have provided first-hand testimony on how Air Force capabilities have been rapidly advanced to project precise and persistent air power effects—they have had a hand in writing the future of the Air Force. *Laminar Strike* is also intended to align with doctrine referred to in *Projecting Power: Canada's Air Force 2035* (hereafter cited as *Projecting Power 2035*). In fact, *Projecting Power 2035* was a reference document for each of our authors, and the guidance for contributions is best described by a quotation from the Canadian Forces Aerospace Warfare Centre (CFAWC) publication:

> [T]here is a need to maintain a full spectrum of warfare capabilities, the [Canadian Forces] CF *will* need to be strategically relevant, operationally responsive and tactically decisive. Its Air Force must be balanced and agile, networked and integrated, deployable and sustainable as well as able to use lethal and non-lethal means that are both precise and discriminating (italics in the original).[1]

Laminar Strike is TF Silver Dart's projection into the future; it envisions an agile, modular, balanced expeditionary Air Wing that is at the leading edge of supporting expeditionary and domestic operations (ops) that await the CF. Contributing authors from TF Silver Dart were challenged to determine how a modular and agile projection of air power would participate in future foreign and domestic deployments. In addition to *Projecting Power 2035*, the writing team also referred to the *Chief of Defence Staff Arctic Planning Directive*[2] and the *Air Force Expeditionary Capability Concept of Operations.*[3]

Laminar Strike does not pretend to deliver all of the answers—it is intended to challenge and expand our collective knowledge and to raise discussion within the Air Force. *Laminar Strike* is TF Silver Dart's legacy, and it captures the experience gained during our 17-month commitment to air operations in a wartime environment. I hope that you will enjoy this timely and rewarding project. It will be a valuable reference for future discussions.

VOLARE AUDEMUS – WE DARE TO FLY

Colonel J. H. Christian Drouin
Commander
Task Force Silver Dart

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1. Andrew B. Godefroy, ed., *Projecting Power: Canada's Air Force 2035* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2009), 27, http://trenton.mil.ca/lodger/CFAWC/production/pubs/Projecting_Power-Canadas_Air_Force_2035_e.pdf (accessed July 7, 2011).

2. Canada, Department of National Defence (DND), Lieutenant-Colonel Steve Davenport, Director Air Strategic Plans (D Air SP) 4, *Chief of Defence Staff* (*CDS) Arctic Planning Directive*, 12 April 2010, Policy Planning Team (PPT) presentation.

3. Canada, DND, *Air Force Expeditionary Capability Concept of Operations*, 3030-1 (AFEC Rdns), 22 September 2009 (hereafter cited as 3030-1 [AFEC Rdns]), 27, http://winnipeg.mil.ca/msnspcoord/documents/DMCS-13667.pdf (accessed July 7, 2011).

TERMINOLOGY OF THE CANADIAN AEROSPACE FUNCTIONS

The terminology in this report is derived from the CFAWC publication *Projecting Power 2035*, and defined according to the *Defence Terminology Bank* (DTB).[4]

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

Sense
The operational function that provides the commander with knowledge.
Note: This function incorporates all capabilities that collect and process data.
(DTB Record 26167)

Shape
The function that optimizes agile manoeuvre and integrated information operations in the delivery of kinetic and non-kinetic aerospace power to achieve desired effects.
(DTB Record 37254)

Move
The function that exploits global reach and speed of aerospace power to rapidly deploy and position personnel and materiel to achieve desired effects. (DTB Record 37252)

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

Laminar
"[D]enoting flow that takes place alongside constant streamlines, without turbulence."[5]

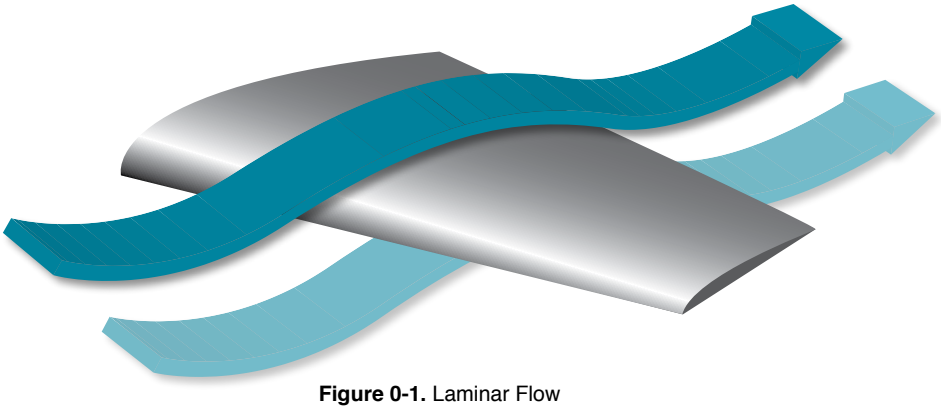

Figure 0-1. Laminar Flow

4. Canada, DND, *Defence Terminology Bank* (hereafter cited as DTB), http://terminology.mil.ca/term-eng.asp.
5. *Concise Oxford English Dictionary*, 11th ed., s.v. "Laminar."

CF Photo: MCpl Robert Bottrill

CF Photo: MCpl Robert Bottrill

CHAPTER ONE

INTRODUCTION

Throughout 2010, the CF has been actively engaged in all conceivable areas of operations. Commitments have ranged from security at the 2010 Winter Olympic Games in British Columbia (BC) to humanitarian assistance for Haitian earthquake victims during Operation (Op) HESTIA, and to the ongoing whole-of-government (WoG) COIN campaign in Afghanistan's Kandahar province. These operations have placed a high demand on Canadian soldiers, sailors, airmen and airwomen, who admirably remain focused, innovative, and adaptable. The Canadian Air Force has been a constant and key enabler when supporting these operations; its personnel have prevailed under extraordinary conditions, and many first-time capabilities have been advanced during these operations.

Canada's Air Force has become a world-class example of flexibility, mobility, and power. New equipment, infrastructure, training and simulation technologies, and outsourcing options have driven empowerment and progress in many Air Force communities, such as air mobility forces, tactical aviation (tac avn), maritime operations, fighters, search and rescue (SAR), and training. The Air Force has quickly mastered the UAV capability during deployed operations in Kandahar province, and many concepts have been introduced that better leverage the capabilities of existing resources. The most precious resource has been knowledge capital, and Air Force operators and support personnel continue to cultivate future capabilities, designs, and doctrine to ensure a lasting relevance and a forward-thinking learning culture.

The JTF-Afg Air Wing and its units are an excellent example of how the Air Force contributes on a global scale by protecting Canadian lives, interests, and values alongside civilian and military multinational partners. From November 2009 to September 2010, Rotation (Roto) 8 Air Wing personnel, known as Task Force Silver Dart, were renowned for their versatility and innovative progress as they integrated air power initiatives at an unimaginable rate. Members of TF Silver Dart came from all corners of Canada's Air Force and brought their extensive expertise and professionalism to Kandahar. TF Silver Dart has compiled its collective experience gained during the 10-month tour, and between the covers of this book are the contributions and lessons learned by those at the coalface. Each contributing author had a common goal: to take stock of their experience and knowledge and apply it to the next expeditionary operation (Africa, Haiti) and ultimately apply it to domestic operations in Northern Canada. We Dare to Write…

David W. Lowthian
Colonel
Deputy Commander
Task Force Silver Dart
Roto 8

CF Photo: MCpl Dan Shouinard

CHAPTER TWO

AIR WING HEADQUARTERS

"Command and control of an [air expeditionary wing] will be compatible with CF operations doctrine."[1]

The Deployable Air Wing: Refining the Expeditionary Air Wing Headquarters Construct

Canadian military air transport operations have been conducted into and within Afghanistan since 2002; the CC130 Hercules aircraft has been the sustainment lifeline to the theatre of operations (TO) when flying regular inter-theatre missions between the TSE staging base and KAF. Hercules aircraft and crews have also forward deployed into KAF in order to conduct intra-theatre tactical airlift missions into smaller airfields within the Afghanistan theatre. The CC150 Polaris (Airbus A310) has been the strategic "airbridge" to and from Canada for the sustainment of theatre requirements, and since late 2007, the CC177 Globemaster has merged strategic and tactical airlift capabilities as a state-of-the-art "stractical" airlifter.

Until late 2008, airlift operations were managed solely by the TSE and its TAU, co-located at a forward staging base in the Middle East, and reported directly to JTF-Afg. In its 2008 analysis of Canada's future role in Afghanistan, the Manley Report[2] recommended that additional air and aviation assets be deployed to Afghanistan "[t]o better ensure the safety and effectiveness of the Canadian contingent."[3] The panel insisted that a medium-helicopter lift capacity and high-performance UAVs for intelligence, surveillance and reconnaissance (ISR) be in place before February 2009.

Suddenly, the Canadian Forces' air and aviation footprint assigned to support Operation ATHENA was to grow from three CC130 aircraft and 196 personnel to three CC130s, eight CH146 Griffons, six CH147 Chinooks, three CU170 Heron UAVs, six civilian contract helicopters, and in excess of 450 personnel. When the Manley Report was released, only one lieutenant-colonel air advisor was located in Kandahar to advise the commander JTF-Afg on air and aviation enablers. Both the commander JTF-Afg and the new Air Force units would require a more robust Air Force presence in theatre, hence the birth of the JTF-Afg Air Wing.

The Joint Task Force-Afghanistan Air Wing Headquarters

The JTF-Afg Air Wing was introduced to the Afghanistan theatre in December 2008 and included a command team, an HQ element (Air Wing HQ), and a total of three units: TSE, Canadian Helicopter Force Afghanistan (CHF[A]), and Canadian Heron UAV Detachment (CHUD). The Air Wing was also charged with managing the civilian-run CCAT operations that provided additional aviation sustainment for JTF-Afg. Responsible for the introduction of the new air and aviation capabilities, the Air Wing HQ evolved comfortably within the restraints of a fixed establishment of 30 personnel.

1. 3030-1 AFEC Rdns, 21.
2. Independent Panel on Canada's Future Role in Afghanistan, "Report of the Independent Panel on Canada's Future Role in Afghanistan," January 2008, http://dsp-psd.pwgsc.gc.ca/collection_2008/dfait-maeci/FR5-20-1-2008E.pdf (accessed July 7, 2011).
3. Ibid, 38.

The Air Wing HQ was sourced with the following: a command element, a core of advisors and liaison officers, a public affairs officer, operations and plans section, a J3 aviation section, and an organic air intelligence section (Figure 2-1).

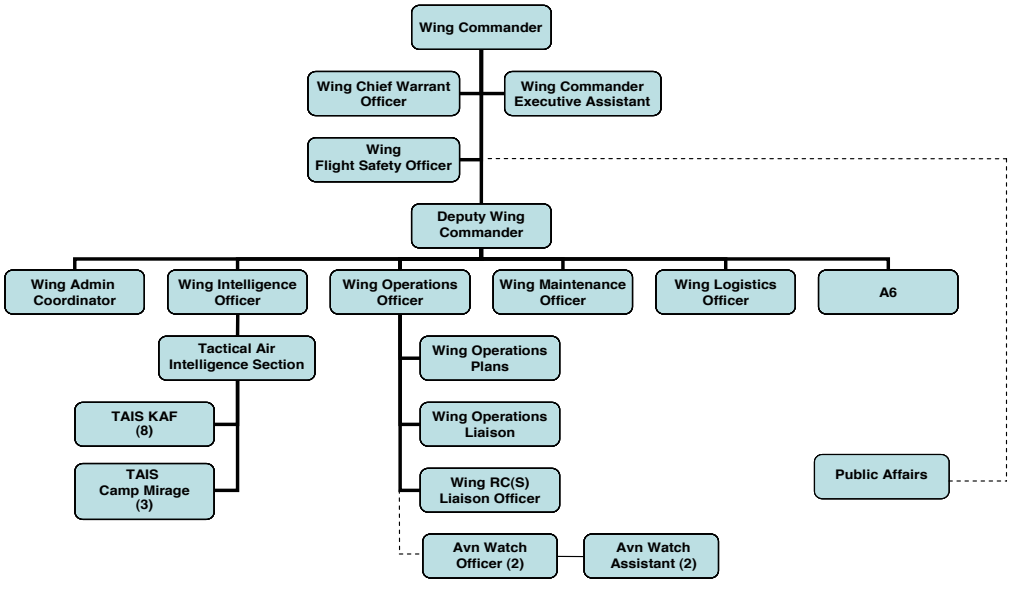

Figure 2-1. The Original Air Wing Headquarters Construct

The Air Wing HQ became a highly functional organization that brought nascent capabilities (CU170, CH147) to initial operational capability (IOC) and full operational capability (FOC) levels. The Air Wing HQ has permitted Air Wing units to "load-shed" staff and reporting functions so that unit focus can remain at the tactical level. A mission acceptance and launch authorization (MALA) process was introduced to ensure the formalization of command oversight; operational risk would therefore be accepted at the appropriate level. Infrastructure developments were championed by Air Wing HQ staff: workspace, connectivity, and shelters were secured for personnel, aircraft, and parts and equipment.

The Air Wing HQ was of immediate value; it enabled focused command and control (C2) functions for the Air Wing commander and evolved the span of control for the commander JTF-Afg as Air Wing units and new capabilities were introduced to Op ATHENA. The first two Air Wing HQ rotations established the architecture and footprint for the organization; the Air Wing HQ stabilized the new formation's role and reporting responsibilities.

Planting the Seed for Organizational Change

The JTF-Afg Air Wing HQ Roto 8 arrived in Kandahar in November 2009. The Roto 8 Air Wing HQ had a distinct advantage over the first two formation HQ: its 30 members participated in the many road-to-high-readiness (RTHR) activities alongside their JTF-Afg HQ 6-09 counterparts for seven months prior to deployment. The RTHR training included

core professional development training, key leadership and campaign winning conferences, and four collective force generation exercises that employed simulation and contracted expertise to enhance the training experience. The commander JTF-Afg[4] and the Air Wing commander actively reinforced a one-team approach and the two HQ bonded as a unified force.

Once in theatre, the Air Wing commander took immediate steps to rapidly advance air and aviation capabilities; the Air Wing HQ would be the first to be deployed longer than the traditional six-month period[5] and could therefore manage longer-term projects without interruption. The results were astounding: CC130 container delivery system (CDS) drops increased dramatically, contracted airlift efficiencies improved, urgent operational requirements (UORs) were prioritized and formally emphasized, CU170 FOC milestones were advanced (record flying rates and durations, dual air vehicle operations), the Air Force lessons learned process was streamlined, the Griffon weapons team (GWT) call-out capability was introduced, and Joint Combat Assessment Team[6] (JCAT) training was successfully accomplished. Most significantly, there were two unprecedented operational accomplishments: Op MOSHTARAK II was the largest aviation insertion ever and Op KHARUT was the first time that all Air Wing units (TAU, CHF[A], CHUD) worked together while introducing the CC130 black illumination (BI) flare drop capability to support the night insertion of United States (US) Army soldiers.

In order to develop new capabilities and to maximize the effectiveness of the assets under his command, the Air Wing Commander Roto 8 identified three important enablers at the outset of his tour: accountable leadership with clarity and vision, a highly integrated relationship with JTF-Afg HQ staff, and a flatter organizational structure that replicated the continental staff system and correlated directly to the JTF-Afg HQ construct. These enablers reinforced the one-team approach fostered by the Commander JTF-Afg and the Air Wing commander; thereby, the seed was planted for a healthy and collaborative joint culture.

Cultural and organizational transformation would provide the Air Wing commander with a clear vision as to how he saw units and capabilities evolving over the course of the rotation in order to advance air and aviation contributions to better support the joint COIN campaign. Key to this transformation was a modified Air Wing HQ organizational structure that would strengthen command focus and influence on the wing's tactical units. The Air Wing HQ construct evolved into a flatter continental A-staff system where the wing commander would no longer have to look through his HQ to influence his units. Personnel establishment was the main constraint in transforming the Air Wing HQ organizational structure; transformation had to be a neutral solution—no additional personnel resources would be considered.

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4. The senior Canadian commander for Op ATHENA is a brigadier-general who has two main responsibilities: as Commander Task Force Kandahar (TFK), he is responsible for the multi-national brigade operating in the TFK AO; as Commander Joint Task Force-Afghanistan, he has national responsibility for Canadian military and civilian personnel employed on Op ATHENA.

5. JTF-Afg Air Wing Roto 8 was deployed for 10 months from 18 November 2009 until 8 September 2010.

6. Joint Combat Assessment Team (JCAT): the JCAT capability is a post-enemy contact data gathering and investigative process that provides for timely responses to known threats to air and aviation resources. Think of it as "combat flight safety."

Transformation in 2010: Evolving the Air Wing Headquarters Construct

During seven months of pre-deployment exercises, the Air Wing HQ rehearsed and refined staff processes internally within the HQ and externally with the JTF-Afg HQ and with the tactical flying units. While changes were made within the Air Wing HQ organization in response to individual capabilities, the HQ construct remained almost identical to the original construct (Figure 2-1). Once in theatre, the Air Wing commander directed that the Air Wing HQ construct be refined; he needed more focus on the tactical units. His intent was clear: unobstructed command support to Air Wing units and an integrated working relationship with the JTF-Afg HQ staff—a one-team effort.

In order to have a clear view of Air Wing units, the wing's C2 structure had to be unambiguous and the Air Wing HQ had to be recognized as another unit within the Air Wing. Under the existing organizational construct, the wing commander seemed to be cornered into commanding an HQ rather than an entire formation. The transformation commenced immediately and an Air Wing HQ commanding officer (CO) and sergeant-major were appointed; the HQ CO also doubled as a chief of staff (COS) in order to manage HQ staff activities and project priorities. This arrangement had an immediate and positive effect on the command team's ability to effect commander's intent: to provide air and aviation advice to the commander JTF-Afg, and to clearly assess the five residual responsibilities under the Chief of the Air Staff and Commander 1 Canadian Air Division (Comd 1 Cdn Air Div) as seen in the following text box.

COMMANDER JTF-AFG AIR WING
FIVE RESIDUAL RESPONSIBILITIES TO THE AIR FORCE:

- **airworthiness**
  - operational airworthiness (OA);
  - technical airworthiness (TA);
- **aircraft maintenance policy and standards;**
- **flight safety;**
- **aircrew training and standards; and**
- **air and aviation doctrine.**

It became apparent that the chief of staff (COS) position was critical to the Air Wing HQ's ability to orchestrate priorities and to deliver thorough and timely assessments to the Air Wing commander. Although great strides were made initially, the new arrangement was unsustainable for a triple-hatted COS (wing maintenance officer, CO, COS). Fortunately, a timely increase to the Air Wing HQ's establishment added three new personnel with the introduction of an A6 (communications and information systems officer or branch); this provided the Air Wing HQ with the depth and flexibility it needed to evolve.

During construct studies, it was determined that a COS position was key to the orchestration of staff output and priorities; the COS should be a stand-alone position with inherent seniority—ideally senior in experience and in rank. The US Military defines the COS as the "head or controlling member of a staff for the purposes of the coordination of its work."[7] During

7. About.com, US Military, http://usmilitary.about.com (accessed July 7, 2011).

pre-deployment exercises, Air Wing Roto 8 had experienced the benefits of this position by observing and working within the JTF-Afg HQ structure. With the COS position, the Army model maximizes staff effort while relieving the command team to focus on operational command (OPCOM). The Air Wing evolved itself to mirror this, and as a result, became more integrated within the JTF-Afg HQ. The Air Wing COS position was of immediate benefit and has become fundamental to the fulfillment of the one-team vision.

On 27 February 2010, duties were reassigned and a new wing COS was appointed as a dedicated position. The position was created by moving the wing information management operator (IMO) to the wing operations section and by re-apportioning responsibilities amongst the operations staff. This also included the next spiral of evolution for the tactical air lessons learned officer (TALLO). A more streamlined reporting process had led to units taking more ownership of reporting responsibilities (much like flight safety), while the wing TALLO provided necessary guidance, worked on critical topics list (CTL) projects, and rapidly delivered reports to the Air Force. This left the Air Force lessons learned officer (AFLLO) within the JTF-Afg joint lessons cell with little to do, and the two positions (TALLO and AFLLO) have since been merged into one (AFLLO is now OPCOM to JTF-Afg joint lessons learned officer and operational control [OPCON] to Comd JTF-Afg Air Wing).

As the Air Wing HQ introduced its new COS, it simultaneously adopted the continental based A-staff system. The two concepts are in fact complementary and lead to high productivity levels: "Coordination… obviously becomes critical, and in the continental system is achieved by a chief of staff."[8] The A-staff system, employed by 1 Canadian Air Division, had been "seeping down into wing level practice";[9] however, any formal change initiatives were stood down with the dismantling of the Air Force C2 reengineering team (AFCCRT) in 1997.[10] In 2009, the *Air Force Air Expeditionary Capability Concept of Operations* echoed the value of the continental A-staff structure for main operating base (MOB) force employment; it also envisioned a more robust deployable wing construct that divided wing responsibilities between operational support and mission support.[11] The first spiral of the new Air Wing construct would explore this division closely.

The Air Wing Transformation: Version One

A Chief of Staff – Operations (COS Ops) and Chief of Staff – Support (COS Sp) structure, similar to the original Canadian Expeditionary Force Command (CEFCOM) construct, was an option that was first considered by the JTF-Afg Air Wing during restructuring (Figure 2-2). This modified continental structure with two chiefs of staff is more in line with older British staff systems than with the continental staff system employed by the United States military.[12]

8. Paul Johnston, "Staff Systems and the Canadian Air Force," *The Canadian Air Force Journal* 1, no. 3 (Fall 2008): 28, http://trenton.mil.ca/lodger/CFAWC/eLibrary/Journal/Archive_e.asp?Vol=Vol1-2008&Issue=Iss3-Fall (accessed July 7, 2011).

9. Ibid, 26.

10. Allan English, *Command & Control of Canadian Aerospace Forces: Conceptual Foundations* (Ottawa: DND, 2008), 73, http://www.airforce.forces.gc.ca/CFAWC/eLibrary/pubs/C2_Conceptual_Foundations.pdf (accessed July 7, 2011).

11. 3030-1 (AFEC Rdns), 20.

12. Johnston, 28.

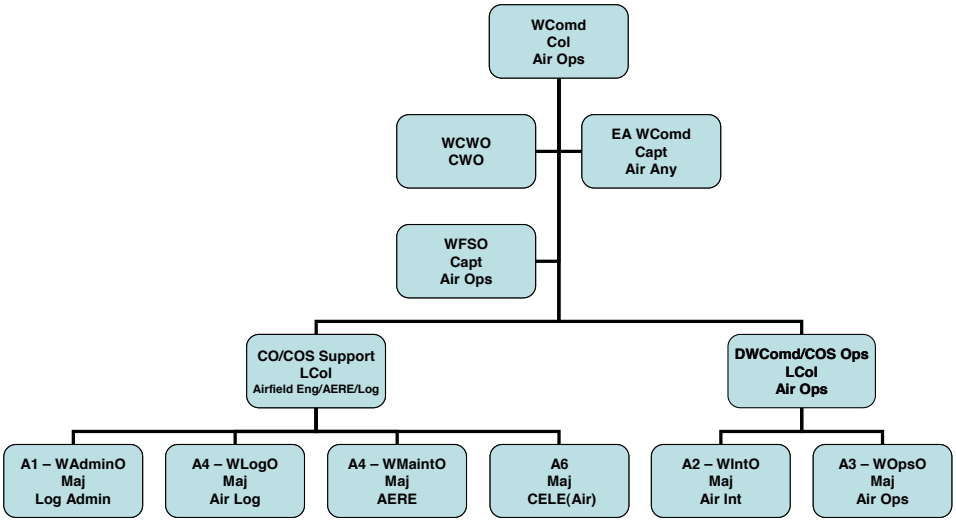


Figure 2-2. COS Operations and COS Support Construct

With a clear distinction between operations and support functions, the Air Wing commander would have the ability to surge either function as in response to changes to priorities. Additionally, the COS operations branch explicitly reinforces the importance of fusing intelligence (int) to operations; the int/ops fusion is a synergistic concept that is employed in joint operations from the tactical through to the strategic level. As the Air Wing HQ studied the COS Ops / COS Sp construct, the command team determined that the structure was more "staff-centric" rather than "command-centric" and would be suited to a more robust establishment that co-locates the Air Wing HQ with a mission support squadron (MSS). Should the Air Wing HQ relocate to a third location similar to the TSE, this would be an option to consider.

The Air Wing Transformation: Task Force Silver Dart

In his book *Command & Control of Canadian Aerospace Forces: Conceptual Foundations*, Dr. Allan English states that it is "unclear whether 1 Cdn Air Div HQ is intended to be an 'operational-level' headquarters or whether it is an 'operational' headquarters in the sense of a headquarters that directs the conduct of operations."[13] This statement captures the jump that the Air Wing commander wanted to take; his Air Wing HQ was to be an operational unit that he could leverage to assist him in directing the operations of the Air Wing's tactical units, including the civilian CCAT capability. Only then would priorities be clearly understood and maintained and would risks be accepted at the appropriate levels with mitigation resources apportioned.

The *Air Force Expeditionary Capability Concept of Operations*, released in September 2009, introduced an air expeditionary wing (AEW) construct that recognized the "necessity for integrated combat, operations support, and mission support forces as the way ahead for the

13. English, 73.

[Air Force] to improve its effectiveness at sustaining deployed operations."[14] In its discussion on deployed operating base force employment, the 2009 document emphasizes the requirement for a clear and coherent C2 structure and its criticality to successful Air Force operations, as outlined in the following text box.[15]

AIR FORCE COMMAND AND CONTROL:

A rigorous, adaptable and coherent C2 structure is a critical aspect to success in AF operations. As such, an AEW must operate in an unambiguous C2 context. AEWs can be employed in support of Canada Command (Canada COM), CEFCOM or North American Aerospace Defence Command (NORAD) ops.

As the Air Wing HQ initiated its transformation, the command team employed the guiding principles presented above: a clear and coherent C2 structure that would enable the Air Wing commander to leverage the Air Wing HQ to assist him in directing the operations of the Air Wing's tactical units.

CF Photo: Cpl James Nightingale

14. 3030-1 (AFEC Rdns), 1.
15. Ibid., 21.

In February 2010, the Air Wing HQ structure was transformed to incorporate the COS position as chef d'orchestre and the continental A-Staff system; at the same time, the entire Air Wing re-invented itself as a TF within the coalition. As noted earlier, the Air Wing was renamed TF Silver Dart, TSE became TF Canuck, CHF(A) became TF Freedom (now TF Faucon), and CHUD became TF Erebus. The results of the transformation were immediate and positive (Figure 2-3).

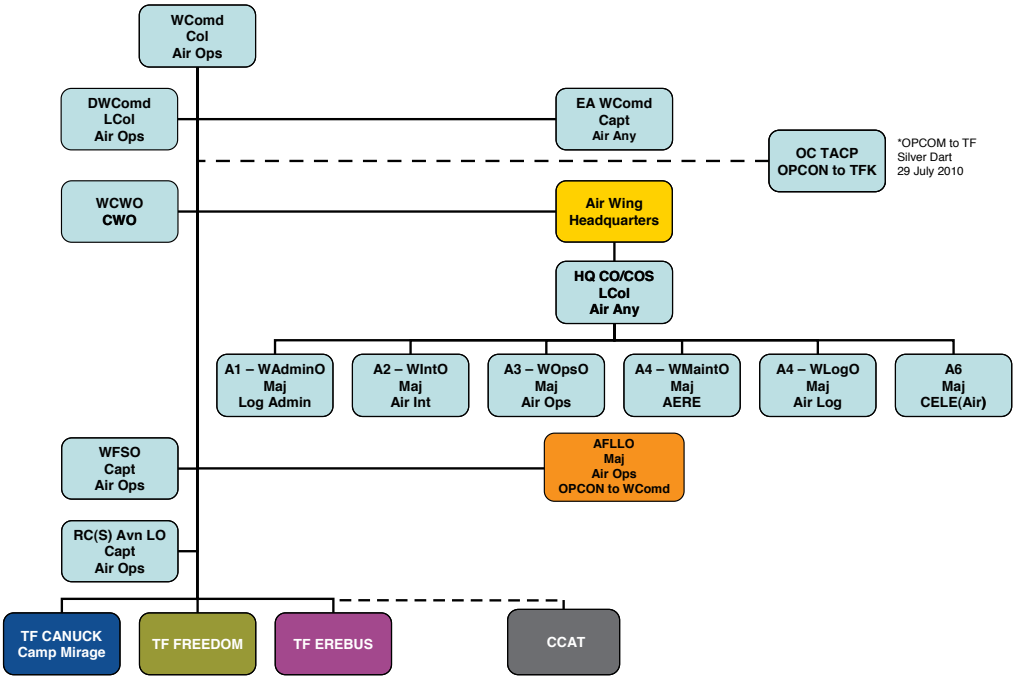


Figure 2-3. Air Wing Transformation: Task Force Silver Dart

The new Air Wing HQ structure had now been in effect for approximately seven months and the benefits had been outstanding. The Air Wing commander had his focus on the tactical flying units and employed the Air Wing HQ as his cornerstone for staff products and reporting assessments in order to support unit requirements, engage the JTF-Afg HQ, and accelerate the introduction of capabilities and more streamlined processes. With other aviation task force commanders, he has studied the COIN campaign closely and has provided necessary guidance so that higher intent is clearly understood.

The deputy wing commander provides the depth and continuity in leadership required by the Air Wing commander. Unit COs (including the HQ COS / CO), Deputy Commander JTF-Afg, JTF-Afg COS and J-Staff, and higher HQ staff (CEFCOM, 1 Cdn Air Div, 1 Wing) have a first point of contact so that operational and administrative issues can be resolved or further explored for Air Wing commander direction. The transformation has essentially enabled the Air Wing commander to clearly command his units while being in two places at once.

Transformation Enablers: Getting it Right for the Next Time

"The Air Force command and control systems need to be modular so that they connect seamlessly with all [other] organizations."[16]

During the seven months of RTHR training, the Air Wing HQ experienced some turnover in personnel due to individual qualification, capability, and/or competence deficiencies. As a result, some positions were either over-ranked or filled by another classification. There was also some consolidation of duties and tasks as well as the refinement of the TALLO position and reporting process. Another very important spiral from the transformation initiative was the addition of the tactical air control party (TACP) to the Air Wing establishment in July 2010, further described in the text box below. The Air Wing has proposed many changes to the establishment in order to achieve balance within the organization and to seamlessly fit within the larger joint HQ environment.

TACTICAL AIR CONTROL PARTY (TACP):

On 29 July 2010, the TACP was formally declared OPCOM to TF Silver Dart by Commander JTF-Afg. Doctrinally, a TACP is not an organic element of the Land Force Battle Group nor the Brigade HQ; it is an extension of Air Force support within the Army air-ground system. The Air Wing transformation recognized an inconsistency in doctrine and now commands TACP as a detachment. TACP remains OPCON to TFK HQ and is responsible to J3 Chief Fires as an integral part of the joint fires team. The Air Wing is now responsible for force generation issues, administrative support, and residual responsibilities on behalf of the TACP.

Projecting Power 2035 proposes that "[o]ne of the most important elements of agility, modularity, and balance is the alignment of battle rhythms."[17] Task Force Silver Dart has proven the importance of aligning constructs to achieve agility, modularity, and balance. Getting ranks and qualifications right when generating the Air Wing HQ will be key to evolving this concept. The Air Wing commander has made some recommendations to CEFCOM and the Air Force; the recommendations were well-received and future rotations should benefit significantly once the amendments are formalized.

Of note, recommendations included the proposal that the Air Wing COS position be ranked as lieutenant-colonel; this was accepted and back-dated to 24 February 2010. Given the seniority required to credibly execute this function, and the requirement to interact and sometimes influence within the joint, multi-national environment, the lieutenant-colonel rank is necessary. Ideally, the Air Wing COS position will be filled by an "Air Any" candidate so that the Air Wing commander and his HQ have the flexibility to shape personnel expertise in accordance with the forecasted priorities for a given rotation. An excellent example of this is the anticipated drawdown in 2011, the focus of which will be on movements and logistics. Typically, the Air Wing COS position will be filled by a lieutenant-colonel selected from

16. Godefroy, 59.
17. Ibid., 60.

Air Force support communities such as logistics, aerospace engineering (AerE), or airfield engineering (Af Engr).

Rank and qualifications are as important for the Air Wing HQ A-Staff. The current Air Wing HQ establishment identifies the A-Staff positions as a mix of captains and majors. While this is inconsistent within itself, it also presents hierarchical and reporting difficulties when the Air Wing units and JTF-Afg J-Staff are established with ranks higher than their counterparts within the Air Wing HQ. This presents unnecessary conflict and is doctrinally unsound; future Air Wing HQ organizations should not be affected by these inconsistencies as amendments to the Air Wing HQ establishment are underway.

The Commander TF Silver Dart has closely collaborated with the Commander JTF-Afg and has successfully established a one-team effort that has rapidly advanced many air and aviation capabilities. This collaborative culture has been refined over seven months of pre-deployment training and ten months in the Afghanistan theatre. The transformation of the Air Wing has been instrumental in synchronizing the two HQ in response to the evolving COIN campaign. The introduction of the Air Wing chief of staff position and the A-Staff continental system were the catalysts that have enabled an agile, modular, and balanced Air Wing organization. "Expeditionary capable air forces will be the foundation for military relevance in the year 2035."[18]

18. Ibid., 58.

CF Photo: MCpl Robert Bottrill

CF Photo: Cpl Bill Gomm

CHAPTER THREE

INTELLIGENCE SUPPORT TO OPERATIONS

"Overall, the threat level is condensed to one word—'MEDIUM—possibly rising to HIGH depending on operational effects'...."[1]

Introduction

During all air operations in Afghanistan, whether routine or deliberate, intelligence support largely takes place in the background. Within the JTF-Afg Air Wing, there is a section of air intelligence specialists that works 24 hours a day, 7 days a week; it is called the tactical air intelligence section, or TAIS. The TAIS coordinates with joint coalition intelligence sections to gather and collate relevant information, analyse possible and likely enemy actions, and present assessments to theatre commanders and operators. The analytical process can take anywhere from hours to weeks, and condensing the threat assessment to just one word may seem like an injustice to the effort expended. However, it sends a strong message: with just one word, commanders and operators have trust in air intelligence professionals and their collective ability to provide timely and accurate intelligence products that will assist in the mitigation of known and possible threats.

To say that intelligence influences all aspects of the modern conflict and military operations is an understatement. From the highest level down to tactical execution of the mission, all rely on the intelligence professional. Command elements require the intelligence professional to present a clear understanding of the threat situation during the operational planning process (OPP). Commanders must be cognizant of possible and likely threats, and have the decision-making powers to either mitigate or accept risks.

How We Do It

A pillar of success for the intelligence professional is to be predictive. When supporting deliberate operations such as Operation MOSHTARAK II (described in the text box below), intelligence personnel must have the tools and proficiency to analyse and sense the complete operational environment; they must have sufficient background knowledge in order to identify any intelligence gaps and actively seek to fill in those gaps. This process will complete the threat picture before commanders, planners, and operators are briefed. In order to confidently predict the probable or most dangerous threat, the intelligence professional must understand the past; this is predictive intelligence.

OPERATION MOSHTARAK II

(*Moshtarak* is Dari for "together"):

On 13 February 2010, approximately 6,000 coalition and Afghan National Army (ANA) troops launched a sustained assault on the areas of Marjah and Nad-e-Ali in Helmand province. Op MOSHTARAK II was a deliberate clear, hold, and build operation and was the largest joint US-NATO-Afghan operation in history; it was also the largest aviation insertion mission ever. A total of 1,200 coalition and ANA troops were inserted over a 12-hour period and TF FREEDOM played a significant role by transporting more than 300 British and ANA troops into landing zones in the vicinity of Marjah.

1. Josh Wingrove, "Inside Canada's flying start to the battle for Marjah," *The Globe and Mail*, February 13, 2010.

The air intelligence support to Operation MOSHTARAK II was extremely comprehensive; it demonstrated how predictive intelligence assessments can support deliberate air operations. From the start of the OPP cycle for Operation MOSHTARAK II, the air mission commander (AMC) and the TAIS worked in unison. Operation MOSHTARAK II was a division-level operation, led by Regional Command South (RC[S]), and the AMC had to communicate with many agencies: higher command, Canadian (TF Freedom), American (TF Pegasus) and British (TF Jaguar) aviation task forces, and the lifted unit—the Royal Welsh. From the outset, the TAIS designated one intelligence specialist to communicate and coordinate with the intelligence sections from all participating agencies. When TF Freedom sent the CO, the squadron operations officer, and the AMC to Helmand province to conduct coordination and liaison in preparation for the operation, the TAIS intelligence specialist was part of that delegation, as follows:

INTELLIGENCE SUPPORT TO OP MOSHTARAK II:

The TAIS intelligence specialist and an imagery analyst from TF EREBUS forward deployed to Camp Bastion in Helmand province with TF FREEDOM. As a result, Camp Bastion had a combined coalition forces intelligence section that included an ISR component. Within this collective intelligence component, the TAIS played a critical role in the successful execution of MOSHTARAK II. Not a single shot was fired on coalition forces' aircraft and the Royal Welsh were safely inserted on time and on target.

The TAIS continued with the intelligence planning for Operation MOSHTARAK II and forged strong links with coalition operations and intelligence partners. These links were critical during planning activities and reinforced the importance of fusing operations' interests to intelligence expertise during mission execution.

CF Photo: Sgt Craig Fiander

Figure 3-1. Marjah, Helmand province

Force Generating a Fusible Intelligence Capability

The Air Force model for expeditionary air operations[2] can be summarized in one statement: provide support to the war fighter at the right time and place. To accomplish this, the intelligence function must be both flexible and focused when supporting the war fighter. In the Air Force, the war fighters are often aircrew who execute the assigned missions.

In order to effectively support the war fighter, the air intelligence force generator, in conjunction with 1 Cdn Air Div A2 (A2 Collection Coordination and Intelligence Requirements Management), must accurately assess force strength, required skill sets, and it must anticipate potential capability gaps that may occur over the course of the operation. During RTHR pre-deployment training, the intelligence team must be identified early in the process and have access to the resources required to develop an effective capability. The intelligence section will require specific training in addition to the requirements established for the Air Wing HQ, as a cross-pollination of fixed- and rotary-wing expertise is essential. A critical eye must be kept on information technology (IT) requirements such as hardware, software, networks, connections and authorities required to operate the many tiers of intelligence information systems. The intelligence function is extremely demanding on IT and associated requirements; this often results in air intelligence training requirements being watered down or conducted in an ad hoc manner. Access to appropriate training venues and sufficient level II and level III facilities is essential.

2. 3030-1 (AFEC Rdns).

The Air Wing A2 must verify that subordinate air intelligence staffs have the tools and resources to support the mission, and this will take time. Shortcomings need to be addressed at the earliest stage and addressed through the chain of command. A pre-deployment checklist for the Air Wing A2 should include seats on the first chalk into theatre (i.e., advance party), basic equipment for up to level II intelligence equipment, and a portable sensitive compartmented information facility (SCIF).[3]

Recommendations for the Next Deployment

Special attention should be given to new deployable capabilities for the Air Force. The MX-15HDi (WESCAM) high-powered camera and full-motion video (FMV) downlink capability introduced for theatre employment during Roto 8's deployment was a great success. Mounted on the CH146 Griffon, this equipment proved to be a game changer in the COIN environment. The MX-15HDi is intended to enhance aircrew situational awareness (SA) that facilitates direct communications with battlespace commanders and joint terminal attack controllers (JTAC). Although it was highly successful when employed as intended, there has been no intelligence nexus envisioned for this capability.

MX-15HDi applications to intelligence remain untapped and should be explored for future employment doctrine. Possible uses of this capability in Canada would include an extra monitoring platform for border incursions or as an aid to civil powers, SAR, or police forces. In order to harvest the benefits of this technology, select TAIS personnel will require a motion imagery qualification similar to those working on the UAV crews.

During the Roto 8 deployment, an intelligence function that was not realized, and therefore not trained for, was the ability to assess damage to aircraft resulting from hostile activity. This investigative capability is recognized by our southern ally, the United States, and is called the Joint Combat Assessment Team or JCAT. The US Air Force, Navy, Army and Marines all contribute personnel and expertise to form this unique forensics specialty.

Whenever Canada has committed Air Force resources to a TO where hostile activity is present, all available intelligence capabilities must be brought to the fight. Several CF aircraft were hit by insurgent fire during Roto 8, including the loss of one CH147D Chinook. Roto 8 was able to form its own basic JCAT capability through liaison and training sessions with American task forces in Afghanistan. The TAIS was able to leverage excellent professional relationships with US Navy and Air Force personnel and introduced basic JCAT knowledge to the JTF-Afg Air Wing via an in-theatre training event in March 2009. This "just-in-time" training was highly successful as 38 Air Wing aircrew, ground crew, intelligence, and flight safety personnel received the basic-level JCAT training. JCAT training needs to be incorporated into Air Force doctrine with training events programmed to retain corporate expertise and to ramp up prior to future deployments. Flight safety and intelligence personnel are ideally suited for this specialty.

Over the course of Roto 8, the TF Silver Dart TAIS delivered well over 1,000 mission briefs and supported numerous deliberate operations during every month of the deployment. The intelligence section was well embedded within the Air Wing sub-units and built valuable relationships with other coalition aviation units and the divisional HQ, RC(S) HQ. Also, IT

3. For the Air Force, the portable SCIF is called Canadian air re-locatable military equipment node (CARMEN).

advances were made and proved to be outstanding resources and enablers; the accreditation of the level III SCIF is an excellent example of a future requirement when establishing the next TAIS.

The reputation of TAIS increased significantly through the deployment, and its published intelligence products were sought after by partner expeditionary wings and higher HQ. The successes of the Roto 8 TAIS are testament to the valuable fusion between operations and intelligence expertise, and specialized force generation solutions that include early identification of personnel, technological requirements, and the introduction of additional qualifications.

CF Photo: MCpl Matthew McGregor

CF Photo: Sgt Matthew McGregor

CHAPTER FOUR

TACTICAL AVIATION

Full Integration

The tac avn community takes pride in its ability to deploy and operate independently; it strives to be a key enabler for the troops in the field. Our experience in Afghanistan has improved our integration with the Army. We have fielded new capabilities that have increased our relevance to the land battle, and we have gained immeasurable experience. But Afghanistan has also demonstrated that tac avn is vastly more potent when we are supported by other capabilities. The principal "take-away" from our experience in Afghanistan is the call for further integration—both with those whom we support, and with those who support us.

Some of the specific capabilities and lessons from Afghanistan are only applicable to theatres where the use of force is expected. However, the notion of tac avn as an enabler, capable of independence but optimized when enabled by other capabilities, clearly has many operational possibilities. This is particularly the case for domestic operations in the more remote parts of Canada.

Air Assault Operations

Air assault operations in Afghanistan highlight the degree to which tac avn has been improved by external enablers. Two critical capabilities, which 1 Wing previously had little exposure to, have proven to be game changers: ISR FMV and black (infrared [IR]) illumination.

The FMV from ISR platforms is used during air assault planning to assess landing zone (LZ) suitability and to identify signs of enemy presence. During execution, it is employed to improve the commander's SA and to assist decision-makers with "go/no-go" decisions. Black illumination is a safety measure that is employed during periods of low ambient light to improve the effectiveness of night vision equipment. The IR flares are deployed from a variety of platforms, including aircraft such as the CC130 Hercules; mortars and artillery are also used. The IR flares illuminate the LZ as CH147 Chinook helicopters are on short final prior to landing. The IR BI capability is only useful to personnel in possession of night vision devices (NVDs), and provides tac avn crews with the ability to land more safely in areas with obscuring phenomenon such as dust or snow. A case study of an air assault operation is outlined below.

OP TUFAAN-FESCHAR:

OP TUFAAN-FESCHAR was a company-sized air assault conducted in support of Task Force Helmand (United Kingdom [UK] combined task force) in the central Helmand River valley. Part of a broader series of operations, OP TUFAAN-FESCHAR was seen as a shaping (the term "shaping" here refers to the Air Force function Shape) effort to set conditions for future success in the area as part of OP MOSHTARAK II. CHF(A), or TF FREEDOM, used two Chinooks for the lift. The Chinooks were escorted by four CH146 Griffon helicopters; the Griffons also provided overwatch of the LZ where they would be poised to engage any insurgents who posed a threat to the Chinooks. The unit was also supported by a British UAV and British IR mortars as the primary black illumination source.

TF FREEDOM lifted combined NATO and Afghan forces out of two forward operating bases (FOBs), inserted them in the vicinity of suspected insurgent compounds, and then conducted immediate resupply of food, water, and ammunition. Aviation was required to achieve the element of surprise, and to bypass known routes that were obstructed by improvised explosive devices (IEDs) between the FOBs and the objective. Without the enabling effects of ISR and black illumination, this mission would not have been feasible.

Op TUFAAN-FESCHAR makes for an interesting example because it was executed outside of TF Freedom's normal AO, which complicated the C2 of the mission.[1] Because the FMV feed was provided by a UK UAV platform, it was not available in the TF Freedom Ops Centre. Furthermore, communications were limited between KAF and the aircraft because only the Chinook has beyond-line-of-sight-radios. To mitigate risk, TF Freedom projected C2 elements forward: the CO was in one of the Griffons conducting "overwatch" with MX-15 sensors, and a liaison detachment (including the wing commander) was embedded with the UK battle group (BG) tactical operations centre (TOC) at one of the UK FOBs in Helmand province to observe FMV.

Op TUFAAN-FESCHAR and similar operations have driven home the following lessons:

- Enablers are not optional. In Afghanistan, without BI, it would not be possible during periods of low ambient light to safely land at austere LZs. For its part, FMV provides a critical margin of safety to commanders who must accomplish the mission within tolerable threat levels. These enablers do not just enhance aviation effectiveness; in many cases, they are the deciding factor as to whether the mission proceeds or not.
- Interoperability—it is easier when it is just us. While it is important to be able to operate with Allies, it is far more practical to integrate with other Canadian entities. When tasking authorities are streamlined, it is less likely that an enabler is made unavailable at the last minute, and national communications and IT systems are in place to facilitate effective C2.

Armed Overwatch / Battlefield Combat Intelligence, Surveillance and Reconnaissance

With the addition of the Dillon Aero M134 Minigun and the WESCAM MX-15 sensor, armed overwatch in support of troops on the ground has become a viable task for the Griffon. The M134, with its precise, high volume of fire, is an ideal anti-personnel weapon in a COIN mission such as Afghanistan where the enemy is dismounted and often in close proximity to civilians. The M134/MX-15 pairing allows us to positively identify from a stand-off position, and then manoeuvre to engage.

Armed overwatch tasks fall broadly into two types: deliberate, where Griffon crews plan the mission in advance with the supported ground forces and develop a common understanding of terrain, threat, and ground scheme of manoeuvre; and hasty, where crews respond to a developing situation (IED strike, troops in contact [TIC]), and are initially handicapped by limited SA. The communications challenges in these situations, particularly hasty overwatch, can be formidable:

- The Griffon crew needs to positively identify the location and disposition of friendly forces.
- The ground force must communicate to the aircrew where they assess the enemy to be located. The aircrew, travelling much faster and with a very different vantage point than the soldier on the ground, need to process this information and locate the enemy location being described to them.

1. When TF Freedom operated outside the TFK AO, we were typically under a C2 relationship with a host aviation TF who had the lead in planning and execution. In the case of TUFAAN-FESCHAR, TF Freedom was operating in someone else's AO, but we were the lead Aviation TF.

CF Photo: MCpl Robert Bottrill

- The crews (two pilots, a flight engineer, and a door gunner in each aircraft) must then ensure that they are all "on the same page" with a shared level of SA.
- Finally, the crew must then position themselves for the engagement, maximizing the effectiveness of the Griffon's door guns while taking full consideration of the potential for friendly or non-combatant collateral damage and the enemy's weapons systems.

TF Freedom regularly conducted armed overwatch missions. The majority have been of the hasty variety, either in support of TIC and IED strikes, or in situations where the Griffon itself is being engaged from an unknown location.

Equipment can play a mitigating role. The MX-15 can be fitted for a tactical common data link (TCDL), which can communicate the Griffon's FMV to a ground-based receive-only video enhanced receiver (ROVER) station, permitting a more seamless integration with the supported ground force. Additionally, the MX-15 provides an immediate increase to SA. When Griffon crews receive a request for TIC support, they can immediately input the friendly or enemy force's location on the moving map display in the cockpit, slew the MX-15 optics to that location, and start to build SA en route to the area. Prior to the implementation of the MX-15, this required a forward air controller-style "talk-on" to build the crew's SA. This can now be done in a matter of seconds by allowing the crew to immediately identify friendly or enemy positions, saving precious time for both aircrews and troops on the ground.

Integration has now been pushed to the next level with the added interaction of the Heron UAV that provides FMV to the TACP who then relays the information to the GWT. Once probability of identification (PID) is confirmed, then the GWT is authorized to proceed with the engagement. This process has recently been used successfully during deliberate operations. Use of the TCDL would also simplify and streamline the engagement process, as both TACP and the battlespace commander could see what the GWT sees, thus further advancing a true battlefield combat ISR capability.

Armed Overwatch Vignette

A section of two CH146B GWT, call sign "Shakedown 30" and "31," launch on a routine armed overwatch mission in support of a Canadian BG. Each aircraft is equipped with an MX-15 and two M134D Miniguns with ammunition. One aircraft is TCDL-equipped, and able to downlink its video to a ROVER station.

While observing an area where a patrol had been ambushed by insurgents earlier in the day, the call comes across the radio: "1, this is 13, contact, wait out." Call sign 1's JTAC has been monitoring the lead Griffon's MX-15 feed using his ROVER laptop back at the combat operations centre. Shortly, he and his company commander will be able to watch the entire contact unfold.

The section lead immediately asks for a grid reference: "13, this is Shakedown 30, send grid over." The ground unit responds: "Shakedowns, 13. My centre of mass located at QQ 12345 67890, radius 100 m [metres], along north-south wall." The aircrews can hear the crack of a rocket-propelled grenade (RPG) explosion and automatic weapons firing in the background of the radio call. Each MX-15 operator inputs the grid immediately into the MX-15 system, slews their sensors onto 13's location, and starts recording the video for later intelligence and operations analysis.

The troops can be seen in a line firing from behind a low mud wall a few kilometres (km) to the south of the Griffons' location. The troops are firing to the west, and the GWT can see the impact of the patrol's rounds near the tree line from where they are taking fire. The GWT, en route to the TIC, call the patrol: "13, Shakedowns are visual friendlies—mark enemy location with smoke—we'll be on station in 2 minutes."

On the way, the GWT conducts a quick scan of the tree line—no muzzle flashes are apparent. Just beyond the tree line, they can see that the field is empty, and there are no locals caught in the crossfire. Within seconds, the M203 smoke grenade lands just short of the tree line. The GWT calls: "Shakedown 30 Flight, contact red smoke." "Shakedowns, 13, I confirm red smoke—the enemy is 20 m southwest [SW] of smoke—request suppressive fire on that location."

The section lead briefs his crew as he talks to his wingman: "Reference tall tree at 12 o'clock for 2000m, tree line 200m west—red smoke." The crew responds on the intercom: "Contact red smoke," while 31 responds: "Contact red smoke," on the inter-plane frequency.

Shakedown 30: "Tree line 200m west."

Shakedown 31: "Contact tree line."

Shakedown 30: "That is your target."

Shakedown 31: "Tally target."

The same talk-on occurs in Shakedown 31's aircraft, to ensure that all crew members have shared SA. The section lead conducts a quick attack brief: "31, this is 30, single pass north to south, right gun, suppressive fire into the tree line SW of red smoke," Shakedown 31 responds: "31 tally target, roger, right gun."

The GWT rolls in overhead of the patrol's position to allow the troops to continue firing without endangering the aircraft. The Griffons fire a 20-second burst, putting thousands of rounds of 7.62mm (millimetre) fire into the tree line. The enemy is now being engaged from the ground and above. The GWT executes a sharp 180-degree turn to set up for a left gun attack. "Shakedowns 31, 30, immediate re-attack south to north, same target." Shakedown 30's left gunner calls "left gun tally target" to the crew. In the turn, the left gunner calls: "Two insurgents with weapons running SW toward that hut, 10 o'clock, 400m." The MX-15 operator slews the turret to the new location, spots the insurgents, and calls "cleared to engage" to his gunner. "31, fire at lead's splash" on inter-plane. Shakedown 31 calls "tally target," and with another 10-second burst, the firefight is over.

While the GWT continues to circle over the patrol's heads to scan for additional threats, the situation report (SITREP) goes out: "1, Shakedown 30 and 31 engaged 2 x insurgents west of call sign 13 at 1433Z, BDA [battle damage assessment] two insurgents killed. Continuing to support 13 until they are back at their FOB."

Call sign 19er, the company commander, acknowledges the SITREP and confirms the BDA. He watched it all unfold on his ROVER. "Good shooting Shakedowns. Thanks for the help. 19er out."

Two points require emphasis. First, the talk-on—the act of the pilot talking his crew's and his number two's eyes onto a target, or vice-versa—is one of the most challenging skills to develop, and it requires constant practice to ensure fast and accurate response. Second, "not getting it right" has potentially catastrophic implications, particularly in complex terrain such as in Afghanistan, in close proximity to friendly troops, where there are multiple compounds, winding narrow paths with high walls, highly contoured grape fields, and a large population of local nationals. This is why training and continued integration between ground troops and aircrew are critical.

Since the new capabilities fielded in Afghanistan, such as the Chinook, MX-15, M134D, and TCDL, are here to stay, we need to internalize the lessons we have learned, incorporate these skills into our crew training, and we must continue to emphasize the culture of air-land integration during collective training events with the Army.

BEYOND AFGHANISTAN / FUTURE CONFLICTS

Future conflicts that we will be involved in will likely bear some resemblance to Afghanistan. The missions will be similar: air assault, armed overwatch, and resupply. There will be a similar requirement for enablers such as ISR FMV, BI, battlefield combat ISR, and a robust command and control information system (C2IS). There will always be a requirement to project tac avn forward away from MOBs, which will present sustainment challenges. To prepare for the next conflict, the CF must continue to advance the practices and capabilities that we have fielded in Afghanistan.

Domestic Operations

It is not difficult to imagine the applicability of tac avn's Afghanistan experience to domestic operations; the MX-15 and TCDL systems are capable of providing immeasurable command SA during heightened security events such as G8/20 summits and Olympic events. Sovereignty operations in Canada's North may require airmobile missions that will require similar planning considerations, ISR support to cue the movement of troops, and protection for the aviation assets moving them. There is also the potential requirement for illumination support for night landings in snow conditions, which occur for more than half the year in the high north. Communications between aircraft and their operating base may be as difficult, if not more so, than they are in Afghanistan.

The sustainment challenges are likely to be much greater due to the lack of civilian infrastructure in the Arctic. Tac avn, while capable of independent operations, will continue to be heavily reliant on other enablers to ensure successful mission accomplishment.

Command and Control

Tactical aviation must be 100 per cent interoperable and integrated with the land force. This causes a structure that apparently can be at odds with traditional Air Force wing HQs. For example, during Op ATHENA, TF Freedom's operational capacity is declared to the divisional level joint HQ, RC(S), for operational taskings. However, the unit is under command of the JTF-Afg Air Wing HQ, and ultimately under command of TFK, which also—understandably—exerts considerable influence on TF Freedom's operations. This can result in conflicting priorities, as missions tasked by RC(S) may not be in keeping with national priorities. This results in a difficult separation of priorities—whose priority comes first: the division-level (non-national) HQ, or the brigade-level (national) HQ?

The Air Wing HQ must be well equipped to support and coordinate these priorities in the execution of both the commander's intent, and high-priority national tasks. This relationship between the unit level, the Air Wing HQ, and other higher HQ has taught us the value of establishing a single chain of command. Future deployments, be they foreign or domestic, should strive to ensure a streamlined C2 structure that enables the rapid tasking and integration of mission elements. It is critical that the request-task-execute chain be as short as possible, with as few intermediary steps as possible.

THE BALANCED HELICOPTER FORCE

Full Range of Mission Capability

In 1990, under looming budgetary constraints, the decision was made by the CF to replace the three aging fleets of tactical aviation helicopters (the CH136 Kiowa, CH135 Twin Huey, and CH147 Chinook) with one utility helicopter fleet (the CH146 Griffon). It was only years later that the impact of this decision was fully understood. What was realized was that the CF had lost balance in its tactical aviation capability. This term "balance" has become commonly used to describe the ability to exploit the full range of mission capabilities of helicopters.

In their article titled "What does a Balanced Tactical Helicopter Force Look Like?,"[2] Dr. Thierry Gongora and Slawomir Wesolkowski outline the importance of maintaining a balance. They explain what balance means and describe international examples of balanced helicopter fleets. Canada stands out as the country with the least amount of balance in its helicopter fleet. The various roles of helicopters would include armed action, reconnaissance, observation, direction of fire, airborne C2, movement of troops/material, air assault, and electronic warfare.[3] A further breakdown of tactical aviation missions would include reconnaissance and surveillance, direction and control of fires, anti-armour and attack operations, air assault, tactical transport, logistic transport, special operations (including combat SAR), command and liaison support, and casualty / aero medical evacuation.[4]

For a period of time in 2006 and 2007, during the force development of the Standing Contingency Task Force (SCTF), there was some discussion on the formation of a CF combat helicopter force based primarily on the merger between the tactical aviation force and the maritime helicopter force. The aim had been to achieve better levels of CF-wide helicopter balance by having these two organizations work together to provide an expanded overland capability. Naturally, there was some resistance from the Navy, and with the termination of force development for the SCTF, came the termination of active consideration for a combined combat helicopter force.

CF Photo: MCpl Robert Bottrill

2. Thierry Gongora and Slawomir Wesolkowski, "What Does a Balanced Tactical Helicopter Force Look Like?," *Canadian Air Force Journal* 1, no. 2 (Summer 2008): 13, http://trenton.mil.ca/lodger/CFAWC/eLibrary/Journal/Archive_e.asp?Vol=Vol1-2008&Issue=Iss2-Summer (accessed July 7, 2011).

3. NATO, ATP 49 (E) *Use of Helicopters in Land Operations* (October, 2008).

4. Canada, DND, B-GA-440-000/AF-000, *Tactical Helicopter Operations* (Ottawa: Chief of the Defence Staff, 9 November 1998), (hereafter cited as B-GA-440), http://trenton.mil.ca/lodger/CFAWC/CDD/Doctrine/Pubs/Tactical/440_Series/B-GA-440-000-AF-000.pdf (accessed July 7, 2011).

Maintained Balance

How have contributing nations maintained balance within the International Security Force Afghanistan (ISAF)? This section will limit its scope to nations that operated in RC(S) from November 2009 to June 2010. Within the ISAF mission, virtually all of the missions detailed in Canadian doctrine are executed by coalition aviation enablers. The only exception is the direction and control of fires, which is primarily done from the ground.

The contributing nations' helicopter balance:

- ***The United States:*** deploying with a wide variety of aircraft types, the United States is undoubtedly the most balanced nation in ISAF. Heavy-lift aircraft include the V22 Osprey, CH-53 Super Stallion, and CH-47 Chinook. Both the utility and medical evacuation (MEDEVAC) configurations of the UH-60 Blackhawk fleet fill the medium-lift capability; the HH-60 Pave Hawk provides combat SAR. The OH-58D Kiowa Warrior provides armed scout and escort support, while the AH-1W Cobra and AH-64 Apache provide an attack helicopter capability.
- ***United Kingdom:*** The CH-47 Chinook is employed as the British heavy-lift helicopter. Two specially equipped variants are used for advanced care MEDEVAC duties. The HC-4 Sea King and HC-3 Merlin provide a medium-lift capability, while the AH-7 Lynx provides light-lift, armed scout, and escort support. The AH-64 Apache is employed in the attack helicopter role.
- ***The Netherlands:*** The CH-47 provides the Dutch with heavy-lift support during the summer months. These are replaced by AS 532 Cougar Mark (Mk) II U2 helicopters during the winter; and they then provide a medium-lift capability. The AH-64 Apache provides the Dutch with an attack helicopter capability.
- ***Canada:*** With the 2008 procurement of six CH147D Chinooks for the Afghanistan mission, the CF took one step towards regaining balance. The Chinook is one of the few platforms which retains the heavy-lift rating during winter and summer months. The retrofitting of eight CH146 Griffon helicopters with M134 Dillon Miniguns and MX15 electro-optical infrared sensors has provided a light-lift, armed scout, and escort capability for Canada's contribution. Given its accuracy, flexible arcs of fire, small calibre, and extremely high rate of fire, the M134 is considered one of the best COIN weapon systems in the ISAF arsenal.

Because of extreme summertime temperatures in the Afghanistan TO, aircraft performance is degraded. As a result, many aircraft that are normally classified as heavy, medium or light lift drop down into the next lower category in the summer.

How is this Working?

For the most part, each regional command HQ (East, West, North, Capital and South) manages an international pool of coalition helicopters. Each nation declares its aviation contribution to a regional command HQ for employment; this is an excellent example of centralized control. Undoubtedly, national interests can impact the tasking of various resources, and high priority national missions can create conflict when apportioning resources. Conflicts are resolved by planning and liaison staff on a daily basis. The centralized control of aviation resources functions quite well; the strength of each helicopter type is tailored to the mission.

Within RC(S), many of the armed scout and attack helicopter assets are dedicated to route patrol, and these missions are called freedom of movement (FOM) tasks. The tasks assigned to lift helicopters fall primarily into two categories: deliberate operations (normally air assault ops) and sustainment ops. Sustainment ops are those that provide logistic and personnel transport between MOBs and FOBs. Given the risks associated with the proliferation of IEDs on most roads within the AO, travel by air is utilized whenever possible. A scheduled sustainment system, called ring routes, allows deployed troops to book air travel via a priority-based bidding system. With demand for aviation support always outweighing supply, this system enables maximum usage of available helicopters. Assignment of appropriate-sized helicopters and numbers of helicopters is critical to maximizing efficiency; a heavy-lift helicopter employed for a medium-lift passenger mission means that cargo is not being delivered somewhere.

Having a mix of light-, medium- and heavy-lift helicopters allows for great flexibility in matching requirement with availability. Aviation allocation is planned six to eight weeks in advance, and ground task forces must anticipate their requirements, especially for deliberate operations. Sustainment requirements are planned with three to four days of lead time, and even greater flexibility is required for these operations. With the exception of relief in place operations of major units where heavy-lift helicopters are a requirement, the medium-lift helicopter is in high demand. Within RC(S) there simply are not enough medium-lift helicopters. Much of the support to sustainment ops is tasked to heavy-lift helicopters because these are available in greater numbers. These helicopters are often tasked to transport small groups of personnel (sometimes as few as two or three) from one FOB to another. If medium-lift helicopters were available, they could be used to much greater efficiency, as the British have shown with their Sea Kings and Merlins.

Future Operations

Every mission is unique. The majority will require helicopter support to include most if not all of the tasks detailed.[5] Regardless of whether future missions are international or domestic, a balanced helicopter force will be needed to fully meet the requirements. Sovereignty ops, including response to natural and man-made disasters (forest fires, floods, oil spills), are domestic "no fail" missions for the CF. Given the scope in time and geography of these missions, a balanced helicopter force would be key in successful mission execution.

Preparedness

Helicopter support to TFK has undoubtedly facilitated operations but more importantly has saved countless lives. Keeping our field forces sustained as well as keeping our troops off the roads, when and where possible, has been a key element of mission success in Afghanistan. Helicopters are a key enabler in operations, and the maintenance of a combat-ready, balanced force is fundamental to operational preparedness.

5. B-GA-440.

CF Photo: Cpl Jax Kennedy

CHAPTER FIVE

AIR MOBILITY

"Left Seat - Nav. Latest weather at the crash site is estimated at vertical visibility 30m in blowing snow. Crash site temperature is -25 degrees Celsius. Wind is estimated 270 degrees at 25 knots. Given the mountainous terrain all around, low visibility, and strong winds, a personnel drop is impossible. The SAR Techs cannot jump. Also, survivors are located at two sites 500m apart...."

Precision Guided Air Delivery System (PGADS)

Just a few years ago, a report like the one above would have meant that crash survivors would have had to wait for the weather to clear before receiving much-needed survival supplies. In Canada's High Arctic, such a delay would likely mean that some survivors would perish prior to search and rescue technicians (SAR Techs) being able to jump in to the sites. Today's air mobility force (AMF) crews have the necessary equipment and training to prevail in exactly this type of scenario. The new air-drop technology is called , or PGADS. Canadian tactical air transport (TAT) crews can now air drop loads with global positioning system (GPS)-equipped steerable parachutes capable of guiding the load to within a few tens of metres of its intended point of impact. In this scenario, although the SAR Techs cannot jump, PGADS-rigged loads could be configured to be dropped to each group of survivors separated by terrain and weather.

The concept of PGADS is really quite simple. And yet, its simplicity affords AMF crews a multitude of options—crews can drop loads accurately from very high above a potential drop zone (DZ)—for example, in mountainous terrain. They can also drop loads accurately to multiple DZs from the same pass. Finally, they can drop loads from a significant stand-off distance to one or multiple DZs (see photo below).

CF Photo: Maj Gilles Bourgoin

The implications of such a capability are immense. Whether supporting SAR efforts in Canada or elsewhere, or providing much-needed supplies to troops in the field, PGADS gives commanders incredible flexibility. It enables Canada to move much-needed materiel and supplies in order to sustain our troops or to save our citizens. Whether dropping supplies to individuals separated on the ground due to terrain, weather, and/or hostile forces, PGADS enables AMF crews to deliver the items needed—when they are needed.

In the past, high winds, mountainous terrain, or the close proximity of hostile forces could conspire to render AMF crews unable to safely or reliably drop loads. Further, the DZ required when using older ("dumb") parachutes was quite large. In SAR or tactical scenarios, such large DZs are often unavailable. With the incredible accuracy of PGADS drops, Canada's Air Force will be able to sustain troops in the field much more efficiently and effectively. Missions cancelled for weather, terrain, or enemy threat will be all but a thing of the past. And domestically, PGADS loads dropped in support of SAR missions like the example above are guaranteed to save the lives of Canadians—lives that would have been undoubtedly lost in the past.

The PGADS has its cons, however. It is expensive, and the steering equipment used to manoeuvre the parachute should ideally be recovered after each mission so that it can be used again. Sometimes this is just not possible, and commanders are forced to decide whether or not to recover the equipment. In some cases, the requirement for a precision insertion of equipment will outweigh the cost of the equipment. However, there will be other scenarios where the requirement for surgical precision will not be as stringent. There will likely be scenarios wherein troops (or survivors, refugees, etc.) will be in the vicinity of a relatively large area suitable as a conventional DZ. In situations like these, Canada's Air Force will be able to use improved container delivery system (ICDS) drops.

CF Photo: Sgt Roxanne Clowe

Improved Container Delivery System

With ICDS, the load is a "dumb" load; it does not steer itself to the DZ. However, improved wind measurement capability prior to the drop enables the AMF crew to accurately drop loads from much higher above the DZ. Thus, it will be particularly useful in tactical scenarios where the crew would normally be exposed to the threat of small-arms fire (SAF [see text box below for a case study]). Like PGADS, ICDS drops enable AMF crews to match the accuracy of drops currently flown from only a few hundred feet (ft) above ground. The ICDS drops, however, will be flown several thousand feet up, possibly above weather, terrain, and some threats as well. Unlike PGADS, ICDS have no equipment to be salvaged after the drop. This makes them very attractive for employment in the tactical environment.

A CDS MISSION IS TURNED DOWN BY THE AIR WING:

In April 2010, the JTF-Afg Air Wing was requested to conduct a CDS mission to air drop supplies into an isolated location in Badghis province. Throughout the month of March, there had been a total of 15 reported events where insurgents had engaged coalition aircraft with small-arms fire in the vicinity of this location. Six of these events were directed at CC130 and CC177 aircraft conducting CDS air drop missions.

The mission was not authorized during the mission acceptance process due to the nature of the threat. With ICDS, the Air Wing would have been able to mitigate the threat and therefore would have accepted the mission.

Prior to the inception of ICDS, Canada was forced to turn down requests for air drops in-theatre due to the threat on the ground. Given that most conventional CDS drops require loads to be released from only a few hundred feet above ground, any requests for CDS support to DZs where the threat of significant SAF is likely must be very carefully considered. With PGADS or ICDS capabilities, Canadian aircrews will be able to confidently drop supplies with a high degree of precision from well above the small-arms threat envelope. This will enable us to provide more consistent support to our soldiers and coalition partners in the operational environment.

Sustaining our troops in the field or our citizens at home requires the very best equipment available. Whether dropping a load accurately to a small opening in the jungle canopy in Africa, to a platoon pinned down in Afghanistan, or to a group of survivors stranded on a mountainside, PGADS and ICDS will enable Canadian AMF crews to get the load to the user quickly, efficiently, and accurately. Sometimes, though, air drops will not be possible. TAT crews will be required to support helicopter operations to facilitate delivery of slung loads or personnel. In these types of scenarios, AMF personnel will also be well equipped for success.

Black Illumination

Building upon the successful in-theatre testing of a new Air Force capability known as black illumination (BI), Canada's Air Force of the future will be far more self-sufficient in terms of its ability to move and sustain troops on the ground. Black illumination involves the dropping of flares from a CC130 or other transport aircraft in order to light up the ground below for

either helicopter crews or ground forces. Although Canada's Air Force has had the capability to provide overt, visible flare illumination for SAR crews for many years, the tactical version of this illumination flare possesses one major difference from its SAR cousin—the light it emits is infrared and can only be seen with NVDs. In Afghanistan, this capability has been tested and employed by Canada's Air Force; it has been successfully used in support of covert insertions of Canadian and coalition troops under cover of darkness. As Canadian helicopter crews approached their insertion point, BI flares were dropped from a Canadian CC130 orbiting high overhead. As the flares descended on parachutes, they were able to light up the helicopter LZ sufficiently so that the helicopter crews could make a safe approach, landing, and egress after inserting their passengers.

Although BI obviously has many tactical uses, it can also be used domestically. For large events such as the Olympics or G20-type conferences, BI will prove very beneficial for Air Force crews tasked with maintaining security. Also, BI could prove to be a vital asset from a larger, WoG perspective as it could be employed in counter-narcotics ops, fisheries patrols, sovereignty ops, and counter-terrorism scenarios. There are many situations wherein the ability to provide covert illumination of an area of interest would be of great advantage to the CF.

Notwithstanding the wide range of applications in which BI could be used both in military ops and domestic scenarios, Canada has yet to decide to formally purchase the flares necessary to sustain this capability. Our current supply of trial flares will run out eventually, and we will have to borrow from other nations in order to maintain the capability in Afghanistan. Given the flexibility to sustain troops in the field in a covert fashion or to move supplies to soldiers, refugees, and the like when needed, the BI capability could play a vital role in expanding Canada's Air Force's ability to respond to future crises. It is hoped that sufficient resources will be allocated to the BI initiative in order to ensure that Canada does not lose this exciting capability in the future.

Intelligence, Surveillance and Reconnaissance, and Electronic Intelligence (ELINT)

Like the ability to provide covert illumination for ground forces, Canada's AMF crews of the future will also be able to sense threats to Canadian soldiers or citizens. Building upon existing technology and capabilities, aircrews will be able to utilize AMF aircraft (e.g., the CC130 Hercules or CC177 Globemaster) to provide commanders with airborne platforms designed to gather signals and ELINT. Indeed, once these capabilities are fully exploited, the net-ready nature of aircraft like the Globemaster can be utilized to assist commanders both at home and abroad with maintaining SA of the battlespace. When such platforms are utilized as part of an ISR package with existing Canadian aircraft like the CP140 Aurora and the CU170 Heron UAV, Canadian Air Force personnel will truly realize their full potential as part of a cohesive ISR team. Whether supporting Canadian citizens in distress, Canadian soldiers in combat, or refugees surrounded by hostile adversaries, Canada's AMF possesses many exciting operational capabilities and continues to develop others.

The ability to move supplies and conduct air drops to troops or persons in need with pinpoint accuracy from a relatively safe altitude means that we will be able to sustain more troops in the future. Further, our ability to provide covert illumination for ground and rotary-wing forces will ensure that Canadian citizens and soldiers are safer in the future. Lastly, our improved ability in sensing the operational world around us, gathering pertinent information from the

battlespace, and passing it through net-enabled platforms to commanders in near real time will ensure that Canada's Air Force is much more self-reliant and poised for success in the future.

A Bright Future

Canada's Air Force of today has matured greatly over the past few years, and the Air Force of tomorrow will build upon that maturity. As such, Canadians can expect their Air Force to continue to display the superior levels of skills, professionalism, and teamwork which have garnered such an impressive reputation to date. The future for our Air Force is very bright, indeed.

CF Photo: Cpl Evan Kuelz

CF Photo: Cpl Pierre Habib

CHAPTER SIX

Authors contributing to *Laminar Strike* were asked to incorporate observations and lessons learned into a story. Creativity was encouraged and the primary resource was to be the writer's experience and background. Authors were told that this was an opportunity to let out their "inner Tom Clancy." The following piece is fictional but is also within the factual grasp of the Canadian Air Force.

THE CALL TO DUTY: INTRODUCING THE CANADIAN CF18 TO THE AFGHANISTAN CAMPAIGN

Lieutenant-Colonel (LCol) Pierre Létourneau was Commanding Officer of 425 Tactical Fighter Squadron (TFS) based in Bagotville, Québec. It was a sunny October afternoon; 2008 was being generous with an Indian summer. Létourneau was enjoying a much needed day off with his family in the Saguenay area. In the middle of a badminton game with his children, Létourneau received a call from the Bagotville COC; he had to report for an important message from division HQ in Winnipeg. Bursting into the COC within 20 minutes, Létourneau grabbed the secret phone to speak to General Souci. What he heard made him proud. Létourneau boasts over 25 years in the fighter community, and the men and women under his command trust him completely; they place their lives in his hands, and their trust is not misplaced.

LCol Létourneau's latest mission was to select the best aviators and ground crews from his squadron and to deploy them to Afghanistan with an "eight pack" of CF18 fighters. Operations began on January 1, 2009.

The squadron spent 90 days preparing 180 personnel and eight fighter aircraft for the mission. For many, this would be the first deployment. Fortunately, most members of 425 TFS had been training for the Afghan scenario for over a year and were familiar with the mission. For the Canadian fighter pilot, airspace in Afghanistan represents a completely new challenge, especially when compared to North American airspace. Afghanistan shares its borders with several countries that would not appreciate a North American fighter jet trespassing in their airspace. Since Afghanistan is only 600 miles (966 km) wide by 400 miles (644 km) long—48 by 32 minutes transonic speed—and he will be based at Kandahar Air Field, which is almost in the middle, the fighter pilot has to be constantly aware of the potential threat of violating airspace. In flying time, 425 TFS pilots can reach Iranian airspace to the west within 25 minutes; Turkmenistan, Uzbekistan, Tajkistan and Chinese airspace within 30 minutes; and Pakistan airspace, to the east and south, in less than 10 minutes.

As 425 TFS was about to be deployed, an intelligence update on the strategic situation caught Létourneau's attention. For more than two decades, China has laboured to build its first, state-of-the-art jet fighter as part of its drive to be a superpower. Its new jet fighter, the J-10, had just entered service in the air force, and it is said that the Chinese engineers, with help from Israel and Russia, had refined a design aimed at matching performance characteristics of advanced fighter craft such as the Lockheed Martin F-16.

An Emerging Threat

In the aftermath of a successful anti-satellite missile test, Beijing has attempted to allay fears that its military build-up poses a threat to China's neighbours and other major powers.[5] New weapons such as the J-10 contribute to a growing unease about China's long-term ambitions. The threat from China's mounting air power[6] is most keenly felt by its neighbouring countries, one of which is Afghanistan. The Pakistan Air Force assisted China[7] in developing the J-10A by providing access to its American-built F-16 fighter aircraft. As a result, Pakistan's Air Force has first rights to procure the J-10A, and this has left Afghan leadership very uncomfortable. To the west of Afghanistan, the Iranian Air Force[8] has successfully tested two fighter planes from the *Azarakhsh* (Thunder) fighter generation, and boasts eight squadrons with fighter and fighter-bomber capabilities.

In a conference room at the KAF, all available pilots, except the two that are flying, are participating in a mission review and theatre training session. The CF18 is a state-of-the-art airplane that is capable of supersonic, all-weather and multi-role missions—crews must have brilliant SA. The fighter's roles include fighter escort, fleet air defence, suppression of enemy air defences (SEAD), air interdiction, close air support (CAS), and aerial reconnaissance.

CF Photo: Cpl Mathieu St-Amour

5. David Lague, "China builds a superpower fighter," *Asia-Pacific International Herald Tribune*, 8 February 2007, http://www.nytimes.com/2007/02/08/world/asia/08iht-fighter.4520265.html (accessed July 7, 2011).

6. Andrei Chang, "China Set to Sell Fighter Jets to Iran," *UPI Asia.com*, 14 December 2007, http://www.upiasia.com/Security/2007/12/14/china_set_to_sell_fighter_jets_to_iran/6264/ (accessed July 7, 2011).

7. Moin Ansari, "China looks to Pakistan for access to Afghanistan," *Siyasat Aur Pakistan*, 11 July 2010, https://siyasipakistan.wordpress.com/category/pak-china-relations/ (accessed July 7, 2011).

8. Simon Tisdall "Iran Could Spring a Nasty Surprise," G*uardian*, 14 July 2010, http://www.guardian.co.uk/commentisfree/2010/jul/14/iran-israel-us-nuclear (accessed July 7, 2011).

The need for a solid training program is extremely important in order to maintain optimum crew proficiency. There is no room for hesitation in the cockpit of a CF18. The Afghan air environment could become hostile if the neighbouring strategic situation deteriorated or if a pilot unknowingly flew outside of protected airspace. Major Benoit Cloutier, the 425 TFS standards and training officer, was in charge of the training session and had the pilots review the armament requirements for their upcoming operations.

CF18 Armament

The CF18 armament consists of:

- **guns:** 1× 20 millimetre (mm) (0.787 inch [in]) M61 Vulcan nose mounted Gatling gun, 578 rounds;
- **hardpoints (9 in total):** 2× wingtip missile launch rails;
  4× under-wing;
  3× under-fuselage;
  total capacity of 13,700 pounds (lb) (6,215 kg) external fuel and ordnance;
- **missiles:** air-to-air missiles: 4× air intercept missiles (AIM)-9 Sidewinder or 4× AIM-120 advanced medium-range air-to-air missile (AMRAAM), and 2× AIM-7 Sparrow or additional 2× AIM-120 AMRAAM;
  air-to-surface missiles: air-to-ground missile (AGM)-65 Maverick;
- **bombs:** joint direct attack munition (JDAM) / precision-guided munition (PGM);
  Paveway series laser-guided bombs;
  Mk 80 series of unguided iron bombs;
  SUU-42A/A flares / infrared decoys dispenser pod and chaff pod.

Since armament and avionics were intimately related, Major Cloutier decided to conduct a complete review of this critical sense and shoot information.

Sensors

Most sensor data and weapons information come through a recently added piece of equipment that has enhanced the modernization of the CF18: the joint helmet mounted cueing system (JHMCS). Visual targeting and aircraft performance information are projected on the back of the helmet's visor. That information includes aircraft altitude, airspeed, gravitational pull, angle of attack, and weapons sighting data. The JHMCS enables pilots to monitor all parameters without disturbing their field of view through the cockpit canopy. The system uses a magnetic transmitter unit fixed to the pilot's seat and a magnetic field probe mounted on the helmet to define helmet point positioning. A helmet vehicle interface (HVI) interacts with the aircraft system bus to provide signal generation for the helmet display. This offers significant improvements to close combat targeting and engagement. The JHMCS is employed for the first time by a Canadian fighter pilot in this theatre scenario. One way to improve one's odds in the fast air environment is to fly an aircraft with excellent pitch and slew capabilities; this allows the pilot to point at enemy aircraft and quickly fire a shot without having to engage in a lengthy close-quarter dogfight.

All the CF18 missions are accomplished with flawless results thanks to the sophistication of the many sensors. The CF18 is a flying sensor that is well orchestrated by the pilot. The recently acquired APG-73 radar is one such example. The APG-73, as compared to the previous APG-65, has a higher processor throughput; greater memory capacity, bandwidth, frequency agility; higher analogue and digital sampling rates; and much improved reliability. The APG-73 can help the pilot sense the area, generate high resolution ground maps, and make use of advanced image correlation algorithms to enhance weapon designation accuracy.

Another piece of kit that has enhanced SA for the fighter pilot is the AN/ALR-67 radar warning receiver. The channelized receiver architecture allows successful detection of emitters in high pulse density, as well as interception of faint distant signals despite interference from strong nearby transmitters. The digital measurement path of the receiver uses leading edge digital technology for improved reliability and improved performance through precision digital parameter measurements. This is a key enabler due to its advanced functionality; the AN/ALR-67 will expand mission success during major combat operations over Afghanistan.

The "language" of the CF18 is transmitted via Link 16 (tactical data link [TDL]), which provides real-time, jam-resistant, secure transfer of combat data, voice, and relative navigation information between widely dispersed battle elements. The pilot, the operations centre, and the ground troops gain SA by exchanging digital data over a common communication link that is continuously and automatically updated in real time. The Link 16 reduces the risk of fratricide, duplicate assignments, and missed targets. Each participant in the communication link is able to electronically sense the battlespace, and Létourneau knows that if pilots must fly in a TO that is surrounded by multiple air forces, SA is key. The modernized CF18 now provides all the information that a fighter pilot needs; once over the target area, the pilot employs the sensors to locate his target and request to engage hostiles. With the Link 16 TDL, target engagement is done with engagement authorities watching a live video feed. Rules of engagement, positive identification, and BDA have become a team effort.

The Ground Fight

Some distance away from KAF, a unit from the Valcartier 22nd Regiment is about to request for air support. The Vandoos were nearly surrounded; and the platoon sergeant (sgt) and his troops were crouched behind the crumbling mud walls of a small Afghan compound. They were taking fire from three directions and the sergeant had not even had his morning coffee yet! Hiding in the tree line to the south, guerrillas were peppering freely with automatic weapons fire. From a grape field to the west came more AK-47 bursts. Most worrisome though, were the rounds coming in from a squat building in a clay compound a few hundred yards to the southeast. They were sniper shots from a bolt-action rifle. Unlike the AK barrage, they were getting closer with each shot. Sgt Patrick "Pug" Tremblay commanded his soldiers to return fire. His urgent, gravelly voice does not quite match his boyish face, long eyelashes, and turned-up nose. Pug, the son of a retired artilleryman, was raised in Québec City; he grew up to be skilled hockey player and a proud Habs fan—if only the Nordiques were still in Québec. Pug has already completed two tours in Afghanistan and has participated in several peacekeeping missions. He is a seasoned soldier. His unit has been trading fire with Taliban insurgents on three out of every four days—Kandahar province is no picnic!

A round whizzes past Pug's left ear; then another to the right. He waves over to a Vandoo carrying a backpack-sized radio and grabs the green handset. "We're receiving accurate fire from the compound!" he shouts over the rattle of machine gun bursts and quickly reads out the grid coordinates. This was supposed to be a simple mission. "Where's my coffee!" thinks Pug. Pug and his platoon have been told to hunker down by a collection of broken-down adobe buildings adjacent to a dusty, tree-shaded courtyard called Moba Khan. For a day and a half, they had surveyed the area to monitor activity or "pattern of life." A small reconnaissance team had the tough job of ambushing a group of Taliban who, according to human intelligence (HUMINT), would be meeting in the compound up the road. But the attack did not go so smoothly. There were more insurgents and guns than anticipated. A firefight quickly followed and two young Vandoo riflemen were shot; four more were injured by an IED. The team successfully made it back to the nearby company HQ and were getting supplies and medical attention. Pug and his troops had been battling the dug-in insurgents since.

LCol Sylvain Ducharme, commander of helicopter Task Force Faucon in Kandahar, is well aware of the lack of stand-off capabilities with the Griffon's incredible Dillon Gatling gun. The Dillon provides awesome fire power, but requires a relatively close engagement distance. Having a longer effective weapon than the opponent has is essential in carrying out a successful aerial attack. Ducharme learned well before stepping up for the Afghanistan mission that the Griffon alone cannot achieve air parity. Air parity is the lowest level of control, meaning control of the skies only above friendly troop positions. With the CF18, air superiority is achieved at a strategic level and slow movers can fly safely in a well protected airspace. Air superiority will even keep neighbouring countries like Iran, Pakistan, and China away from Afghanistan airspace.

Pakistan had recently been talking to the Taliban with an agenda to see President Karzai succeed with his agreement with the Taliban. Pakistan would like to have a government that incorporates the Taliban in Afghanistan because Islamabad believes such a regime would be sympathetic to Pakistani interests. It is reported that Karzai is under considerable pressure from Pakistan to fold, and that the Chinese are probably curious to know how things will play out. Michael Swaine, a senior associate at the Carnegie Endowment for International Peace in Washington, says that China looks at the Afghanistan situation through its relationship with Pakistan. Despite perceived progress, new weapons such as the J-10 are likely to contribute to growing unease, especially regarding China's long-term ambitions. The threat from China's mounting air power is most keenly felt in Afghanistan. Military experts say that the deployment of the J-10 in big numbers will further erode stability in that part of the world.

Ducharme, a 26-year veteran, is a history graduate from Laval University and has a Master's Degree in Military Strategy; he also knows about simple survival and aviation tactics. He will protect his helicopter crews and will keep their missions within the limits of their capabilities. The Dillon Gatling gun provides a self-defence capability for the CH146 Griffon and is worth its weight in gold when escorting the CH147 Chinook heavy-lift workhorse. Ducharme has made himself clear to his pilots during many tactical briefings that if engaged, they will execute evasive manoeuvres while suppressing insurgent fire—the Chinook is the prize and will be protected. Once the aircraft have cleared the vicinity of the engagement, crews are to pass grid coordinates to let the fast air in to finish the job.

A pair of Canadian CF18s circle overhead. Cameras located in the new sniper pod of the aircraft capture the landscape in detail: the opposing compounds, the tree line to one side, and the fields between. The images are relayed via video down link to the company commander, and the airborne warning and control system (AWACS) aircraft is orbiting at high altitude. AWACS is an airborne radar system designed to control friendly aircraft and to detect airborne threats. The AWACS weapon system is used offensively to direct fighters to their target locations, and defensively to counter attacks. AWACS can also be used to conduct surveillance, and C2 battlespace management (BM). Here in Afghanistan, AWACS has allowed coalition forces to have a God's eye view of the aerial battlefield.

Command and Control

Information is also sent to the combined air operations centre (CAOC) via geostationary satellite communication. The geostationary satellite is excellent for theatre applications because the ground-based antennas, when directed toward the satellite, can operate effectively without the need for expensive equipment to track the satellite's motion. With this real-time data, the satellite can provide commanders with operational-level C2 of air and aviation assets. The CAOC is the focal point for planning, directing, and shaping air and space ops. It is uniquely structured to meet coalition requirements to deliver effects for various commanders in support of strategic, operational, and tactical objectives across a full spectrum of operations, including air mobility support and ground assaults.

From a burned-out schoolhouse and just over half a mile (800 m) away, Major (Maj) Eric Simard, the company commander, leans over a small table and looks at the footage on a laptop. Maj Simard is a former Montréal cop from a family of musicians; he has a weakness for chewing tobacco and reality television. However, he radiates authority and anyone who knows anything in the command post focuses on him. Simard asks his forward air controller (FAC), Captain (Capt) Jacques Descauteau, to review the situation.

"This is where the friendlies are," Capt Descauteau says, pointing to the screen, "and this is where the sniper is." It is a building in the northern compound, next to the main east-west road. The next step seems obvious: call the CF18s and have them reduce the Taliban positions to rubble. Capt Descauteau radios his briefing to the CF18s above, and the lead pilot in the formation, Major André "Tigre" Paradis, awaits instructions from the CAOC.

The mission will be simple today. There are more sensors and information than is needed for the task, and Tigre already knows where this is going. His formation is flying at 20,000 ft (6,100 m) in a counter-rotating combat air patrol (CAP) in order to maintain sensor contact. On the secure communications suite, Tigre passes instructions to his wingman, Capt Manon "Mamo" Dubois; there is calm in his voice. Mamo will be delivering the package if the CAOC decides to go ahead with the plan. Tigre remembers vividly the same scenario in Bosnia, although it was with a much different CF18 then. The airframe has not changed, but Tigre does not know how they managed to accomplish everything in Bosnia without collateral damage—technology has taken the CF18 a long way. Today there will be no risk of being off target, and everyone involved will be able to visually witness the accuracy; the BDA will not be a problem. The weapon will be a smart bomb called SCALPEL (small contained area laser precision energetic load – see text box below); one delivered to each target. The programming sequence is complete.

SCALPEL[5]:

SCALPEL® offers a precise, small weapon system with low collateral damage in urban environments. SCALPEL is a spiral development program leveraging the qualified and aircraft-certified Paveway II Enhanced Laser Guided Training Round (E-LGTR) technology. With its E-LGTR infrastructure already in place, SCALPEL offers minimal aircraft integration costs, minimal development effort, low technical and schedule risk, and affordable unit cost.

SCALPEL can be fitted on F-16, F/A-18, AV-8B, medium and large UAV aircraft and other domestic and international platforms. Combined with the Lockheed Martin Sniper XR navigation pod or other forward looking infra-red (FLIR) systems, SCALPEL offers a high-value, low-risk solution for special operations. *Credit: Lockheed Martin*

With SCALPEL, a smaller-sized bomb is used to reduce the possibility of collateral damage. In a case like this, it also reduces the minimum safety distance from friendly troops; Pug and his troops will be safe. Lasing of the target will be done by the lead aircraft. The Vandoo soldiers possess a ground laser pod, but they do not have the required protection and cover from the still active sniper to use it. Satisfied with the target parameters and the rules of engagement, the CAOC gives the authorization to drop on all targets. Exactly 29 seconds after the "clear to engage" signal, all targets are destroyed.

Canadian Presence

Afghanistan was never going to be easy. Canadians in Afghanistan are filling the battlefield with everything they have. From the private trooper on the ground to the CF18 pilot at 41,000 ft (12.5 km), the Canadian presence is felt.

CF Photo: Cpl Pierre Habib

5 SCALPEL® is registered in the U.S. Patent and Trademark Office. All Rights Reserved. Lockheed Martin Corporation, http://www.lockheedmartin.com/products/SCALPEL/index.html (accessed July 7, 2011).

CF Photo: Sgt Frank Hudec

CHAPTER SEVEN

THE CP140 AURORA

The CP140 Aurora and her crews have proven themselves time and time again on missions at home and abroad. It has demonstrated that airframes like the CP140 must be flexible and adaptable to an ever-changing world. The intent of this discussion is to open some eyes and to generate dialogue on the future life of the Aurora, an augmentation, or its replacement.

Versatility

The CP140 Aurora remains as one of the most versatile aircraft in the Canadian Air Force. It has been used in a SAR standby role where it was launched on only a moment's notice to respond to an airline crash off the coast of Peggy's Cove. Late at night, Swiss Air 111 was in transit from John F. Kennedy (JFK) Airport. Destined for Europe, the crew experienced an in-flight emergency over the south shore of Nova Scotia; a fire consumed the cockpit. Unfortunately, all lives were lost when the aircraft could not make the Halifax airport. The Aurora was the first aircraft on the scene. It began to sense the situation and immediately commenced a search for survivors. As more aircraft and surface vessels began to arrive on location, the Aurora crew quickly took command of these assets and reverted to a role of on-scene commander and functioned as a communications platform. The Aurora's endurance provided coverage, radar search, detection, and direction capability for over 10 hours and allowed it to shape the rescue and recovery effort.

This capability was further demonstrated when it was called upon to act as an airborne command post during Manitoba flood relief ops in 1997. CH146 Griffons were performing humanitarian assistance near the US border and relayed information via the Aurora to the operations centre in Winnipeg. More recently, the CP140 Aurora was employed during post-9/11 operations in a surveillance role over the Persian Gulf. The aircraft has capabilities that are possessed by no other aircraft in the Canadian Forces' inventory. It possesses an excellent combination of endurance, speed, manoeuvrability, and communications equipment. Following the recent CP140 Aurora mid-life upgrade, the aircraft is now equipped with the state-of-the-art MX-20 imaging radar, which has outstanding resolution on an almost three-dimensional (3D) display. Aurora crews have always trained as a cohesive team to ensure tactics, procedures, and mission diversity are of the highest quality.

The aircraft still has expandability in its airframe, and will last another 15 years if properly maintained and updated with the latest technologies. The Aurora has served and will continue to serve in diverse areas of the world, including Canada's High Arctic. Deployed to such locations as Iqaluit, Norman Wells, Yellowknife, and Inuvik, Aurora crews have flown over the vast landscape and will be the first to assure that the CP140 Aurora is the right aircraft at the right time for this expansive area.

Armament

As briefly demonstrated during Exercise MAPLE GUARDIAN in Wainwright, Alberta, in May 2009, the Aurora demonstrated its ability to work effectively as an integral part of the land force campaign. The aircraft was employed as an airborne observation and communications platform with the joint TOC. It was able to sense battlespace activities and gather vital information and imagery, and this data was passed to the operations centre below in a very timely and efficient manner. During MAPLE GUARDIAN, the JTF-Afg Air Wing also employed the Heron UAV.

The single Heron relayed video information to the TOC and this new ISR platform proved to be an essential tool. Unfortunately, the UAV was lost to a simulated crash and the commander quickly lost his ability to influence the battle. However, the Aurora could have been rapidly deployed from nearby Comox and tasked to provide the same intelligence information. Concurrently, it could provide the human part of the equation while airborne, not only to the TOC but also to the commanders on the ground and back home.

In addition to its command and sense role, the aircraft is also capable of being outfitted for battle. It can in fact be equipped with AGM-114 Hellfire missiles to deal with any immediate threat to ground forces at risk. The Aurora has 10 hard points located on the underside of its wing in addition to the 8 torpedo racks that are internally located in the bomb bay. The exterior hard points were originally designed to carry MK46 torpedoes for transport, but some of these hard points have the forward firing weapon capability to host a weapon such as the CRV-7 air-to-ground rocket, Harpoon missile, and possibly the Maverick air-to-ground missile. Unfortunately, the only system that has been used on a CP140 Aurora has been the CRV-7 outside of the obvious MK46 Mod 5A Torpedo, and the survival kit air droppable (SKAD). With regards to the CRV-7, the software can allow the pilot to fire "single" or "ripple" from a pod of 19 rockets. With 4 pods mounted, that provides a substantial weapon platform. In this day of GPS guidance systems and IR sensor guidance heads, weapons such as the CRV-7 can be an excellent asset, not only on the Aurora but also on other platforms, such as the CF18 Hornet and the CH146 Griffon.

CF Photo: MCpl Danielle Bernier

CF Photo

The A3 (the operations officer or branch) Ammunition Coordination (A3 Ammo Coord) at 1 Cdn Air Div HQ is the primary and central point for weapons control, inventory, testing, and use. This position is responsible for the systems evaluation monitoring program (SEMP), which is the basic "cradle-to-grave" weapon testing for the CF18 Hornet. This is where testing is conducted during the assembly, mounting, and engaging of a target (air-to-air or air-to-ground). New systems have come on line, such as the Enhanced Paveway 2 (EP2), which is a GPS / inertial navigation system (INS) / IR guided air-to-ground weapon that has incredible accuracy. The guidance system, combined with the air foil steering group, can be attached to a guided bomb unit (GBU)-10-12-16 (500-1000-2000-lb [227-454-907-kg] bomb). At this time, it is only employed by one aircraft—the CF18 Hornet. The CP140 Aurora is the only other possible airframe that can carry such a weapon. It could be carried on either the external hard points or from the internal racks. The internal bomb bay mounting lugs are the same and they are already tied into the weapon's computer. The 14 Software Engineering Squadron (14 SES) could develop additional programming code to allow for the positioning and dropping of the EP2. The one offset with regards to weapons of this calibre, despite their excellent accuracy, is the devastation created by such large weapons. For that very reason, the US developed a weapon that has similar flight characteristics to the EP2 or GBU called SCALPEL. The laser guided training round (LGTR) is a lightweight ordnance similar to an AIM-9 air-to-air missile with an IR seeker head and is used in place of the GBU series weapons. It is an excellent training aid and relatively inexpensive. SCALPEL is an LGTR with an 8-lb (3.6-kg) warhead instead of a 500-lb (227-kg) bomb. It is an excellent answer to controlling damage while at the same time hitting the desired target with precision. Once again, the bomb rack lugs are the same as any

other conventional weapon and can be mounted on typical hard points. The IR pointers would be a new requirement, but in concept the CP140 Aurora mounted with any combination of CRV-7, AGM-114 Hellfire or SCALPEL would be an excellent and diversified marriage of technology, weapons systems, sensors, and flexibility in any theatre, including Canada's North. The year 2009 saw the deployment of the Aurora into Afghanistan in a mapping role, but additional employment in theatre could test the many aspects mentioned above.

In Theatre

Concepts, tactics, weapons delivery, and command, control, and communication (C3) all could be evaluated while being actively employed throughout all phases of Command, Sense, and Shape. In fact, Afghanistan would be the ideal theatre and location on the globe for trials of over-the-horizon communications, video down link, and data link. The CP140 could act as an airborne augmentation to the Heron UAV fleet. Three to five aircraft could be properly employed to maintain a 24/7 overwatch for RC(S) while providing excellent service as an airborne command centre. No aircraft so well-equipped exists at KAF. The CH146 Griffons are employed at times to take field commanders on aerial reconnaissance (RECCE) missions. The Aurora could provide an excellent service to commanders by allowing them to personally fly with this technology at their fingertips. Commanders would be enabled to identify areas of interest that they wish to view and could have them recorded using the MX camera system. Further, they would be able to communicate directly to their battlespace commanders. The CP140 can fly outside any known threat band for long periods of time and can move from one side of the AO to another in minutes.

Consider the Op MOSHTARAK II insertion mission where coalition air and intelligence forces worked together to build SA awareness and a combined C2 construct. The operation involved several nations over four days. Canada's contribution was limited to the current but effective JTF-Afg Air Wing air and aviation assets. If the Aurora had been deployed in its current configuration, it could have remained safely over the battlefield and provided the commanders an opportunity to sense and command the area with a bird's eye view. Airborne handovers could be conducted for continuity.

Quick Reaction

In an attempt to think outside the box and get the best bang for the buck, the Air Force must gravitate more towards what a platform is capable of doing rather than what it is designed to do. The Aurora can be viewed as the Swiss Army knife of the Air Force. As mentioned earlier, the Aurora can also carry SKAD, which is normally used in the SAR role at sea or over land, including the High Arctic. But let us suppose we change the contents of the SKAD. The concept of a parachute-assisted cartridge delivery system is sound and quite accurate (also tied into the weapon delivery computer system on the Aurora). What if the contents were weapons, ammunition, and communication device delivery packages for a quick reaction force (QRF) resupply during a TIC or for a remote jungle food drop for isolated or special operations forces (SOF) troops?

Today and the Way Ahead

The Aurora possesses the potential ability to open the main cargo door while in flight to allow parachutists to exit. A QRF could conceivably be quickly flown to a remote location and


CF Photo: Pte Melissa Spence

dropped in place; the Aurora could then circle and deliver an operationally prepared SKAD for use once they are on the ground. The Aurora could then again circle to a safe altitude and act as an on-station command vehicle. For a larger requirement, the CP140 Aurora could work in conjunction with a CC130 Hercules. While the CP140 Aurora continues to orbit overhead, an airborne electronic sensor operator (AESOP) could drop BI flares, either through the general-purpose chute or accurately fired through one of the three internal preloaded sonobuoy tubes. Black illumination is only one type of illumination ordnance it can carry. It also carries large parachute night-white illumination flares—as many as 56. The CP140 Aurora will play a key role in opening Canada's door to Arctic operations.

The Aurora is one of the most unique and diversified platforms ever designed. Its original purpose was to conduct antisubmarine warfare during the cold war. Now, it is gainfully employed by several nations around the world in operations such as counter-narcotics, arctic patrols, iceberg monitoring off the coast of Labrador, pollution watch in the Gulf of Mexico, hurricane hunting in the Caribbean, and SAR. No other airframe in the Canadian Air Force inventory but the Aurora could support Afghanistan operations in so many unique ways. The tactics, procedures, policies, and proven concepts that could be developed would greatly benefit Canada's coming operations at home and abroad. However, the number of mission-ready airframes may pose a problem. The Aurora has benefitted from Block 1 and 2 upgrades with new and improved navigation, communications, acoustics, and imagining radar systems. Block 3 will bring the final improvements needed, such as enhanced computer processing power, magnetic anomaly detection (MAD), and improved electronic warfare support measures (ESM), to mention only a few.

CF Photo: Sgt Daren Kraus

CHAPTER EIGHT

INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE

The Unmanned Air Vehicle

"The Heron was on task when elements came under contact from several locations. The Heron provided great support and the information was of great help to direct other UAV assets to provide protection and warn off ground forces. We'd like to thank you and your operators for the great work, and we are convinced that their work saved Canadian lives."

The above excerpt, edited for operational security, was from feedback after a mission conducted by TF Erebus, a CF unit operating the CU170 Heron unmanned aerial system (UAS) in KAF. Named after the Greek god associated with darkness and shadows, TF Erebus has provided a crucial intelligence, surveillance, target acquisition and reconnaissance (ISTAR) capability since the start of flying ops in January 2008.

The CU170 Heron is a medium-altitude long-endurance (MALE) UAV able to conduct operations in excess of 24 hours and at altitudes up to 30,000 ft (9100 m). It has a wingspan of 16.6 m, a length of 8.5 m, and a maximum take-off weight of 1150 km.[1] In addition to the vehicle, the Heron UAS includes the ground data terminal (GDT), the advanced ground control station (GCS), and the common ground exploitation suite (CGES). As all of the components can be stored in shipping containers, the Heron UAS is a readily deployable system that greatly increases flexibility.

CF Photo: Cpl Kevin Sauvé

1. Kyle Welsh, "Task Force Erebus," *The Canadian Air Force Journal* 3, no. 2 (Spring 2010): 20, http://www.airforce.forces.gc.ca/cfawc/eLibrary/Journal/Vol3-2010/Iss2-Spring/Sections/06-Task_Force_Erebus_e.pdf (accessed July 7, 2011).

Task Force Erebus is comprised of personnel of various trades and elements from the CF, as well as contractors from MacDonald Dettwiler and Associates Ltd. of Richmond, BC. Canadian Forces members include pilots, air combat systems officers (ACSO), AESOP, intelligence analysts (IA), electronic warfare (EW) analysts, supply technicians, aerospace telecommunications and information systems technicians (ATIS Tech), and a resource management support clerk (RMS Clk). These members are drawn from units across Canada and typically have had no experience on UAS ops. Therefore, many of the members are required to undergo a training period of up to a year to qualify on the Heron prior to deployment to Afghanistan.

The Heron flight crew consists of an air vehicle operator (AVO), a payload operator (PO), IA and EW analysts. The AVO, also the mission commander, is drawn from the pilot or ACSO trades, while the PO is an AESOP. The AVO duties, in addition to flying the vehicle and coordinating airspace, include pre-flight planning, briefings, and inspections, as well as post-flight administration and debriefings, much like a pilot in a manned airplane. The PO, in conjunction with the AVO and the IA, who is in contact with the requesting agency, operates the sensors in a manner that provides the best product for the end-user.

While the Heron operates like a manned airplane in most respects, there are some important differences. With its long endurance, multiple crews over the course of a mission are necessary, and so the crew conducting the take-off is generally not the crew that conducts the landing. In addition, the AVO does not fly with conventional flight controls; instead, only a keyboard and trackball are used. Finally, take-off and landing sequences are conducted via the automatic take-off and landing (ATOL) system, with little input from the AVO other than inserting the correct parameters and monitoring the automatic sequence. Despite these differences, AVOs have little to no difficulty adapting to the Heron from their experience in other aircraft, and they quickly become comfortable with the systems in a short period of time.

The Heron is the first Canadian-operated UAV with a communications-gathering capability. As this was unprecedented in the CF, the first rotation of EW analysts was limited to three CF personnel without a local cultural advisor (LCA), with one of the members being familiar with Pashtu, the local language of Kandahar province. However, in that rotation, reports were limited to direction-finding only. On the second rotation, the team grew to five EW analysts, including one in the all source intelligence centre (ASIC) as a liaison. In addition, an LCA was added to translate received communications and to assist the IAs with cultural awareness. The addition of the LCA was crucial in that EW reports now included translated communications, providing much greater information for the requesting agency. The third rotation built upon the successes of the first two and proved that an LCA was essential for the mission.

Since the initial deployment, TF Erebus has reached many milestones. It recorded one of the longest continuous flights by a CF aircraft in April 2010 by flying for 24.7 hours. It then surpassed that record by flying for 25.9 hours in June 2010. It conducted a dual Heron mission that same month, proving that it was possible to fly two Canadian Herons simultaneously. Finally, on the 25 June 2010, the unit flew its 500th mission. These milestones have opened the door for the possibility of continuous dual Heron ops, giving around-the-clock coverage.

The impact of TF Erebus should not be understated. The endurance and sensor suite of the Heron have been invaluable in operations in Afghanistan, and have saved lives as a result.

Because of this, customer demand is high, and the Heron is consistently requested for more missions than it could physically accomplish. In an attempt to fulfill these requests, TF Erebus operators routinely pushed expected limits of the Heron's endurance, and the contracted number of flying hours has been increased as a result. This has allowed TF Erebus to support more operations with its capabilities.

One giant leap in the advancement of Heron UAV has been the integration of its employment with other theatre capabilities such as the GWT, artillery, TACP, and the battlespace commander. This unprecedented level of integration with the ground troops and other Air Force resources is due to the increased understanding of the battlefield and joint environment that has led to a better use of the TF Erebus liaison officer, and has ultimately resulted in the improved delivery of effects on the ground. Task Force Erebus was able to make key stakeholders work together as a unified force multiplier to enhance the effective delivery of intelligence and fire to the coalition mission.

Looking towards the future, TF Erebus is also a stepping stone to the upcoming Joint Unmanned Surveillance Target Acquisition System (JUSTAS) project, in which Canada plans to purchase UAS for domestic and deployed operations. The benefits are clear; a platform such as a UAS, with its long loiter time, sensor suite, and ground-based crews, would be well suited for domestic operations, SAR assistance, and surveillance. In addition, flying a UAVwould be more economical than a manned aircraft for the same period of time. Now, however, important issues such as airspace coordination and the lack of an all-weather capable UAS will need to be overcome. When that has been achieved, missions presently carried out by manned aircraft, such as maritime surveillance and the search portion of SAR would be ideal for UAS.

There have been four full rotations of personnel since TF Erebus started operating from KAF in 2008. Since that time, it has set and broken many milestones, participated in important operations, and most importantly, saved lives. Through the work of the team, the unit has lived up to its motto: *Semper Vigilo* (Always Vigilant).

PERSISTENT SURVEILLANCE SYSTEMS

Information and Situational Awareness

Command and Sense are two key operational functions in any deployed military operational construct. ISTAR is a key enabler in the Sense function. It aids commanders with the development of accurate SAR that is vital in commanding and controlling military forces.

Surveillance, as part of ISTAR, can be achieved through many different means, including but not limited to the use of mounted and dismounted patrols, ground-based observations posts, ground-based sensor systems, aerial manned and unmanned platforms, satellites, and more recently, persistent surveillance systems (PSS). Surveillance carried from great height is much more effective than surveillance carried from the ground, where topography, vegetation, or other obstruction obscures potential targets. Because surveillance is a continuous requirement, many of these capabilities are lacking in both the ability to provide the required perspective and persistence.

The only two that fill this perspective and persistent requirement are satellites and PSS. Most people are familiar with the capabilities and limitations of satellites, but given the very recent proliferation of PSS, these may not be well known. The aim of this section is to briefly present the capabilities, limitations, and employment of PSS deployed in the TFK AO.

There are two primary types of PSS. Basically, these systems elevate a sensor package through the use of either towers or balloons. Many terms are used to describe these systems, but for the purposes of this section, towers will be referred to as persistent surveillance towers (PST) and balloons as persistent threat detection systems (PTDS).

Capabilities and Employment

The advantage that height above terrain brings to surveillance is considerable. The PST and PTDS bring very different capabilities in height above terrain ranging from 50 to 100 ft (15 to 31m) for the PST and 1000 to 3500 ft (305 to 1067 m) for the PTDS. Area coverage is directly proportional to the height of the sensor. As mentioned earlier, topography also plays a large factor in area coverage.

The sensor packages that the PSS support vary greatly and can be customized to include real time full motion video; colour day camera with zoom; high-magnification FLIR thermal imager; slew to cue from other sensors, such as acoustic sensors for the detection of direct or indirect fires; auto stabilized platform; rangefinder; and laser illuminator and designator.

Transmission of the signal from the sensor package is normally done via cabling attached to the PST or through the tether for the PTDS. Wireless transmission is under development. Once the signal is received at the GCS it can then be routed into any network capable of handling the security level and volume of the data. The signal can then be shared with anyone who requires it.

The relatively low cost of the PSS, compared to the alternatives of satellites or aerial manned or unmanned platforms, makes them very attractive. Given the greater cost of operation of the PTDS over the PST, the number deployed has been less than the PST. Its deployment has primarily been based on geography with the aim of establishing large linked areas of coverage. The PST are used to augment these areas and to provide closer and more intimate coverage.

A secondary effect that the PSS provide, in a non-permissive environment, is deterrence. Insurgent activity has been proven to decrease considerably when these systems are present, and consequently, when they are removed, normally for maintenance, the insurgent activity levels go back up. The idea of using decoys (systems that look like the PSS but are non-functional) has been considered but not yet fielded. The launch and recovery of the PST and the PTDS within the TFK AO are carried out by land force members. Control and operation of sensor packages are also carried out by land force members.

The PSS are used for two distinct purposes: the first purpose is the collection of information for developing intelligence for use in future operations, and the second purpose is providing SA for coordinating force protection against attacks. Both the PST and the PTDS are relatively portable units allowing for greater flexibility in meeting the needs of a rapidly changing mission, which has been the character of TFK during the period of November 2009 to July 2010.

Limitations and Challenges

To a lesser extent than satellites and aerial platforms, the PSS are vulnerable to environmental conditions. Reductions in cloud ceiling and visibility can have a profound effect in the capability of sensor packages to achieve their potential. The adverse effect of dust on very fragile electronics and optical equipment is ever-present in the TFK AO. The effect of high wind on the PTDS is considerable. Maximum wind limitations exist for their launch, recovery, and employment. Operations in conditions exceeding these limits can and have resulted in the breaking of the tether and the loss of the balloon and its sensor package. Also, operating in a non-permissive environment, which describes the entire TFK AO, requires that the base station for the PST and/or launch and recovery site for a PTDS need to be in a secure area.

Exploiting the third dimension by going vertically brings the challenge of sharing airspace with other users, particularly those that operate in the lower altitudes, such as helicopters. Two methods of deconfliction are in place to reduce the risk of collision with the PSS. These include the reservation of airspace and the marking of the PSS so that they are seen by flight crews.

Regarding airspace reservation, ISAF direction has been that the airspace needs to be reserved and communicated to all airspace users three days in advance of the erection of a PST or the launch of a PTDS. This direction has not always been followed, and one PTDS has been lost as a result of a severed tether by a helicopter. Luckily, the helicopter was only slightly damaged and was able to recover safely at KAF. To date, very few of the PSS within the TFK AO have been marked. The reason cited is that battlespace owners believe that marking the PSS will make them more susceptible to insurgent attack.

Highlights

During the period from November 2009 to July 2010, much of the credit for the security improvements along one of the TFK problem routes has been attributed to the deployment of the PSS, both the PST and the PTDS at different locations. The PSS has greatly facilitated the successful defence of TFK tactical infrastructure from insurgent attack.

Future Operations

The employment of the PSS in future operations must be considered. Employment on both domestic and international operations of the PSS will supplement aerial manned/unmanned platforms and satellites, providing a balanced ISTAR capability. In permissive environments (as in most domestic operations), the PSS can be widely deployed over vast regions to provide increased SA. Task Force Kandahar has demonstrated the effective use of the PSS throughout the AO. These systems bring great balance to the already existing systems for the provision of surveillance. Many lessons that would be applicable on future missions have been learned from their use in Afghanistan.

CF Photo: Cpl Roxanne Shewchuk

CHAPTER NINE

CONTRACTED SUPPORT

A Possible Scenario

It was 0500 hours local time at FOB Masum Ghar. The first day's call to prayer woke Master Corporal (MCpl) McRaub from a somewhat restful sleep (the best that could be expected in the heat). One leg was not even out of the cot yet, and McRaub was already thinking about the day's patrol. Insurgents had been slowly fixing McRaub and his fellow troops to the FOB. Insurgent FOM was not only slowing down security patrols, it was also starting to affect the re-supply runs.

The route leading up to Masum Ghar was becoming increasingly more infested with IEDs. It had been two weeks since the last resupply convoy, or combat logistics patrol (CLP). Ten tonnes of supplies had come in with plenty of kit and supplies, but the FOB was now in need of additional stores. Fresh fruit would be a nice break from hard rations.

Normally, supplies can be flown in, but with the threat assessment in the area increasing from medium to high, the contracted helicopters would not be coming in due to the higher risk. High risk means high insurance rates, and the contractors were playing it safe and watching balance sheets at the same time. McRaub couldn't blame them. The contracted aircraft did not have protective armour or self-protection systems (SPS), and the aircrew did not carry personal weapons.

Military aviation would now have to fill in the gap left by the grounded contractor. Any residual airlift capability left over from already scheduled missions would get supplies to the FOB. The troops at the FOB hoped this worked out. Maybe the security situation would improve, but then again, hope is not a method.

Why Contracted Support

With the military's present budget, manning level, and equipment inventory, there is a delta between the resources available and what is required to successfully meet a given task or mission. This can range from skilled technicians supporting third-line maintenance to fielding enough airframes to achieve a desired effect (cargo movement, ISR coverage) in the AO. In the coalition environment with a massive troop inflow, there is never enough military aviation available to service all requirements. Contracted support can meet the military's short-term needs to augment a TF and fill any gaps in capability. Adding civilian companies and their expertise onto a TF can be a force multiplier for the commander. Military resources can then be released for other more robust tasks, such as deliberate operations and taking the fight to the enemy.

Resources Versus Effect

The resources-versus-effect concept must be well understood before a statement of work is detailed in a contract. How much a commander requires to influence or control a specific resource or capability will determine the level of command over a contracted solution. The resources-versus-effect concept assists in determining whether the contracted resource or desired effect is appropriate.

Providing a resource can be boiled down to a company providing a unique tool (e.g., an airframe) or a personnel skill-set for the military to directly employ; whereas, providing an effect leaves it up to the contractor to manage their equipment or personnel expertise to achieve the military's desired end-state. Resources versus effect ultimately translates into tactical command (TACOM) verses tactical control (TACON).

CF Photo: Cpl Andrew Saunders

Handing resources over to the military chain of command under TACOM is perhaps the most reliable means for the military to maintain command and to control the contracted capability. TACOM gives the chain of command the complete ability to task, reorganize, and support resources to meet the requirements of the day. A contractor provides an integral level of support to a unit and thereby gives an appropriate level of command that is easy to use and truly augments the military.

Take, for example, skilled technicians contracted to carry out the maintenance of a helicopter. Adding more skilled labour to a unit maintenance organization to make up for manning shortfalls will give the squadron aircraft maintenance and engineering officer (SAMEO) the resources needed to repair aircraft in a timely fashion. Airworthiness policies prohibit contracted technicians from conducting repair work on CF aircraft; therefore, current manning shortfall challenges cannot be mitigated by leveraging contracted manpower for repair functions. As airworthiness responsibility ultimately rests with the SAMEO, supervision, oversight, and command of contracted maintenance activities is required; TACOM of contracted personnel will also be required. In addition, the workload for maintenance will vary on the flying rate and type of operations in the AO. Having TACOM to re-task and refocus the contracted support in response to priorities will enable the SAMEO to achieve the unit mission: providing serviceable aircraft to support flying ops.

From the contractor's point of view, a TACOM relationship may not be ideal. While the contractor still retains operational command of the resource, C2 over how the resource is used

on a daily basis will be out of their hands. This can also lead to perceptions that their personnel and equipment are being misemployed. Finding and shaping a common middle ground in the contract is key to success. Clearly defining the scope of service, identifying known limitations, and establishing a process to resolve conflicts will go a long way in preventing the possibility of degrading the military unit's ability to meet its mission.

A contractor that provides an effect will have a different command relationship with the military—the military tells the contractor what to do, not how to do it. In this case, the contractor plans, and with some coordinating instructions, executes the mission to achieve an effect that is desired by the military chain of command. Command over their resources is retained by the contractor; the military unit only has TACON.

With TACON, how a desired effect is achieved and to what standard it is achieved will be determined by the contract and detailed in the concept of operations (CONOPS). These two documents will give direction to the contractors on what they are obliged to deliver, and defines the military's plan on how to employ the contractor. If these two documents are not in line, there is a distinct possibility that contracted effects may not meet the military's intent. Additionally, managing subordinate units' expectations as to what effect the contractor will provide must be included in the CONOPS. One way to develop some indirect control over a contractor's delivery of an effect is to develop a method of payment that is fair and clear to both the contractor and military.

Contracts and Competition

A balanced payment against performance clause is an indirect way to shape the contractor's behaviour and how effects are delivered. This method will ensure that the contractor is paid a fair wage and remains motivated to support Canada before other interests. Future deployments will most likely see Canada as a member of a coalition force again; Canada will continue to operate with allies, and some will likely have a TACON relationship with the very same contractor as Canada. It is possible to meet the requirements for all allies with a shared resource pool and exceptional planning. If all goes well, this will be transparent to Canadian units; however, there exists an element of risk. If the contractors are unable to meet all of their commitments all of the time, shared resource arrangements will generate strong and sometimes disabling competition amongst allies all wanting to have their missions supported first. Agreeing to how a contractor prioritizes delivery of desired effects and how conflicts are resolved is vital to a successful contract. When a task cannot be supported, advance notification must be given—again, planning is key. Sustainment operations should not be a continuous crisis-management exercise.

Take, for example, contracted aviation that is required to move cargo to operating bases throughout the AO. When there is conflicting demand for airlift amongst several contracting nations, it makes good business sense for the contractor to support the most lucrative contract. A payment method where a base fee per month is paid regardless of the level of support delivered will place a contracting unit or nation low on the priority list—the monthly fee is free money for the contractor. However, if the payment schedule is balanced with measurable performance criteria that are directly linked to specified effects (amount of cargo delivered, punctuality, emergency, etc.), the contracting party's interests are protected.

A TACON relationship leaves the contractor free to organize and to determine the level of support (logistics chain, spare parts, staff levels) required to meet the effect. Reducing the costs and expenses that do not directly contribute to earning a profit will help the contractors meet their goal of earning a fair profit. It would be to the contractors' advantage to use the least number of airframes (cost) to support the largest number of contracts (profit). This economy of effort also implies that spare parts, staffing levels, and built-in redundancies such as maintaining standby aircraft would be reduced to the minimum required. The burden of command and planning the logistical support may be gone, but so is the control over the support.

Support to Contractors

If it were a perfect world, and "just-in-time" delivery reliably worked to support battlefield requirements, contracting would not be an issue. Since the military routinely operates in remote areas of the world and is usually at the end of a long logistics chain, there will be a reliance on contracted support. A contract must be shaped so that operations and sustainment requirements are uninterrupted. Canada's leasing of contracted ISR air vehicles and integral support is an excellent example of how contracted capabilities and support impact operations. Employed to provide up to 24-hour ISR coverage for a deployed task force, the contractor requires sufficient serviceable UAV air frames and sensors to deliver on its obligated effects. If there are not enough spares in theatre to ensure UAV and sensor payload availability, the mission fails. If the delivery time for a replacement is too long, future missions will fail.

CF Photo: Mcpl Bruno Turcotte

Support also ranges from basics such as housing, messing, and in some cases, access to the military supply chain. Future theatres of operations will dictate the level of support that the military can and will provide and will thereby determine the level of support required by the contractor. Basic necessities will need to be considered when evaluating a "turn-key" bid.

More and more, the military will operate in a non-permissive environment; such is the nature of humanitarian assistance, peacekeeping, and wartime operations. The operating environment will greatly influence the scope of work that the contractors are willing to commit to and how the military will employ contracted enablers. If contractors are to provide aviation airlift in an austere environment, they must be kept informed of threats to aviation, including enemy activities and intentions. Sharing of intelligence information will enable the contractors to make informed decisions during mission planning and while completing assigned tasks. Access to wing flying orders and coalition instructions, such as restricted airspace and communications procedures, will ensure safety and effectiveness for the contracted agencies. The contractors will become less of a liability and operate more like sub-units. Including the contractors in the Air Forces' flight safety and lessons learned programs soon becomes a force-multiplier; see the text box below.

SKYLINK'S CANADIAN CONTRACTED AIR TRANSPORT INTRODUCES A FLIGHT SAFETY OFFICER:

The JTF-Afg Air Wing provided recommendations regarding the renewal of SkyLink's CCAT contract in July 2010. Two recent wing flight safety surveys had reported that the flight safety reporting and educational culture at SkyLink required significant improvement. One renewal recommendation was for SkyLink to introduce a flight safety officer (FSO) position within its establishment. Ideally, the position would possess the Air Force's FSO qualification and would report directly to SkyLink management. The recommendation was incorporated into the contract and SkyLink now has an FSO who reports exclusively to the operations manager. The FSO is also scheduled to receive Basic and Advanced Flight Safety Training in Winnipeg in September 2010.

Integrated Contract Support

Distinguishing between a contracted resource and a contracted effect will immediately determine how a contractor's capabilities will be employed in the field to augment military forces. Determining the scope of work and defining how the contractor is commanded within a military context is critical to effectively employing a contractor and minimizing conflict and risk. Integrating contracted support and understanding TACOM versus TACON relationships in the contracted context will ensure that the contractor becomes a force multiplier rather than a consumer of military resources.

CF Photo: Cpl Marc-André Gaudreault

CHAPTER TEN

TACTICAL AIR CONTROL PARTY

In the last few years, the TACP has shifted from an augmented role within the BG to one that equally supports both the BG and the brigade; most recently it has been operating entirely as a brigade-level asset. The TACP is responsible to provide air liaison to land forces and to facilitate the control of aircraft. As the battlespace has become more joint and dynamic, the TACP's primary role has shifted from an exclusively air-ground liaison to one that is entirely responsible for the control of air and aviation assets within the 3D scope of the battle.

Command

Each position within the TACP is vital to the overall success of the team. All TACP personnel strive to conduct their duties to the best of their ability, looking for opportunities to improve efficiency and effectiveness. Given the heavy reliance on technology, all TACP personnel are well versed in trouble-shooting radios, video down links (ROVER), computers and programs.

The TACP is made up of Air Force personnel from several wings, and composition varies in experience and military occupation (MOC). The officer commanding (OC) is normally a pilot or AEC, and his staff consists of three JTAC and two air liaison officers (ALO) normally coming from a pilot, AEC or air navigator (ANav) background. The OC manages the TACP in order to maximize support to all JTACs and units. This includes operation planning, advisory functions, liaison and coordination of all TACP administration. The JTACs are responsible for coordination and airspace deconfliction within their respective AO. They are also thoroughly proficient at target confirmation and fire authorization (type 2 control), which is the only means by which TACP can conduct air strikes. The ALOs are responsible for administration, maintaining awareness of current and future operations and liaising between flying units and ground units. Finally, the TACP has two system operators (SYS Op) and two signal operators (SIG Op) who assist during times of high activity to allow the JTAC to focus on other CAS or ISR assets, coordinate with field JTACs, and conduct type 2 controls.

At the brigade level, the TACP is responsible for the integration and deconfliction of all air assets supporting the subordinate battalions. This requires close liaison with the fire support coordination centre (FSCC), aviation, airspace coordination centre (ASCC), ISTAR, and the land force units. The orchestration required for ensuring maximum effectiveness and safety requires a dedicated team effort with extreme attention to detail. The JTACs within the brigade also provide a 24/7 strike capability whether in support of deliberate targeting or on behalf of the subordinate battalions.

Sense

A large percentage of work done by the TACP is the deconfliction of air and aviation assets entering or exiting their restricted operating zone (ROZ); however, they are also involved in several other important tasks. In the event that there are TIC, the TACP is responsible for coordinating air support. In some cases, aircraft are unavailable, and it is the TACP's job to liaise with higher command to pull aircraft from a lower priority task and have them support the troops. The TACP coordinates an average of ten pre-planned missions, and supports an average of four to five TIC events per day.

The JTACs play an important role within the TACP. They provide the ability to conduct kinetic strikes with various assets that are controlled directly from the TOC, using real-time video feed from the aircraft's targeting pod. They also provide strike capability for any units that require immediate CAS but do not have a qualified JTAC located with the unit on the ground. The intent is to avoid having an unqualified soldier give clearance to drop bombs. JTACs are well versed in weaponry and will select the appropriate weapon to gain maximum effectiveness with minimum collateral damage; whereas, an unqualified soldier may not posses the requisite knowledge.

TACP ALOs contribute to planning and coordinating CAS and close combat attack (CCA) in support of deliberate operations. They also liaise directly with flying units in order to ensure all critical information is passed on. By keeping the units well informed through the use of updated special instructions (SPINS or SI), communications plans (COMPLANs), and well-illustrated CONOPS, the aircrews require less time gaining SA upon check-in and have more time for the mission at hand.

Shape
Finally, the TACP controls CAS and ISR assets in support of counter-IED efforts, providing route scans along main routes and interior lines within the AO. They also liaise with ISTAR, ASIC, and counter-IED cells that provide intelligence as well as monitor ROVER feeds to help spot anything suspicious. This is all in an effort to prevent and interdict IED emplacement, thus allowing safe FOM for ground troops. The following scenarios will illustrate how the TACP is a key component within JTF-Afg and the BG.

SCENARIO 1

"Contact Battle Group!" someone yells in TFK's TOC. Everyone's ears perk up as information slowly begins to trickle in over the radio, telephone, and chat. The details never seem to arrive quickly enough.

Oscar Company (Coy), Third Platoon, callsign 1-3, while on a dismounted patrol north of a small village in the Panjway'i District of Kandahar Province has struck an IED. Immediately following the blast, the small section of soldiers with their ANA counterparts begin to receive SAF from a wadi to the west. The details continue to filter in; some of them are contradictory to one another.

Slayer 15, the Oscar Coy JTAC, requests immediate CAS over the BG fires nets. The request makes its way to the BG TACP, who in turn forwards the request to the TFK TACP as air supported troops in contact (AIRTIC). Nothing is immediately available. Attack helicopters are working an operation north of the Arghandab River and are unable to support. There are no armed drones overhead. The request is sent higher, to the air support ops centre (ASOC) over the joint air request network (JARN). All anyone can do now is wait.

The request is received, acknowledged, designated, and prioritized. There is never a guarantee that the request will be supported. Finally, word is received that a pair of A-10s are being pulled away from their routine mission to support the TIC. They are still 10 minutes away.

CF Photo

As the section continues to receive SAF, reports of casualties begin to arrive. Two soldiers are wounded, both of them seriously. If they do not make it to the Role 3 Hospital within 60 minutes—the "Golden Hour"—their chance of survival drops to almost zero. RC(S) HQ authorizes the release of MEDEVAC helicopters to pick up the wounded soldiers.

"Fire Mission!" is now yelled out by the TFK FSCC. A quantity of 81-mm mortars has been requested to suppress the enemy. The TACP begins to plot the details of the fire mission on the map. Point of origin, target area, and max ord (i.e., height) are the details that the TACP must be made aware of immediately. The information is plotted and relayed to any affected aircraft, predominately UAVs and helicopters.

"Decon Complete!" is yelled by the TACP, once confirmation is made that there are no aircraft at risk. "Air Space Clear!" is followed immediately by the FSCC. Within seconds the impact of the mortars is seen through the video feed of one of the drones. The enemy shifts its location, but does not break contact. The A-10s are now five minutes away. "Slayer TOC, Slayer TOC. This is Dustoff 11 on urgent MEDEVAC." The helicopters check in. The TACP passes the information for the mortar shoot, with restrictions to keep the birds east of the target area and safe. Having acknowledged the restrictions, the pair of UH-60 Blackhawks goes racing towards the battle and the injured soldiers.

The A-10s are now overhead and check in with the TACP. They are assigned an operating altitude within the ROZ, and just like the helicopters, they too are passed restrictions to ensure their safety before being pushed to their final controller, Slayer 15.

Through the video down link, the JTAC, the BG TOC and the TFK TOC are able to see exactly what the aircraft sees. By listening to the frequency from which the JTAC is controlling, the TACP is able to keep up its SA and help out pre-emptively. The insurgents continue to fire on the section, but their location is still not known.

Anticipating the release of ordnance or a show of force from the A-10s, the TACP maintains positive control of the airspace over the battle. Helicopters are no longer a factor, and the MEDEVAC has successfully retrieved the casualties and is en route to the Role 3 Hospital. The UAVs have been passed restrictions to stay offset from the target area to the east.

The ground commander has now requested a show of force. He wants the A-10s to fly low over the target area to break to the contact. The A-10s come up on Slayer TOC frequency for instructions. They are relayed the other aircrafts' positions and altitudes, and given heading restrictions to keep them away from any potential safety threats.

Having returned to the JTAC frequency, the TOC watches on the video feed as the A-10s go screaming towards the earth. The pair of jets fly low level over the enemy position. Contact is broken, but the enemy cannot be located.

The JTAC uses the A-10s to conduct a RECCE of the area. The A-10 pilots scan the last known position of the insurgents, but are unable to find any traces. Under the cover of the aircraft, the dismounted patrol makes its way back to the armoured vehicles and rolls back to the FOB. On return to base, the A-10s advise Slayer 15 that they are once again being pulled to support TIC in one of the adjacent unit's AO. Released, the pair of jets go racing across the sky to support the other unit.

Having returned to a normal pace of operations, the TACP lifts all remaining air space restrictions. The UAVs press on with their original tasks; the helicopters can move about the AO unrestricted. The TACP does this more than 10 times a day.

SCENARIO 2

It is the middle of the night, and the only time of the day when the heat is bearable enough to permit the heavy physical activity required to dig an IED into the road. It is also the best time to conduct counter-ISAF activities without the local nationals observing and reporting to coalition forces.

It has been a quiet night, both in the TOC and in the field. The BG is conducting battle procedure and planning for an upcoming operation, and has no troops on patrol. A single MQ-9 Reaper UAV is scanning the TFK AO under the direction of the TACP JTAC, Slayer 02. For over an hour there has been no movement reported.

While scanning the main supply routes (MSRs), the Reaper is able to pick up evidence of recent digging activity on the roads. The coordinates are relayed through the operations chat to

USAF Photo: Sgt Brian Ferguson

the rest of the units. The Reaper comes across three individuals on a road just one kilometre south of a friendly patrol base. They look suspicious. All eyes in the TOC are now on the TACP. Through the chat network, Slayer 02 is able to speak with the pilot and crew of the UAV.

They study the screen and watch intensely. "Zoom in one, switch polarity white hot," Slayer 02 directs. The image on the screen changes to match the request. These individuals are clearly digging something into the middle of the road. Through the chat lines, the IA confirms the assessment. In the distance, a helicopter flies past and the three individuals take cover. Once it is gone they resume their activity. Everyone continues to watch as the situation unfolds. Two of the individuals are confirmed to be carrying weapons.

Slayer 02 continues to watch the individuals, prepositioning the Reaper for the best vantage point to set up a strike. There is a flurry of activity in the background. The TOC duty officer is requesting the status and location of Blue (friendly) forces from the BG. The location of friendly forces is a critical factor in any kinetic decision, and in this instance, there are no troops within 1000 metres.

"ASCC, I need a ROZ," Slayer 02 says to the ASCC. A ROZ around the target area is crucial for both safety and efficiency. The ROZ is permissive to the aircraft about to conduct the strike, thereby providing unrestricted freedom to manoeuvre prior to release of ordnance. Simultaneously, the ROZ restricts other aircraft from operating in the area, thus keeping them away from ballistic trajectories.

The request is sent higher. Within 5 minutes, the airspace has been deconflicted and Slayer 02 is now the control authority over the target area. The three individuals, positively identified now as insurgents conducting a hostile act, are the centre of everyone's attention. Authorization to engage is approved by the senior TOC staff, the authority which is delegated by the commander himself in his absence.

Slayer 02 sends a message over the radio to the Reaper. It is the instruction for a strike: target location and description, elevation, and nearest location of friendly forces, among other details. "Request one by GBU-12," Slayer 02 calmly says to the Reaper. A single laser-guided 500-lb (227-kg) bomb is enough to destroy the targets; it also ensures minimum collateral damage to any nearby structures. The Reaper reads back the details before being given the final "Cleared Hot" command from Slayer 02.

The Reaper maintains "eyes on" with its targeting pod the entire time. It orbits overhead, and once established on its final heading calls, "60 seconds." All eyes are on the screen. The insurgents are unaware that they are being targeted. The Reaper pilot calls the release of ordnance. The insurgents continue to dig. The screen suddenly glows white, indicating a massive heat signature. "Splash—good hit," the pilot says. There is a second explosion, almost as large as the first. This confirms that the insurgents were in possession of large quantities of home-made explosives (HME).

The Reaper circles overhead, watching and waiting for the cloud of dust to dissipate. All that remains is a crater in the road where the digging had taken place. There is no evidence of any survivors. The Reaper reports his air BDA, "3 x enemy KIA [killed in action]." Exact details and confirmation will be unavailable until the morning when a patrol will push out to the impact site for a ground-level assessment.

Slayer 02 reports the details of the strike, including the initial BDA, to RC(S) HQ while the TOC staff transcribes the details into a briefing slide for the commander. The impact site is marked on the TACP map for future reference, and Slayer 02 presses on with the sweep of the AO. The Reaper is only halfway through its on-station time and may still be able to find other targets of opportunity.

Conclusion

The TACP is a highly specialized unit of Air Force personnel who bring a significant capability to the ground force commanders. Whether through detailed integration of all air assets flying through the battlespace, or by providing kinetic strike capability within the TOC, the TACP is the core of the joint fires team.

CF Photo: Cpl Pierre Habib

CF Photo: WO Serge Peters

CHAPTER ELEVEN

DEPLOYED AEROSPACE CONTROL OPERATIONS

What Aerospace Control Has Provided

Within the aerospace control trade there are two subsets, air traffic control (ATC) and air weapons control (AWC). These two specialities, while requiring much of the same skills and abilities, provide two very different capabilities to any deployed environment. Throughout Canada's mission in Afghanistan, many AECs have deployed in various functions; however, we have yet to see a tactical radar squadron or ATC unit deploy for significant periods of time.

Early in 2010, we saw what the Air Force could do by responding to the disastrous earthquake in Haiti. Part of this deployment included setting up an airfield in Jacmel, Haiti, so that CC130s could deliver much-needed supplies to the Haitian population. Through the employment of airfield engineers and members of 8 Wing Air Communication and Control Squadron (known as 8 ACCS), the Air Force successfully established and maintained an airfield in a foreign nation for several months. Much of the manpower from the aerospace control field came from individual ATC units that were asked to give up one to two controllers per unit. One must remember that this occurred during the Winter Olympics in British Columbia, and while up to a dozen aerospace control officers were deployed in Afghanistan.

While recent events have shown that the aerospace control branch is highly capable of deploying rapidly to austere settings, there remains more potential within the specialty whereby domestic and deployed operations can be better enabled with this expertise.

What Aerospace Control Can and Should Provide

In order to ensure a robust and deployable cadre of controllers, there should be a renewed focus on identifying and placing controllers at every Canadian wing on an increased state of readiness. From the ATC perspective, two to three officers and three to four non-commissioned members (NCM) could be selected from each wing to maintain an elevated readiness status. The force generation bill would be relatively low because training could be staggered over the course of a year so that minimal impact would be felt by home units. This same procedure could be applied to the two tactical radar squadrons in Cold Lake and Bagotville, as well as in North Bay, the home of NORAD operations within Canada (NORAD operations permitting).

In addition to having the right people ready, thought must be given to future equipment purchases. Notwithstanding NORAD obligations, the next conflict is more likely to take place in a developing country quite some distance from the Western Hemisphere. This means that while training for an air-to-air war within NORAD remains important, renewed focus must be placed on air-to-ground ops where assets and airspace management will be critical. Much efficiency can be gained through multi-purpose equipment purchases. As an example, radar systems exist that are capable of providing instrument flight rules (IFR) control in the terminal area surrounding the airfield as well as providing a tactical radar capability for battlefield management. A purchase such as this would cement the one-team concept of providing the army with a one-stop deployable solution for battlespace air management. It could also augment coastal surveillance activities, and paired with the UAV capability, it would enable joint broad area maritime surveillance (BAMS) of our northern shores and littoral regions.

At an underdeveloped airport, 8 ACCS can provide and maintain both IFR and visual flight rules (VFR) services to an airport for all CF aircraft, as well as contracted and coalition aircraft. This deployed capability can operate much like an airport operations branch at any home base; this includes the staff functions required to liaise with airfield users. Members from one of our tactical radar squadrons could be deployed as control and reporting centres outside of ATC control zones, where they will provide critical airspace management functions within the battlespace.

Flexible and Modular

In order to stay relevant and grow capabilities for the future, we must continue to push the limits of the envelope in order to develop best practices and modular capabilities that enable us to deploy for any mission at any time—with the right crew force and the right equipment. As a smaller force, members of the CF must be prepared to conduct several different missions at any one time. AECs bring a special set of skills and abilities to the fight and should be the part of any Air Wing deployed in the future.

CF Photo: WO Serge Peters

CF Photo: MCpl Robert Bottrill

CHAPTER TWELVE

INFORMATION MANAGEMENT

There is an ever-increasing amount of information produced during deployed operations. This is especially evident within the digital battlespace as we rely more on computers and related software applications. As the amount of information grows, so does the need to be able to manage this information. The information needs to be managed in order to provide commanders accurate and timely information so appropriate command decisions can be made. Information management is an operational imperative. Effective IM planning ensures that critical command and staff information requirements are met in a timely fashion. Effective IM allows all stakeholders to develop, share, and derive conclusions from collected and compiled information. The end state is a shared SA. An effective IM plan with proper implementation will provide commanders and their staffs with shared and sustained SA.

What is Information Management?

In order to exploit IM, one needs to understand what IM is and what benefits it can provide. If commanders and their staffs understand IM, then they can actively employ vast amounts of information to their benefit.

Information management (also morphing into knowledge management [KM]) is a discipline that directs and supports effective and efficient management of information. Effective IM spans organizational planning and systems development to disposal and/or long-term preservation. Information management is the planning, coordination, and control of the acquisition, analysis, processing, integration, distribution, use, safeguarding, and disposal of information. Information management ensures that the value of information is identified and fully exploited.

A definition of information management (IM) is as follows: "The means through which an organization maximizes the efficiency with which it plans, collects, organizes, controls, disseminates, uses and disposes of its information, and through which it ensures that the actual value and the potential value of that information is identified and exploited to the fullest extent."[1] In a military context, IM includes five major processes: collecting, processing, storing, displaying, and disseminating relevant information.

All members perform a certain level of personal IM while completing their daily responsibilities. One example is how members manage the email they receive. Due to limited space, the majority of members create an archive or personal storage tables file to store emails. They create a folder structure that allows them to retrieve emails or information when required at a later time.

The member follows the IM procedure described earlier: receiving the email (collecting), reading it to determine any relevant information (processing), moving it to the correct file folder within their mailbox (storing), creating a folder structure for the storage (display), and potentially forwarding the email if required (disseminating). There is already a certain level of IM inherent in Microsoft Outlook as it sorts emails in different ways such as date received, subject, and sender. While this level of IM is different for each individual, the end goal is the same—the management of information so that it can be easily accessed and exploited.

1. DTB record 13818, http://terminology.mil.ca/term-eng.asp (accessed July 7, 2011).

Another example of IM is how members name a file. Creating a naming convention is one way to manage information so that all people can look at a file and already know a certain level of information. With the naming convention currently used in theatre, people can determine the date of the file, the file number, the classification, the unit that created the file, and a description of the file. This provides members with the ability to identify different characteristics of the file without having to open it. A number of other personal IM techniques also provide benefits. Using email distribution lists, employing links, and creating shortcuts on the desktop are some quick examples. All of these techniques allow easier access to information so that it can be exploited. While these examples of IM may be basic, they provide insight into

CF Photo: MCpl Kevin Mac Aulay

IM and demonstrate some of the benefits that it can provide. The IM employed in theatre is much more complicated due to the increased amount of information being processed, but the underlying goals remain the same.

Duties and Responsibilities of an Information Management Operator within the Air Wing Headquarters

Information management is in its infancy in the Air Force. The roles and responsibilities of an IMO within the deployed Air Wing are still being defined and developed. It is important that these roles and responsibilities, including the benefits of IM, be communicated to a commander and his staff.

The overall responsibility for IM rests with the commander. The IMO within the JTF-Afg HQ is responsible to the commander (through the COS) for coordinating IM activities within the HQ. This construct differs from the reporting relationship within the Air Wing; the IMO reports to the A3. This difference does provide a shift in emphasis of IM that directly supports operations as opposed to supporting HQ staff. Information management within the Air Wing HQ is primarily concerned with operational information to support the commander's ability to make informed decisions. The IMO must be knowledgeable of information requirements and management capabilities of all staff sections within the HQ. The IMO must also understand how information flows in, out, and within the HQ.

It is important to distinguish between IM personnel and signallers/technicians. While the Air Wing IMO may be a signaller or a part of communications and electronic engineering – air (CELE-Air), it is not the IM cell staff's responsibility to fix problems with the network or with software; this responsibility belongs to the A6 branch. If the IMO comes from a technical background, it is vital that the operator acquires the operational training and experience to allow them to understand IM requirements in order to support the commander's intent.

Information management sometimes occurs when there is a keen individual completing an operations job that takes the initiative and develops a platform or program that meets a given requirement. These members are ideal candidates for the IM function as they have the operational and technical knowledge to address IM issues. Operators know what information must be processed and passed, and with a technical background, they have the ability to implement effective solutions.

It has been established that by having the IMO report within the A3 branch, the result will be a more "ops-centric" IM policy and set of procedures; this may very well be within the commander's intent, as it was for the Air Wing Roto 8. The IM would be directed at the information produced within operations for the commander to provide SA and a common operating picture (COP). Alternatively, by placing the IMO position directly under the COS, information sharing and exploitation within the HQ and the A-Staff would be the result—there would be less of an impact on IM within operations.

Tools Being Used

Users must have the opportunity to train on the IM tools that they will use while deployed. This will give users the familiarity required when IM solutions are developed in conjunction with these tools.

Tactical Network (TACNET)[2] is the main C2IS in theatre used by Canada. Two of the main programs that provide basic IM on TACNET are SharePoint and ORION.[3] SharePoint is a content management system with a web interface that supports document sharing while providing the benefit of some type of version control and with the ability to control access to files. ORION is a wiki which provides benefit of data fusion. It does not provide the level of management for files that SharePoint does, but it provides better linkage between related files. Chat is another integral program for IM. It provides everyone who has the program the ability to see the same information that everyone else does. This promotes shared SA between units. There is the ability to review past statements on chat to build a picture of what has happened in the recent past. With the Transverse chat program used in theatre, there is the ability to colour code specific words and the ability to easily view archived chat logs with Internet Explorer.

The coalition network in theatre, Afghan Mission Network, has recently implemented SharePoint for the higher HQ, regional HQ, and unit websites. This will provide commonality between systems that will give users more familiarity on how to utilize SharePoint.

The development of the land command support system (LCSS)-ISAF network, Canada's portion of the Afghan Mission Network, has given an opportunity for information sharing between our network, TACNET, and the coalition network. Despite the technical and procedural challenges, it does provide the ability to share information with coalition forces.

Although the Battleview program was developed as the COP for JTF-Afg and the Air Wing, it was determined that, due to technical limitations, it would not be able to provide the proper information in a timely fashion. As a result, information from different programs would be used to develop a COP for the commander and his staff. Chat, via Transverse, gives a significant amount of information to the staff. Falcon View became the main mapping program for different units, including the aviation battalion, to track events and incidents. The ISR feeds would provide the visual picture for the staff. All of this information would be combined to provide the proper COP to the commander and his staff.

What We are Actually Doing within Headquarters

The main challenges for IM during this tour have been the lack of HQ knowledge of what IM is and the benefits it can provide, the difficulty associated with providing IM across a joint and combined coalition environment, and providing users with an understanding of the tools available to them for IM. Information management within the HQ is still misunderstood. Some tend to group together IM and A6CIS. While these two areas can sometimes work together, they are two different disciplines that require different focus. Some of the confusion has resulted from the fact that the Air Wing IMO was double-hatted as the A6 during the first three months of deployment. This was the case from Roto 0 of the Air Wing HQ deployment until the end of the fourth month of Roto 2 when the CIS technical assistance visit (TAV) arrived in theatre. Whenever there was an issue related to technology, the commander and his staff would turn to the IMO for the solution, whether it was related to IM or CIS. This was not conducive to developing understanding of the role of the IMO within the HQ.

2. Tactical Network (TACNET) is the Army's secret-level tactical network based on and connected to their garrison secret level network known as the Land Command Support System (LCSS).

3. Orion is an encyclopaedia-based information network that is modelled after Wikipedia.

Although the IMO could be responsible to the COS for coordinating IM procedures throughout HQ, there was no opportunity for the Air Wing to train in this construct. The current organizational structure of the Air Wing HQ, with a wing COS, was only implemented once the new A6 personnel arrived in February 2010. This did not give the opportunity for the IMO and COS to work together to understand the role that the IMO can play as an enabler for the entire HQ. When the A6 team arrived in February, the Air Wing IMO reported directly to the A3 rather than to the COS. The choice was to emphasize IM within operations. This resulted in addressing operational IM issues and a more ops-centric IMO.

Since there is not a dedicated IM position within the Air Wing, IM in general was usually reactive. This resulted in addressing IM issues as they occurred. Solutions to problems encountered may not have been the best solution, but they addressed the issues at the time and moved the IM function from within the Air Wing HQ forward. When managing operations, a balance is required between analysis and decision. Sometimes the timely decision provides benefit in the interim pending the development of a better solution. This issue can be mitigated by having the IMO as the primary position and other responsibilities secondary to this.

The Air Wing IM started out following the IM plan developed by the JTF-Afg HQ. Since the Air Wing exists to support ground forces, including JTF-Afg, the JTF-Afg IM plan was adopted. This is one of the keys when working in a joint environment. If information is not managed similarly between elements, there is the risk that the different command structures are not using the same information to make decisions. While each command structure has different information requirements, it is important that they share similar information to enhance overall SA.

Naming Conventions

A naming convention is one of the simple ways IM provides excellent benefit for managing numerous files and for helping with version control. This was introduced during training events, and users were encouraged to utilize the naming convention, especially for documents that were being distributed outside the Air Wing. The naming convention has had moderate success for managing the multitude of documents.

Slowly, the Air Wing has begun to utilize SharePoint for document management. Users have started to see the IM benefits, especially for documents that are required to be shared with other units. There is much value to introducing the IM tools during training to provide users with the opportunity to use and understand them.

Sometimes IM is required in reaction to technical issues that arise. The implementation of the Defence Wide Area Network (DWAN) IM plan is one example. The plan was initiated by JTF-Afg J6 in order to address limitations with the current infrastructure, information protection, and archiving issues. There were numerous duplicate files, large amounts of media files, and liberal access across the network, and all were causing technical and security issues. In response to these issues, the IM plan was developed and coordinated.

Information management was involved in the TACNET migration. Essentially, the start state of the network needed to be determined. There were new email addresses, new user accounts, and a new folder structure with associated permissions. Program and software requirements

were determined. Information sharing requirements were determined, and the requisite information and reports were published on SharePoint.

New capabilities have been developed that bring about new IM issues. One example of this is the video data produced by the new ISR platforms. Large amounts of data produced by TF Erebus require processing, storing, and archiving. The MX-15 HD camera for the CH146 has created some issues when developing IM practices; currently, all the data for the MX-15 is being stored locally. Other airframes, such as the CF18 R2 with the sniper pod, CP140 Aurora with the MX-20, and the Cyclone helicopter, will have similar IM issues.

There is limited ability to share this information with other organizations, and new challenges will exist once download capability has been implemented successfully. Also, the question will need to be asked of how the information is going to be stored and processed—is it going to mirror the system employed by the Heron or will another plan be developed? Large amounts of files stored on the system are becoming a serious issue. If discipline with the naming convention is not followed, it will be difficult to find files when required.

Future of Information Management

Most IM has been completed by CIS personnel without an understanding of the operational requirements. It is vital there is some linkage between IM and operations. Most of the information produced is from operations for the consumption of the commander. This information needs to be managed so it can be exploited by the appropriate branch personnel. There is added benefit to having an IM representative (rep) within an operations cell. This will be evident because the IM rep will know the information needs of the commander and his staff. Information management reps can use this knowledge to develop tools or techniques to meet command structure requirements. These solutions will address the issues facing the command staff because they are the same issues that the IM rep is facing. The CIS provides the tools requested by users; IM describes how to use these tools.

It is important to train with the HQ and operations so all members can understand what IM is and what benefits it can provide. It is also important for the IMO to understand operations and information flow within the HQ to enable better solutions. Training should be completed in combination with the joint HQ IMO to ensure the acquisition of similar skills and expectations. Information management reps need to obtain an extensive level of training on the applications and software that they will be using.

The future of warfare will most likely be a combined and joint environment. This will increase the challenges to provide effective IM due to the different networks and platforms available, and so IM will need to determine the interconnectivity required between coalition networks. Information management is able to take the requirements from operations and the HQ and push these requirements to CIS and A6 to develop the proper connectivity. A key to IM is providing forces with the same information so that there is shared SA. However, classification may prevent some sharing of information with coalition partners, and the sharing could be especially difficult when capacity building within a country such as Afghanistan.

Next generation digital battlefield environments will include coalition forces, international governmental organizations, civilian agencies, and other military forces. All of the different

agencies and organizations will need to input, retrieve, and move data. Future IM will need the ability to fuse this extensive information from the different agencies in order to provide command staff with the relevant information either to advise or to make decisions. Information will need to be shared and restricted. New capabilities are inevitable with the growth of technology, including space technology, which will make available new platforms to provide information to command staff. All of these organizations and new platforms will push this information to the command staff to give them an enhanced ability to manage and decipher what is relevant, thereby allowing them to make more effective and better-informed decisions.

Effective, Shared Information

Information management is an integral part of a deployed HQ. Effective IM provides shared SA not only among the HQ and command staff, but also across all coalition forces. Technology will advance and more and more information will be produced during future operations both at home and abroad. With the increase of information, the management and exploitation of this information becomes progressively complex. This magnifies the significance of IM and the IMO in the deployments of the future.

CF Photo: MCpl Frank Hudec

CF Photo: Cpl Shilo Adamson

CHAPTER THIRTEEN

LOGISTICS AND MAINTENANCE

Logistics

The creation of Canada's first AEW during Op ATHENA in December 2008 was the beginning of a more robust future for the Air Force. The JTF-Afg Air Wing at KAF in 2010 is the most diverse wing within the Canadian Air Force. Without a doubt, it has the most intricate and involved support chain as well. The Air Wing supports four different platforms: CC130 Hercules, CH146 Griffon, CH147 Chinook, and CU170 Heron. Each platform has a different supply chain that adds another layer to the already complex supply network for Op ATHENA.

The JTF-Afg Air Wing units were stood up as separate entities over different time frames, thus there are shortcomings and redundancies across the wing. For operations at KAF, all Air Wing units have integral supply support with the A4 logistics, or wing logistics officer, with the Air Wing HQ being the conduit between units and outside agencies such as TFK HQ and 1 Cdn Air Div. Each unit has established squadron quartermasters (SQ) to provide customers with basic support; however, for all KAF-based units, the national support element (NSE) still provides the majority of the general support. In the future, when an AEW is formed as one entity rather than by piecemeal, these redundancies will be improved upon, thus providing better support to the customer while potentially doing so with fewer personnel.

Maintenance

In December 2008, the CF regained a heavy-lift helicopter capability; specifically, this was the CH147 Chinook. Six "new" 101st Airborne CH47D Chinooks were flown from Baghram Air Base to KAF. Most of these aircraft had already seen action in Vietnam, Iraq, and now, Afghanistan. The acceptance team, composed of aircrews, engineers, and technicians, was quick to rebrand these helicopters in a proper Canadian fashion.

Technicians and Training

The 2008 deployment to Afghanistan was the first overseas deployment for the CH146 Griffon and its crews since Kosovo, Bosnia. (Most recently, they were employed in Haiti.) The first two rotations in Afghanistan drew technicians from 408 Tactical Helicopter Squadron (THS), 430 THS, and several from 427 Special Operations Aviation Squadron. This shared concept proved to be difficult for Roto 8 due to the short turnover between deployments and the limited number of technicians that were available. During RTHR force generation training, members of CHF(A) participated in preparation training, unit training, and most importantly, qualification training. CH147 Chinook technicians had to be drawn from CH146 ranks, and this put considerable strain on the system.

Once selected, CH147 technicians received minimal yet sufficient training from Boeing, plus "hands-on" experience with various US Army National Guard units. Confidence and experience would come with time in theatre. This meant a steep learning curve and the Roto 8 maintenance flight demonstrated a high level of flexibility and technical expertise required to support intense combat flying ops. One valuable by-product of this rapid and steep qualification program was that newly-trained CH147 Chinook technicians were still qualified on the CH146 Griffon. Dual qualifications are "gold" in the maintenance world.

Infrastructure and Parts

The desert environment is hostile and unrelenting, especially for helicopter units and their demanding maintenance requirements. Crews were expected to operate in weather that included a cold and wet winter season and a dry and extremely hot summer season. Problems such as corrosion and overheating avionics equipment constantly plagued the maintenance flight. Aircraft parts became a serious concern; the flight had to modify shipping methods and streamline the shipping of parts classified as "Repair and Overhaul." The acquisition and cross-servicing agreement (ACSA) process was utilized when purchasing Chinook D Model parts directly from US Army units in theatre, and this proved to be very efficient when parts were available. Infrastructure requirements are an area that is often taken for granted. Roto 6 and part of Roto 7 had to work in offices on loan from NATO until construction was completed on Canadian ramps, hangars, and office space. Infrastructure development and improvement had to be done continuously throughout Roto 8; in fact, this was almost a full-time commitment, and infrastructure development must be considered a high priority during deployed operations. The infrastructure outcome at KAF was exceptional and now permits the repairing and servicing of two airframes simultaneously.

The Air Expeditionary Wing Concept

An AEW is a recent concept for the Canadian Air Force. The initial vision commenced with the Air Force Support Capability (AFSC) in 2001 and then morphed into the Air Force Expeditionary Capability (AFEC) concept. This was introduced in 2006 and further refined in 2009.[1] The AFEC concept was based on the support functions for a deployed Air Force with a MSS. Logistics foundations would force generate a mission support flight (MSF) by providing close and integral support to the deployed Air Force operation.

"An expeditionary Air Force capability enables global force projection and ensures that the Air Force can execute all types of missions anywhere and at any time."[2] The ability to achieve this will be critical in allowing the Air Force to remain relevant in the future security and operating environments. As a result, it is paramount that the logistics component be redefined to best support operations.

Although the Air Force is currently experiencing its first AEW, the existing organization was not developed based on the AFEC concept. It is impossible to use the existing MSS structure within the framework of the JTF-Afg Air Wing; the current MSS is committed to supporting the TSE staging base, not the Air Wing. As a result, the support concept that has stood up within the JTF-Afg Air Wing does not have much more than basic integral support capabilities. If the Air Wing were to redeploy in the future and have embedded support similar to an MSS, many of the current duplication of efforts would be mitigated. The Air Wing of 2010 sees three separate and distinct units providing the majority of their own close and integral support with an HQ layered on top as a late addition. As a result, the existing personnel establishment was not redefined from a strategic level to determine if processes, specifically support processes, could be streamlined.

1. 3030-1 (AFEC Rdns).
2. Godefroy, 58.

CF Photo: Sgt Craig Fiander

CC130 Hercules Support: Overcoming Geographical Challenges

Throughout Op ATHENA, the CC130 fleet is primarily supported with spare parts directly from 8 Wing Trenton. However, there is close coordination required for larger items such as engines and propellers. This coordination is between the air maintenance officer at TSE and the 8 Air Maintenance Squadron in Trenton. The parts are controlled and managed by the senior aircraft maintenance authority (SAMA) within the Hercules fleet, which has to authorize the release of the major items to TSE. To facilitate this, a memorandum of understanding (MOU) between the two organizations exists to establish a baseline of support.

A complicating factor for the resupply of CC130 aircraft spares is the fact that the TAU operates from both the TSE staging location and KAF; however, the supply account structure does not reflect the two geographical locations. As a result, to resupply the CC130 fleet, it is not as easy as a requisition in Mincom Information Management System (MIMS) to order a part. Coordination is required between the TSE and KAF in order to identify an item as one destined to support deployed operations in KAF. In order to establish a more accountable and transparent process with the CF supply system, a supply technician from the TSE was permanently forward deployed to support the TAU detachment in KAF.

CF Photo: MCpl Dan Shouinard

CH146 Griffon Support: Combining Military and Contracted Services

The Griffon helicopter is supported directly by Bell Helicopter, which requires its own supply program: the Bell customer online ordering process (COOP). Consequently, the aircraft spares clerks require specific training on this unique supply system to be able to submit demands for parts, which will be received directly by the contractor to fill the demand. To ensure that proper visibility is achieved when shipping parts directly from a contractor facility, Bell Helicopter coordinates closely with Inbound Logistics Coordination Centre (ILCC) within Canadian Material Support Group (CMSG) to move items from Calgary to Trenton for furtherance to KAF. This process, which combines military oversight with contracted supply and delivery solutions, enables supply technicians in KAF to easily track parts orders from Calgary. Through the National Movements and Distribution System (NMDS), the supply technicians are able to hasten the shipping of an item and access real-time updates on the status of a demand.

CH147 Chinook Support: Geographical, Contractual, and Coalition Challenges

The supply chain for the CH147 Chinook fleet is significantly longer than most because the consolidation point, or second- and third-line warehouse, is located in Huntsville, Alabama. This capability was purchased through a foreign military sales (FMS) contract, thus there are finite spare parts that the CF owns and to which there is quick resupply access. Although the parts are Canadian owned, the capability is a short-term initiative, and fleet support must operate through a more laborious FMS contract. Longer-term and more transparent materiel accountability and tracking solutions were not implemented. As a result, key players at the Canadian weapon system manager's (WSM) level are co-located with US Army counterparts, with a common but bureaucratic effort to support the CH147 fleet in a responsive manner.

The aircraft spares support situated in KAF is strictly provided by US contractors who use the US Chinook supply system—the Unit Level Logistics System – Aviation Enhanced (ULLS-AE)—to track parts. As a result, like the Griffon fleet, these items are not seen from a Canadian national perspective within the CF supply system. Additionally, the program that is used in KAF is a "closed-loop" program; thus, the supply technicians do not have a real-time feed of what parts are available at the consumption point in Huntsville or within coalition warehouses at KAF. Access to real-time information can be critical to operations as the aircraft sparing for the CH147 fleet is extremely limited.

If a part is not available within Canadian inventory (in KAF or in Huntsville), the team has two courses of action to pursue: determine if the part can be purchased in KAF through the ACSA process, or determine if the WSM can make amendments to the contract to purchase the part within the FMS case. The preferred and more expedient course of action would be to get the part in theatre via the ACSA process. However, relying on the ACSA process is not a sure thing—our allies are not obligated to sell us any aircraft spares at any time.

CU170 Support: Civilian Support with Customs Delays

The CU170 Heron is fully supported through civilian contractors. As a result, the only support provided by the unit is general support. Although this sounds like the easy solution, it can be frustrating for the customer—the military support chain is bound by contractual timelines and cannot influence nor expedite parts delivery. The support contract sources its parts from Israel and this introduces customs issues and delays, especially when parts are routed through certain Middle Eastern or Southwest Asian countries. Unfortunately, the normal military channels to resolve diplomatic delays cannot be used in the case of CU170 support. This has the potential to affect operations at any given time.

CF Photo: MCpl Robert Bottrill

Air Force Versus Army Support

In addition to specific fleet support, an air wing has unique basic logistics requirements that can be vastly different but equally important to that of an army brigade. As a result, it cannot be expected that an air wing can be integrated into a traditional army environment without changing or adding processes to meet requirements that are unique to an air force. These requirements can range from being very basic to quite technical. Below is an excellent example.

THROUGH THE EYES OF THE AIR FORCE:

The Air Wing has been waiting for a TAV to have its aircraft refuelling tenders undergo annual recertification. This has not been a great concern for army personnel because an army is not governed by stringent rules required to maintain airworthiness standards. In Canada, an annual recertification process would be programmed within the regular scheduled maintenance calendar; however, this is not the case in theatre, and is a layer of complication to operations in Afghanistan.

As a result, the aircraft refuelling tenders have been operating under a waiver until a TAV can support the recertification requirement. Because this tendered support is applied directly to Air Force airworthiness responsibilities, expiry dates cannot be overrun or ignored. The Air Wing commander inherits a far greater risk of accepting a delay in recertifying aircraft refuelling tenders than an Army commander in a similar predicament.

Aircraft support equipment is another area that needs attention during deployed operations; aircraft maintenance support equipment (AMSE) and maintenance tooling require regular maintenance and become critical to maintaining operational tempo. For instance, in November 2009, the NSE was not yet capable of providing full second-line support to the Air Wing's AMSE. It was one year since the Air Wing had been established and the NSE had not been provided with an up-to-date inventory of wing assets. Vehicle maintenance support for AMSE is unique to the Air Force; a typical maintenance company is not manned to support requirements that are specific to the Air Force. Airworthiness accreditation and standards are factors that cannot be ignored, even when maintaining equipment that will be only hooked up to an aircraft.

The calibration of aircraft maintenance tools is also a critical requirement; there was a basic capability to support this in Afghanistan, but out-sourcing was still required. The combination of shipping times, calibration time, and some of the very short durations between calibration dates led to some serious gaps in tooling availability. The US Army has a calibration centre located at KAF, and CHF(A) was able to set up an account to have calibration performed in KAF by our allies. This was achieved through the CH147 WSM within the FMS case for the Chinook fleet and was proven to be a true enabler for the Air Wing.

Clothing

Another basic issue that needs to be taken into consideration when there are Air Force units within an army-dominated environment is clothing. Initiatives are continually sought to better support Army personnel in a theatre of war; however, the same specifications cannot

automatically be translated to their Air Wing comrades. The Air Force must adopt airworthiness standards when it is looking to introduce new clothing items to aircrew; it must also be recognized that there are impacts to the ground crew. For instance, the Army is introducing a new Dri-Fire shirt that has moisture wicking properties that are ideal for an operating location such as Afghanistan. However, based on current specifications, Air Force personnel working around aircraft cannot benefit from this excellent piece of military clothing because it does not have the anti-static properties required.

This is just one example of why having a robust AEW capability to address larger air-wing issues is ideal. In a case such as this, the Air Wing HQ is best positioned to coordinate in-theatre test and evaluation requirements so that innovative and operationally beneficial clothing and equipment can be introduced to theatre operations in a timely manner. Identifying an appropriate hot-weather shirt suitable for the extreme environmental conditions of an Afghanistan summer and receiving the item the following winter is not ideal.

Bridging the Gap

It is anticipated that "the CF *will* face considerable challenges, and very likely, increasing demands for participation in international stability operations" (italics in original).[3] As a result, logistics support needs to be equally robust to ensure that increased international activity is supportable and sustainable. For logisticians to best support operations, they must constantly coordinate their support efforts with the operators in order to better understand and appreciate mission priorities and future activities. With this SA, logisticians can plan and prepare a concept to best support the operators. However, without the ability to plan support, logisticians are left to be reactive vice proactive in response to operationally important situations. This does not make for overly effective support, and usually just meets the basic needs.

Logisticians must be able to provide the right support at the right time to optimize the capabilities of air operations. This means having the right tools to provide effective support. Currently, there are few facts that supply technicians can rely on to determine stock levels required to manage a fleet. This has been set over time and through experience rather than through historical data. With the coming of a new Air Force it will be critical for the logistics support to develop at a rate equal to that of the operational capability.

"The future Air Force must be robust, agile, flexible, relevant, and decisive. It must be knowledge-based, combat-effective, interoperable, and conducive to joint, interagency, multinational and public (JIMP) operations."[4] To be able to support the future Air Force, logisticians need to be just as robust, agile, flexible, relevant, and decisive. The air logistics branch needs to be viewed as truly supporting the operations; it must be a centre of subject matter expertise that determines the most suitable methods to sustain operations.

Equipment

In addition to getting the support structure right, the Air Force also needs to get the equipment right. Analysing the usage rates of aircraft spares for all Canadian Air Force fleets is essential to ensure that when these fleets are deployed, a comprehensive "pack-up kit" is there to support the maintenance activities required. Using historical data to predict future requirements will

3. Godefroy, 1.
4. Ibid, ix.

provide better support to any operation. Distribution Resource Planning (DRP) is a tool that can extrapolate data up to 48 months old and produce usage rates and recommended maximums and minimums for stock levels. If not this particular tool, a similar tool needs to be employed at first- and second-line units to better prepare stock levels for maintenance activities.

Resource planning data becomes even more critical when standing up an AEW because it removes the guesswork from determining the best sparing levels required to sustain operations at a forward location. Furthermore, because the AEW concept is based on the ability to support any combination of aircraft fleets, it is not necessarily guaranteed that there will be logistics expertise within the MSF for each particular platform. It will be critical for deployed logistics personnel to have access to a common resource to plan more precisely and to provide better support to the mission. Even with the best team, success will not be achieved without the correct tools and equipment for logistics staff to perform their duties. Greater emphasis needs to be placed on planning tools and appropriate resources to mitigate future requirements that could have significant impact on operations.

To Predict Future Requirements

The Air Force has made great strides in standing up its first AEW; the Air Wing has been highly effective given both the rapid introduction and many operational constraints. In moving forward, there are real efficiencies that can be made to ensure that an AEW is successfully supported not only to meet the demands of current operations but also to predict future requirements. In doing so, not only would customers have greater confidence in the logistics system, but also the AEW would have greater operational flexibility.

CF Photo: Cpl Isabel Lavallee-Raby

CF Photo: Cpl Tina Gillies

CHAPTER FOURTEEN

A6 COMMUNICATIONS INFORMATION SYSTEMS

"In the war against terror, there is no such thing as a doorstep defence.You cannot be, as a nation—any nation—an oasis unto yourself. You've got to be part of an international dynamic that is more stable, less chaotic, and not the fertile garden for growing terrorists." General Rick Hillier[1]

Learning from the Past, for the Future

In his landmark text, *Futuring: The Exploration of the Future*,[2] Edward Cornish compares the study of the future with the grand expeditions of the great European explorers. Military professionals will readily identify with the great explorers' meticulous preparations. An explorer's success depended upon having the right equipment, the right supplies, the right teammates, and the right training—all at the right time. In addition, Cornish identifies seven lessons from these great expeditions that are applicable to any study of the future: prepare for obstacles, anticipate needs, use poor information when necessary, expect the unexpected, think long term (strategically) as well as short term (tactically), dream productively (creatively innovate), and learn from predecessors.

Learning from our predecessors is nothing new. We have been doing this since the beginning of humankind, and the learning process is fundamental to growth. We find ourselves in an era of persistent growth fuelled by an information-led society. With growth comes understanding. Understanding fosters the development of ideas. Differences in ideas can lead to conflict. In managing conflict, we must possess the ability to harness information in order to apply lessons learned. This evolution becomes more critical as we adapt to newer technologies, especially when dealing with information and knowledge management. The proper application of available and budding technologies is vital to forward progress.

New Beginnings in February 2009

The primary objective of this chapter is to provide the reader with an assessment on how the Air Force vision is being achieved vis-à-vis the role of IT and CIS. This will be accomplished by applying lessons learned from the JTF-Afg Air Wing A6 Branch, which was added to the Roto 8 Air Wing in February 2009. To orient the assessment, the Air Force vision as depicted by the publication *Projecting Power 2035* will be used.

The next section orients the reader to the predicted role of IT and CIS as viewed by *Projecting Power 2035*. The observations will be framed within the publication's definition of the five primary Air Force functions that will guide future development of the Air Force.[3]

1. Steven Chase, "Outspoken general bows out with no regrets," *The Globe and Mail*, April 16, 2008, http://v1.theglobeandmail.com/servlet/story/RTGAM.20080416.whillier16/BNStory/Front (accessed July 7, 2011).

2. Edward Cornish, *Futuring: The Exploration of the Future* (Bethesda, MD: World Future Society, 2004), 1.

3. Since the publication of *Projecting Power 2035*, the Air Force functions have been modified to total six in number, and they are Command, Act (Shape and Move), Sense, Sustain, Shield, Generate. See Canada, DND, B-GA-400-000/FP-000 *Canadian Forces Aerospace Doctrine*, 2nd ed., December 2010, http://www.airforce.forces.gc.ca/cfawc/CDD/Doctrine_e.asp (accessed July 7, 2011).

Today's Air Force will become an interconnected and interoperable system of sensor networks, decision-makers, and shooters of tomorrow.

Five Primary Air Force Functions

The five primary Air Force functions are listed as Command, Sense, Shape, Move, and Sustain. In order to maintain focus, only three important functions will be discussed in this chapter. This section will focus on the functions that are influenced and enabled by CIS expertise and technology: Command, Sense, and Sustain. Although not elaborated upon in this chapter, shaping the digital battlespace is a physical and information operations objective.

CF Photo: Cpl John Bradley

Command

Command is "the operational function that integrates all the operational functions into a single comprehensive strategic, operational or tactical level concept."[4] Inherent in Command is the act of making decisions and ensuring that those decisions are carried out. Accurate and timely information is a fundamental requirement.

4. DTB Record 26166.

Projecting Power 2035 states that the future Air Force will be supported by rapid, network-enabled information systems. Once a clear understanding of the commander's intent has been established, modern information and knowledge systems will provide the means to enable commanders at all levels to make and effect decisions. The ability to electronically assign resources with accountability will permit flexible decision-making in near real time. The Air Force must invest in the development of information networks that employ both a network-centric and a distributed computing system to manage future aerospace platforms and systems. This will require modern information networks with collaborative information sharing technologies in order to seamlessly integrate Air Force with joint and combined networked operations.

Projecting Power 2035 envisions that a "virtual" CAOC may be relied upon for C2 of all aerospace ops. Today, modern military forces can deploy modeling and simulation technology to rehearse large-scale in-theatre distributed training to quickly enable operational planning for coalition partners. Finally, to support efficient decision-making processes, there exists a requirement for real-time imagery and up-to-date intelligence information. Networks that support this must be sealed, secure, and reliable. Most importantly, trust will play a central role in achieving missions in a distributed battlespace. Establishing, maintaining, and fostering trust through distributed information systems will require flexible leadership styles and the creation of varied complex relationships between sensors, decision-makers, and the shooters. It is expected that decision-making and actions in future aerospace ops will continue to be made in near real time; therefore, the information tempo does not outpace the commander's decision-making capability. See example below.

EMPOWERING DECISION-MAKERS:

Approximately 10 years ago, RAND Institute, a government think tank in the United States, coined the term "network-centric" and introduced its approach to support military decision-making. By using interconnected sensors (i.e., military platforms) to "see" the battlefield, information is quickly routed to a centralized decision-maker who may be located at a distance from the actual battle. Five years ago, this centralized and hierarchical approach to decisions-making transformed to a distributed approach. By empowering decision-makers at all levels with a "commander's intent," the effect was to empower decision-making at the pointy end.

Today, technicians in the Air Force have developed the technical expertise to interconnect and administer networks. These advances were the result of convergence to using common standards, interfaces, and the adoption of the best practice design methodologies.

The difficult part, however, is implementing security controls. Implementing different national security policies from different countries is an extremely complex technical problem. This is currently seen in Afghanistan. Some positions require four different workstations on their desktop to be able to adequately function in a coalition environment. Trust is required by nations to allow other nations access to their information; this creates delays, and sometimes, is just not accepted practice.

The solution then becomes something called "federating."[5] Federating is not commonly understood amongst different nations and takes significant understanding of technology to implement; it also requires investment. Naturally, not all nations can / are able to invest. Hence, standardization and connectivity issues exist. Therefore, compartmentalization of information for security purposes remains a complex issue. The CF must ensure that it continues to invest in the international development of coalition networks and information systems. It is essential that national security policies and information security are accounted for when subscribing to a federated coalition network.

Sense

Sense is "the operational function that provides the commander with knowledge."[6] The key to the successful military ops is acquiring information and processing it rapidly for decision-makers. An example is the process outlined in the text box below.

THE OODA LOOP (OBSERVE, ORIENT, DECIDE AND ACT)

In the 1980s, Lieutenant-Colonel John Boyd, a retired US Air Force fighter pilot, developed a key concept that is referred to as the "OODA Loop." The OODA Loop—observe, orient, decide, and act—is a decision-making process by which an entity, either an individual or an organization, reacts to an event. Subsequently, the key to victory is to be able to create situations wherein one can make appropriate decisions more quickly than one's opponent. This theory is applied in modern military strategic thinking and forms the basis for rapidly changing IT and communications support systems.

Data is an antiquated term. Today, given the compressed decision-making cycle, information is processed by the sensor. Therefore, using common interfacing standards, the platform senses the information necessary and displays it to be used quickly. This is called near real time. Although the processing can be done almost instantly, the near real time is a function of the transmission mechanism. *Projecting Power 2035* states that real-time systems will be commonplace in the future. Furthermore, *Projecting Power 2035* states that the Air Force of the future will collect, filter, fuse, analyse, disseminate, store, and retrieve knowledge to improve shared SA. We are still in the data/information realm, but progress is being made.

Currently, significant advances are being made in the world of artificial intelligence towards replacing the decision-maker with automated decision-making capabilities (recall HAL in *2001: A Space Odyssey*); we are not there yet. It is envisioned that most air-breathing platforms will be capable of conducting extensive ISR tasks, and all sensors will be directly connected to C2 systems as a sealed and self-sustaining network. This is being done today, and can be seen in Afghanistan with a host of platforms able to provide ISR services.

5. Federating is a revolutionary approach that promotes the interconnection of systems. In an interconnected environment, stakeholders bring together capabilities and connect them among themselves.

6. DTB Record 26167.

In reality, however, observations made in Afghanistan suggest that being able to transmit near real time is still a problem. The issue stems from the ability to quickly adapt to changing circumstances and respond with the appropriate engineering support. For example, it has been demonstrated that the current satellite communication facility to provide rear-link communications can no longer meet the demand of secure C2 information requirements. Engineering support to rectify this deficiency is estimated to take five to six months. Operations must continue, and the impact of not having the appropriate tools means that security risks may exist or that timely information for decision support will not be available. Ultimately, decision-makers will have to rely on experience and the best information available to support their decisions. To stay inside an adversary's OODA loop, the best information will have to be better. Technology has a role to play here.

Sustain

Sustain is "the operational function that regenerates and maintains capabilities in support of operations."[7] This is called force generation and there is a critical requirement to ensure that the Air Force of tomorrow has the properly trained technicians and planners.

During inception planning for the JTF-Afg Air Wing in 2008, it was determined that the Air Wing would deploy without integral CIS augmentation. Support would be provided by the JTF-Afg J6 and the signals squadron. In April 2009 came the realization that with an increase to the deployed establishment of approximately 10 per cent, the CIS support footprint was not matched accordingly. This disparity was reviewed and the A6 CIS support function was added to the Air Wing in February 2010. The lessons learned from the insertion of the A6 branch have highlighted the importance of this new Air Wing capability.

A6 Specific Lessons Learned

Below are some of the lessons learned from the A6. These lessons learned consist of a service support strategy that relies heavily upon using all the expertise available at the Air Wing to ensure effective and efficient use of resources. Furthermore, it provides a service support model for the Air Wing help desk. The intent was not to build a separate stove-piped help desk, but to complement and load-shed the national Information Management Service Transformation (IMST) initiative in Canada. It was agreed that A6 service personnel would work with the civilian contracted help desk in order to establish a virtual extension via a temporary Air Wing help desk. Meanwhile, the A6 refined the integral CIS requirements for the Air Wing. The two items are presented below in more detail.

Developing a Strategic Plan

The first step was to determine how to quickly and efficiently align A6 strengths with external support agencies. Another important objective was to tactfully merge a new A6 role with technical resources already residing within Air Wing units. With the focus on the management of information, a service support strategic model was designed. The governing intent was to match appropriate subject matter expertise from the A6 branch to three primary categories of users within the Air Wing.

7. DTB Record 26170.

These categories and corresponding A6 support authorities are as follows:

- **Category 3:** other IM/IT professionals, such as A6 COMKAF (commander of Kandahar Airfield), Canadian Forces Contractor Augmentation Program (CANCAP), J6, S6, et cetera. The primary authority for direct service interaction was the A6.
- **Category 2:** Air Wing IT and CIS "super users" such as pilots, navigators, aviation technicians, administrative personnel, and other "out-of-trade" personnel who are very knowledgeable with IT and CIS. The authority for interaction and coordination rests with the A6 master warrant officer. Many short-term projects lie in this area.
- **Category 1:** average users who are not interested in the inner workings of IT equipment. These users want systems implemented or maintained to meet specific needs. The authority for service interaction and coordination is the A6 help desk.

Using the above system effectively and efficiently allowed for ease of transition and directed the right level of technical knowledge at the appropriate user base. The system also enabled division of labour and service coordination and allowed the A6 to harness the experience and knowledge of users to ensure a team approach to effecting change.

THE AIR WING COMMUNICATION AND INFORMATION SYSTEMS HELP DESK

The Plan

A temporary Air Wing A6 help desk was quickly implemented by incorporating the strategy presented above. By providing a single call centre within the Air Wing, the help desk was able to quickly determine priority of services and specific problem areas unique to the Air Wing.

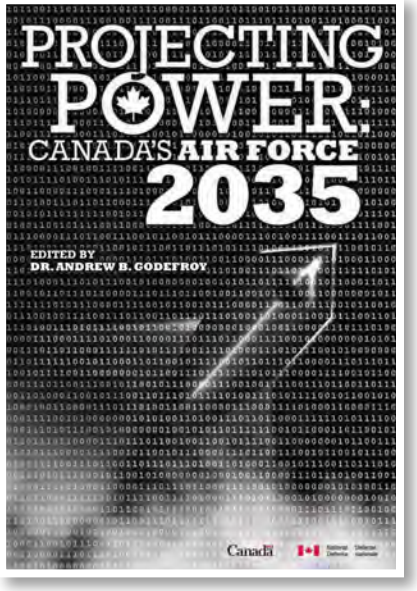
To implement the help desk, two technicians were dispatched from the TSE on rotational basis. At TSE, an MSS was in place and the technicians were part of a group of eighteen technicians, linemen, and operators who provided integral support to the TSE. The two TSE technicians provided had an IT systems background and focus tailored to the operational and support requirements at TSE.

Results

Establishing the A6 help desk was an absolute success. It not only allowed the identification of key service process issues, it also became a logical and more responsive extension of the CANCAP help desk. As importantly, the A6 help desk was able to load-shed the local signals squadron by providing second-line support, especially given geographical challenges at the vast KAF. Another benefit of the A6 help desk was that it was easily transformed into a service depot with very little effort. Therefore, the centralized help desk could use existing software and function as a consolidated service desk to provide second-line service support throughout KAF.

A Look into the Future

Projecting Power 2035 provides the reader with a futuristic glimpse of Canada's Air Force, and presents five fundamental Air Force functions. Using lessons learned from JTF-Afg Air Wing Roto 8 and its recent deployment to Afghanistan, the Air Wing A6 provides a SITREP on how this future function looks today.



There is no doubt that we live in an information age. The importance of information and how it enables decision-making is clear. The use of technology to gather and process information and to make it readily (real-time) available to the decision-maker is critical for modern military forces. Connecting coalition contributors with common and secure technology and information systems remains a challenge, but state-of-the-art enablers that permit decision-makers to command, sense, sustain, and train will keep the Air Force's OODA Loop one step ahead of its adversary's.

CF Photo: MCpl Dan Shouinard

CF Photo: MCpl Dan Shouinard

CHAPTER FIFTEEN

THE NEXT MISSION

Laminar Strike is TF Silver Dart's projection of air power solutions for the near future. Through recent deployment experiences and the introduction of numerous capabilities, JTF-Afg Air Wing Roto 8 is testimony that an agile, modular, and balanced expeditionary air wing is within reach—we are on our way to 2035.

The Manley Panel provided reason for the introduction of the deployed Air Wing and its newest capabilities in 2008, and it had an immediate and positive impact on the battlefield in Kandahar. The deployed Air Wing has also been the proving ground for the Air Force's ability to "push the envelope" and bring new tools to the joint fight: counter-IED and CCA sense-and-shoot missions, JCAT qualifications, BI-flare drop missions, unparalleled tactical airlift support to NATO, a refined HQ that employs the continental A-Staff construct, an integral CIS support team, a responsive logistics network that leverages contracted supply chains and cross-sharing enablers with coalition partners, command of the TACP detachment, enhanced control of contracted aviation airlift, extended and dual-vehicle UAV ops, and a dedicated IM position that is nested in the operations branch.

These new capabilities and tools have not been one-dimensional additions to the joint battlefield; rather, they have become complementary to one another and have provided much in the way of synergistic payoff—for the Air Wing and the joint task force. The TF Erebus Heron UAV will monitor insurgent patterns over time, and the unit will then advise the TACP detachment that an area of interest exists. This is done through the normal chain of command followed by a courtesy call to the TACP liaison officer. The TACP detachment studies the data and coordinates kinetic options with TF Freedom while staffing a mission request. Task Force Freedom works in conjunction with the Air Wing A3 branch to secure a line of tasking in order to conduct the CCA mission. Once on mission, the Heron UAV will circle overhead the target in order to pick up threats and to positively identify the target. There are many layers to a mission like this, and the layers are becoming more and more Canadian. This is only one example, and there are many more.

As Op ATHENA winds down in 2011, the CF will have to ready itself for the next mission. The OPCOM in Canada will undergo another transformation in order to model a C2 construct around expeditionary operations of the future. At the same time, more attention will be paid to Canada's security and sovereignty, especially in Canada's Arctic. Op NANOOK was conducted in August 2010, and it demonstrated how the CF and WoG partners can deal with challenges in the North. The exercise consisted of more than 900 participants from the Canadian Navy, Army, Air and Special Forces. More than 600 personnel from Denmark and the US participated, and 14 governmental departments and agencies were also involved in the exercise.[1]

1. Canada, DND, "Canada Command – Op NANOOK 2010," *National Defence and the Canadian Forces*, (August-October, 2010), http://www.canadacom.forces.gc.ca/daily/archive-nanook10-eng.asp?#200810 (accessed July 7, 2011).

Whether the next mission is in the Congo, Haiti, or Northern Canada, it must be considered as an expeditionary mission. It will involve a WoG solution and will most probably be combined with international partners—military and civilian. The Air Force will play a key role, especially as the inventory of capabilities and platforms becomes broader: strategic and tactical airlifters with excellent response times, heavy-lift helicopters with exceptional power and versatility, UAVs with unheard of endurance and surveillance capabilities, real-time information processing and management tools, a state-of-the-art fighter aircraft, a new maritime sensor helicopter, and above all, a crew force that has been seasoned in battle alongside joint coalition forces and other government stakeholders.

Not only will the Air Force be more robust and flexible, but also it will be capable of layering its many specialties so that synergies can be realized, much like those experienced in Kandahar by the JTF-Afg Air Wing Roto 8. Canada's post-Op ATHENA Air Force will be fluid, smooth, and regular; it will flow as though in different layers. It will be laminar.

Drawing by Col David Lothian

CONCLUDING REMARKS

Laminar Strike is a reflection on 17 months of accumulated knowledge and experiences from a diverse group of professional men and women of all ranks and positions who have served on the road to high readiness and on a 10-month tour in Afghanistan. Their tour ended on 8 September 2010, and they have closed another significant chapter of Canadian Air Force history.

These individuals have become a tight and integral part of the most versatile Air Wing assembled in recent times, and they have devoted their expertise to this manual so that first-hand knowledge may be passed on to their peers and to future leaders of the Air Force. The chapters and case studies within this book are not the definitive answers, but rather are the results of discussion, reflection, experience, and lessons learned during training and theatre operations. *Laminar Strike* is a living example of TF Silver Dart and its ability to demonstrate innovative flexibility and significant progress while employing many layers of air power. *Laminar Strike* is also a glimpse into the future through the eyes of the Air Wing members who committed almost a year and a half to Canada's mission in Afghanistan.

People are our strongest asset, and the Silver Dart team has proven that a cross section of Air Force personnel can accomplish great synergies and contribute immensely to expeditionary joint operations. The deployed Air Wing has sustained the pace and the relevance of the security mission in Kandahar and has brought to life the recommendations brought forth by the Manley Report. The collective contributions of TF Silver Dart have shown how balanced, agile, and modular solutions envisioned in *Projecting Power 2035* are well within reach. Canada's Air Force is well on its way to being able to command, sense, shape, move, and sustain operations in future operating environments at home or abroad.

GLOSSARY

The definitions contained in this glossary are derived from several sources. Where this document is the source, none will be indicated. Definitions taken from other sources will be indicated at the end of each term using the following abbreviations:

DTB – *Defence Terminology Bank*, http://terminology.mil.ca/term-eng.asp
PP CAF-2035 – *Projecting Power: Canada's Air Force 2035*, http://trenton.mil.ca/lodger/CFAWC/production/pubs/Projecting_Power-Canadas_Air_Force_2035_e.pdf

air expeditionary wing (AEW)
A deployed aerospace force that employs aerospace power and conducts aerospace operations. Note: An AEW comprises, at its core, a command element, one or more air detachments, an operations support flight and a mission support flight. (DTB Record 34903)

Air Force (AF)
The branch of the armed forces charged with generating and projecting aerospace power in defence of the nation and its national interests and institutions. (DTB Record 34080)

air power
That component of military power that is applied within or from the air environment to achieve efforts above, on, and below the surface of the earth. (PP CAF-2035)

collateral damage
Inadvertent casualties and destruction in civilian areas caused by military operations. (DTB Record 26989)

counter-insurgency (COIN)
Those military, paramilitary, political, economic, psychological and civic actions taken to defeat insurgency. (DTB Record 3941)

combat operation
A military force where the use or threatened use of force, including lethal force, is essential to impose will on an armed opponent or to accomplish a mission. The actual level of force used will be in accordance with specified rules of engagement. (DTB Record 21754)

emerging threat
The increasing presence of social, environmental, economic, and military problems that may cause instability, thereby resulting in diplomatic or military intervention.

information domain
The domain in which information and data reside. (PP CAF-2035)

information management (IM)
The means through which an organization maximizes the efficiency with which it plans, collects, organizes, controls, disseminates, uses and disposes of its information, and through which it ensures that the actual value and the potential value of that information is identified and exploited to the fullest extent. (DTB Record 13818)

intelligence, surveillance and reconnaissance (ISR)
An activity that synchronizes and integrates the planning and operation of sensors and assets as well as the processing, exploitation and dissemination of the resulting information and intelligence. Note: ISR is an integrated intelligence and operations function in direct support of current and future operations. (PP CAF-2035)

knowledge management (KM)
An integrated systematic approach which when applied to an organization enables the optimal use of timely, accurate and relevant information; it also facilitates knowledge discovery and innovation, fosters the development of a learning organization and enhances understanding by integrating all sources of information, as well as individual and collective knowledge and experience. (DTB Record 18879)

network-centric
Network centric operations (NCO) rely on computer equipment and networked communications technology to provide a shared awareness of the battle space.

projecting power
The ability of a nation to apply all or some of its elements of national power—diplomatic, information, military and economic—to rapidly and effectively deploy and sustain forces in and from multiple dispersed locations (at home or abroad) to respond to crises , to contribute to deterrence, and to enhance regional stability. (PP CAF-2035)

LIST OF ABBREVIATIONS

1 Cdn Air Div	1 Canadian Air Division
3D	3 dimensional
ACSA	acquisition and cross-servicing agreement
ACSO	air combat systems officer
admin	administrative/administration
AeC	aerospace controller
AerE	aerospace engineering
AESOP	airborne electronic sensor operator
AEW	air expeditionary wing
AFEC	Air Force expeditionary capability
AFLLO	Air Force lessons learned officer
AGM	air-to-ground missile
AIM	air intercept missile
Air Int	air intelligence
Air Log	air logistics
Air Ops	air operations
ALO	air liaison officer
AMC	air mission commander
AMF	air mobility force
AMSE	aircraft maintenance support equipment
ANA	Afghan National Army
AO	area of operations
ASCC	airspace coordination centre
ASIC	all source intelligence centre
ATC	air traffic control
avn	aviation
AVO	air vehicle operator
AWACS	airborne warning and control system
BC	British Columbia
BDA	battle damage assessment
BG	battle group
BI	black illumination

C2	command and control
C2IS	command and control information system
CANCAP	Canadian Forces Contractor Augmentation Program
CAOC	combined air operations centre
Capt	captain
CAS	close air support
CCA	close combat attack
CCAT	Canadian Contracted Air Transport
CDS	container delivery system
CEFCOM	Canadian Expeditionary Force Command
CELE	communications and electronics engineering
CF	Canadian Forces
CFAWC	Canadian Forces Aerospace Warfare Centre
CHF(A)	Canadian Helicopter Force Afghanistan
CHUD	Canadian Heron Unmanned Aerial Vehicle Detachment
CIS	communication and information systems
CO	commanding officer
COC	combat operations centre
COIN	counter-insurgency
Col	colonel
comd	commander
CONOPS	concept of operations
COP	common operating picture
COS	chief of staff
COS Ops	Chief of Staff–Operations
COS Sp	Chief of Staff–Support
coy	company
CWO	chief warrant officer
D / W Comd	deputy wing commander
DND	Department of National Defence
DZ	drop zone

EA	executive assistant
ELINT	electronic intelligence
EP2	Enhanced Paveway 2
EW	electronic warfare
FLIR	forward looking infra-red
FMS	foreign military sales
FMV	full-motion video
FOB	forward operating base
FOC	full operational capability
FOM	freedom of movement
FSCC	fire support coordination centre
FSO	flight safety officer
ft	feet
GBU	guided bomb unit
GCS	ground control station
GPS	global positioning system
GWT	Griffon weapons team
HQ	headquarters
IA	intelligence analyst
ICDS	improved container delivery system
IED	improvised explosive device
IFR	instrument flight rules
IM	information management
IMO	information management operator
in	inch
int	intelligence
IR	infrared
ISAF	International Security Assistance Force
ISR	intelligence, surveillance and reconnaissance
ISTAR	intelligence, surveillance, target acquisition and reconnaissance
IT	information technology

JCAT	Joint Combat Assessment Team
JHMCS	joint helmet mounted cueing system
JTAC	joint terminal attack controllers
JTF-Afg	Joint Task Force Afghanistan
KAF	Kandahar Airfield
kg	kilogram
km	kilometre
KM	knowledge management
lb	pound
LCA	local cultural advisor
LCol	lieutenant-colonel
LGTR	laser guided training round
Log Admin	logistics administrator
LZ	landing zone
m	metre
Maj	major
MEDEVAC	medical evacuation
Mk	Mark
mm	millimetre
MOB	main operating base
MSF	mission support flight
MSS	mission support squadron
NATO	North Atlantic Treaty Organization
NORAD	North American Aerospace Defence Command
NSE	national support element
NVD	night vision device
OC	officer commanding
OODA (Loop)	observe, orient, decide, act
Op	operation

OPCOM	operational command
OPCON	operational control
OPP	operational planning process
ops	operations
PGADS	precision guided air delivery system
PO	payload operator
PSS	persistent surveillance systems
PST	persistent surveillance towers
PTDS	persistent threat detection systems
QRF	quick reaction force
RC	repair coordinator
RC(S)	Regional Command South
RECCE	reconnaissance
rep	representative
Roto	rotation
ROVER	receive-only video enhanced receiver
ROZ	restricted operating zone
RTHR	road to high readiness
SA	situational awareness
SAF	small arms fire
SAMEO	squadron aircraft maintenance and engineering officer
SAR	search and rescue
SCIF	sensitive compartmented information facility
SCTF	Standing Contingency Task Force
sgt	sergeant
SITREP	situation report
SKAD	survival kit air droppable
SW	southwest
tac avn	tactical aviation
TACNET	Tactical Network

TACOM	tactical command
TACON	tactical control
TACP	tactical air control party
TAIS	tactical air intelligence section
TALLO	tactical air lessons learned officer
TAT	tactical air transport
TAU	tactical airlift unit
TAV	technical assistance visit
TCDL	tactical common data link
TDL	tactical data link
TF	task force
TFK	Task Force Kandahar
TFS	tactical fighter squadron
THS	tactical helicopter squadron
TIC	troops in contact
TO	theatre of operations
TOC	tactical operations centre
TSE	theatre support element
UAS	unmanned aerial system
UAV	unmanned aerial vehicle
UK	United Kingdom
US	United States
W Admin O	wing administrative officer
W Comd	wing commander
W Int O	wing intelligence officer
W Log O	wing logistics officer
W Maint O	wing maintenance officer
W Ops O	wing operations officer
WCWO	wing chief warrant officer
WFSO	wing flight safety officer
WoG	whole of government
WSM	weapon system manager

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