B-GA-402-003/FP-001

ROYAL CANADIAN AIR FORCE

DOCTRINE

FORCE SUSTAINMENT

National Defence Défense nationale

CANADIAN ARMED FORCES
FORCES ARMÉES CANADIENNES

Canada

Issued on the authority of the Commander Royal Canadian Air Force

D2-384/2017E-PDF
978-0-660-08387-2

B-GA-402-003/FP-001

This publication is available on the DIN at http://w08-ttn-vmweb01/CFAWC/en/index.asp
and on the Internet at http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/aerospace-doctrine.page

Art direction by Canadian Forces Aerospace Warfare Centre
Production Section

2nd Edition, July 2017

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PREFACE

This manual provides the operational-level doctrine for force sustainment within the Royal Canadian Air Force (RCAF). This manual has been designed for use by the following:

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

b. CAF air units and headquarters; and

c. other CAF elements that command or support CAF air forces.

This manual is presented in five chapters:

a. **Chapter 1 – Sustainment** provides an overview of the CAF support framework, strategic lines of communications, operational-support-hub concept as well as the relationship between the levels of sustainment and lines of support.

b. **Chapter 2 – Fundamentals of Sustainment** includes the principles, characteristics and components of RCAF sustainment.

c. **Chapter 3 – Supporting the RCAF** focuses on supporting elements (operations support, aircraft-weapon-system maintenance, mission support and specialist support), unique support situations (support to tactical aviation and maritime air) and support service-delivery options (military assets, contract services, host-nation support and cooperation with other nations).

d. **Chapter 4 – Support to Operations** discusses how main operating bases support operations. It also reviews how operations—single environment (RCAF), expeditionary and North American Aerospace Defence Command—are supported.

e. **Chapter 5 – Support Planning** introduces the CAF operations planning process; provides an overview of support planning, the support estimate and its planning factors; and discusses support planning during operations and considerations for reconstitution.

This manual supersedes B-GA-406-000/FP-001, *Canadian Forces Aerospace Sustain Doctrine*, 1st edition, February 2011 and is to be used in conjunction with:

a. B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*;

b. B-GA-401-002/FP-001, *Royal Canadian Air Force Doctrine: Intelligence, Surveillance and Reconnaissance*;

c. B-GA-402-001/FP-001, *Royal Canadian Air Force Doctrine: Command and Control*;

d. B-GA-403-000/FP-001, *Canadian Forces Aerospace Shape Doctrine*;

e. B-GA-404-000/FP-001, *Canadian Forces Aerospace Move Doctrine*; and

f. B-GA-405-000/FP-001, *Canadian Forces Aerospace Shield Doctrine*.

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

The Commander 1 Canadian Air Division is the approval authority for this doctrine.

KEYNOTES

These keynotes are the fundamental beliefs upon which this doctrine publication is built.

- The force-sustainment capability encompasses the four components of sustainment—personnel, materiel, infrastructure and services—that must be provided to enable air operations.
- Sustaining the Royal Canadian Air Force (RCAF) requires sufficient operations-support and mission-support capabilities within the force structure at all destinations for all theatres and categories of operations.
- The application of the principles of sustainment increases the probability of a successful support plan and the effective conduct of sustainment operations.
- The following five characteristics of sustainment should be incorporated in all sustainment plans and operations: robustness, agility, scalability, integration and reliability.
- The following five key factors apply when planning the support requirements for a military operation: destination, demand, distance, duration and risk.
- Reconstitution is a key activity that is planned and implemented to restore a desired level of combat effectiveness to RCAF units and assets.
- Essential requirements to sustain a main operating base or deployed operating base are: common organizational structures, common processes and procedures, consistent standards for equipment and training as well as the application of common prioritization criteria for personnel and materiel.
- Support planning must be fully integrated in all phases of the overall planning process.

CHAPTER 1

SUSTAINMENT

CAF Photo

INTRODUCTION

The Royal Canadian Air Force's (RCAF's) recent involvement in operations around the world has been extremely varied in nature, and this trend is likely to continue. The employment and sustainment of air power are complex activities and require a unique mix of professional skills, knowledge, cohesion and teamwork. Demands upon all elements of the RCAF are apparent as it adapts to operations prosecuted across vast distances and against a constantly evolving threat. Notwithstanding this volatility, the fundamental framework of the Canadian Armed Forces (CAF) sustainment system remains constant, regardless of the conditions or nature of the operation. Based on the premise that the RCAF will continue to conduct operations at home and abroad, the ability to sustain those operations remains one of the highest priorities for the RCAF.

THE CAF SUPPORT FRAMEWORK

At the strategic and operational levels, the RCAF uses the integrated CAF support framework, depicted in Figure 1-1, to support itself. At the tactical level, the RCAF employs mission- and operations-support elements (MSEs and OSEs) to provide tactical-level support to a deployed air task force (ATF). In turn, the MSE engages the centralized CAF national system through the joint task force support component (JTFSC) for operational-level support. The CAF support framework is designed to provide the required support to deployed forces in the right quantity at the right place and at the right time. The framework—spanning the strategic, operational and tactical levels—involves a number of supporting organizations and agencies, both internal and external to CAF.

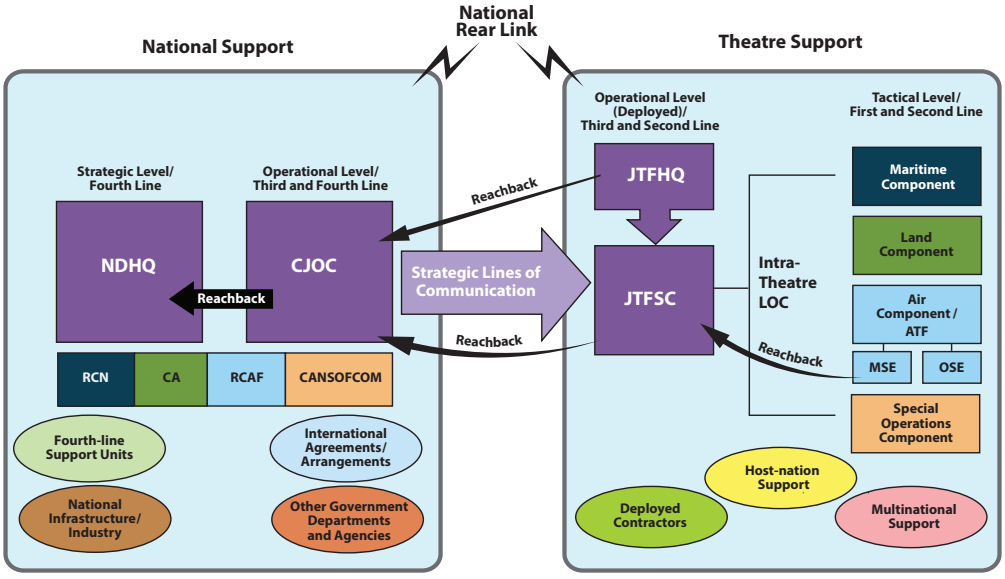


Figure 1-1. The CAF support framework[1]

1. B-GL-005-400/FP-001, Canadian Forces Joint Publication (CFJP) 4-0, *Support* (February 24, 2014), 2-3.

STRATEGIC LINES OF COMMUNICATION

The strategic lines of communication (SLOC), as depicted in Figure 1-1, are a vital part of the CAF support framework. They are "all the land, water and air routes that connect a deployed force with the home nation, and along which sustainment activities occur, as well as the activities themselves."[2] SLOC are the lifelines that link a deployed task force in a theatre of operations to national support in Canada.

Whether operating independently or as part of a joint or multinational force, the RCAF uses the SLOC and CAF support framework to sustain deployed operations. A combination of different facilities—including operational support hubs (OS Hubs), intermediate staging terminals, casualty support teams and third-location decompression facilities—established along the SLOC enables the effective sustainment of operations.

Operational-support-hub concept

An important component of SLOCs, CAF uses the hub-and-spoke method[3] to respond rapidly to crises worldwide, enabling more efficient, effective and economical support to integrated operations. "The OS Hub[4] concept involves a series of very specific, pre-negotiated arrangements that allow CAF access, rather than a permanent physical presence, to countries in key strategic locations around the world. … [A]n OS Hub is not a 'base' but rather a means of facilitating the projection and sustainment of CAF task forces."[5]

Primarily through its air-mobility assets, the RCAF is key to the success of the OS Hub concept and the hub-and-spoke method.

LEVELS OF SUSTAINMENT

To understand RCAF sustainment, it is first necessary to examine the levels of sustainment used within CAF. Canadian joint doctrine distinguishes between three levels of operations: strategic, operational and tactical. A similar approach is taken with the levels of sustainment, in that there are also three levels. However, there is a significant degree of overlap between the levels of sustainment, which are defined as:

a. **Strategic level of sustainment** is primarily concerned with mobilization, national acquisition, force readiness, force generation and force projection.

b. **Operational level of sustainment** is concerned with sustaining a force within a theatre of operations.

c. **Tactical level of sustainment** is concerned with providing the necessary materiel and services to combat forces and is accomplished through a variety of

2. *Defence Terminology Bank* (*DTB*) record 41456. The definition includes the following note: "The lines of communications include the transportation nodes. The associated activities include reception, staging, onward movement and integration (RSOI); third-location decompression and medical evacuation."

3. Hub-and-spoke method is "a method of sustaining outlying locations, formations and units from a central and secure position." *DTB* 43593.

4. "Within a pre-established global hub-and-spoke network," an operational support hub is "an operational support node situated on or at the terminus of the strategic lines of communication." *DTB* 47834.

5. CFJP 4.0, *Support*, 2-14.

sustainment tasks, including replenishment, infrastructure construction and repair, health services support (HSS), materiel management and personnel administration.[6]

The success of the CAF support framework is dependent on the successful integration of the strategic, operational and tactical levels of sustainment. Figure 1-2 depicts the levels of sustainment, lines of support and the organizations responsible for providing or coordinating the support to operations conducted by the Commander (Comd) RCAF at main operating bases (MOBs) and the Comd Canadian Joint Operations Command at deployed operating bases (DOBs).

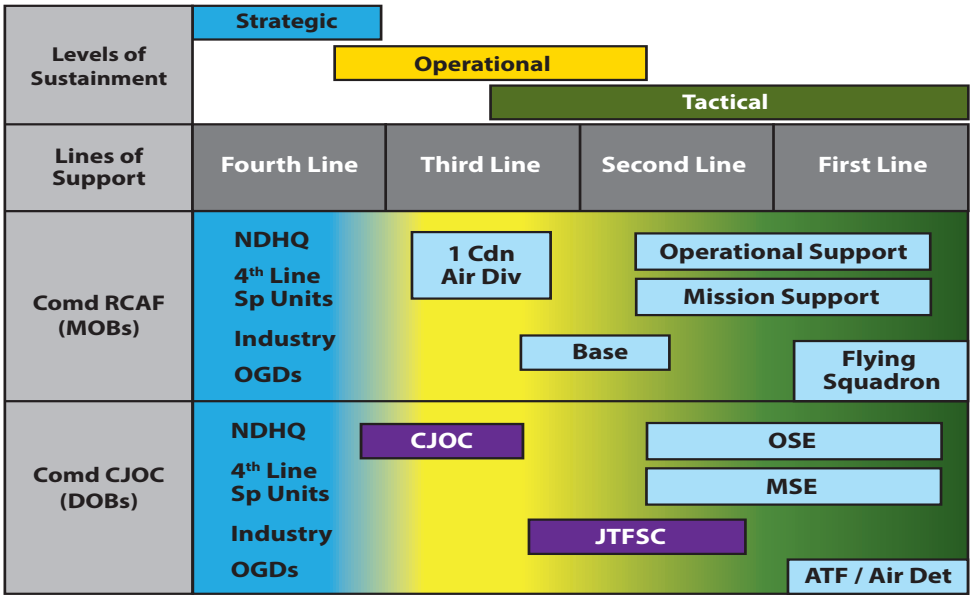


Figure 1-2. Relationship between levels of sustainment and lines of support

There is close relationship between levels of sustainment and lines of support. While levels of sustainment describe the level of effort involved, lines of support indicate where support assets are grouped. It is important to note that levels of sustainment and lines of support overlap each other; a level of sustainment may encompass more than one line of support and a line of support may correlate to more than one level of sustainment. For example, tactical-level sustainment incorporates first-, second-, and third-line support, while third-line support may be found at both the operational and tactical levels of sustainment.

LINES OF SUPPORT

Consistent with the CAF support framework, the RCAF follows a continuum of support that stretches from national resources to the air detachment and individual airman/airwoman. Although the flow is generally linear, from one line of support to the next, the support framework operates on the principle of flexibility that allows,

6. Ibid., 2-4.

and indeed encourages, the bypassing of lines of support where and when appropriate. The allocation of capabilities within each line conforms to the level of need, the threat as well as the requirement for mobility and protection. The grouping of capabilities into lines of support ensures that each level of command is effectively sustained but that it is not burdened with holding capabilities that are better held elsewhere. A particular line of support may contain a number of support units. The RCAF categorizes support into lines of support as follows:

a. **First-line support**. Support capabilities that are organic to a unit or a squadron.

b. **Second-line support**. Support capabilities that are organic or allocated to a formation (e.g., air wing / MOB).

c. **Third-line support**. Support capabilities provided to a joint task force (JTF) within a theatre of operations or at support installations deployed along the SLOC.

d. **Fourth-line support**. Support capabilities provided by national-level resources, such as national depots, contractors and industry.

Transition Issue[7]

In some support doctrine manuals, tactical-level sustainment has been divided into three categories:

- **Integral support (IS).** The support of an immediate and organic nature required to fulfill a unit's primary function.
- **Close support (CS).** The support given to the supported component command to meet its unique requirements to deal with tasks of immediate concern to its commander's operations.
- **General support (GS).** Support given to the supported force as a whole rather than to any particular subdivision of it. It includes activities such as movement control, waste disposal, medical treatment and evacuation and personnel support services. General support may be provided through a combination of military, contracted, host nation or alliance/coalition support options.

These categories were replaced in CFJP 4.0, Support by "lines of support," which reflect the link between support capabilities and the level of command at which those capabilities are found.

SUSTAINING RCAF CAPABILITIES

The RCAF's ability to deliver and sustain air power relies on assured and continued access to secure air bases that are in the right locations, have adequate base infrastructure and utilities, have the right mix of essential personnel, and are capable of providing the required services. From these secure bases, air power can be projected to destinations throughout the world.

7. Ibid., 2-6.

Sustaining RCAF capabilities consists of maintaining the capability at the desired level of readiness. This is accomplished through continuation training and maintaining equipment, using fixed Canadian operating locations with permanent infrastructure—MOBs. The MOB is where the RCAF derives its capacity to generate and sustain the full spectrum of air power capabilities it is expected to deliver. The majority of RCAF operational capabilities can be found at one of seven primary MOBs: Greenwood, Shearwater, Bagotville, Trenton, Winnipeg, Cold Lake and Comox.[8] The organizational structures that occupy these MOBs are referred to as wings. Wings or MOBs have the primary purposes of:

a. **Force generation (FG)**. Wings conduct the training (from individual skills to team integration) required to maintain readiness. FG also includes generating equipment and personnel for an ATF when designated "high readiness" on a rotational basis; and

b. **Force employment (FE)**. Wings conduct activities that command, control and sustain allocated forces.

The RCAF must be able to sustain capabilities from MOBs and DOBs, including forward operating bases (FOBs)[9] and forward operating locations (FOLs).[10] In most cases, RCAF capabilities can be more easily sustained from MOBs, as they offer the required personnel, equipment, infrastructure and services needed to sustain a wide range of capabilities. Likewise, sustaining RCAF capabilities from DOBs can prove challenging, due to scarce infrastructure; limited equipment and services; and, in the case of FOLs, extreme weather.

CAF Photo: Cpl Audrey Solomon

8. Tactical aviation and maritime aviation are located at select Army and Navy MOBs.

9. FOBs are a special type of DOB; they are "an expeditionary base, located in the combat zone, that supports the employment and sustainment of deployed forces." *DTB* record 28933.

10. FOLs are a special type of DOB; they are typically sites in the Canadian Arctic, not normally occupied, that are able to support CF188 operations. An FOL could be a commercial facility. An FOL is "any location at which materiel has been prepositioned and services prearranged to support the employment and sustainment of expeditionary air forces." *DTB* record 37296.

CHAPTER 2

FUNDAMENTALS OF SUSTAINMENT

CAF Photo

The fundamental principles and characteristics of Royal Canadian Air Force (RCAF) sustainment have evolved through experience and lessons that have been learned during operations. These principles and characteristics are shared by not only the Canadian Army and Royal Canadian Navy but also the militaries of many other nations. They provide the basis upon which to measure the soundness of a sustainment plan. When applied, the principles and characteristics should increase the probability of achieving mission success.

Sustainment
The ability of a nation or force to maintain effective military power to achieve desired effects.[1]


CAF Photo: Cpl Nicolas Tremblay

PRINCIPLES OF SUSTAINMENT

The following principles of sustainment[2] always apply and should be viewed as guidelines when planning and conducting sustainment operations:

a. **Foresight.** Foresight is essential in sustainment planning and execution. Adequate foresight will minimize the likelihood that support factors will impose undesirable limitations on a commander's plan. Good examples of foresight are prepositioning stocks and ensuring that adequate contingency-support arrangements (with our allies or industry) are, when needed, capable of being put into effect quickly.

b. **Economy.** Sustainment resources are often expensive and in short supply. The tendency towards excessive holdings must be avoided so that unnecessary costs with ordering, transporting, storing and even abandoning resources do not occur. Asset visibility ensures that the commander is provided with key information required to make decisions. A system must be in place to ensure that resources are managed in the most effective and efficient manner possible, keeping in mind operational imperatives. The primary goal is to ensure the air operation is robustly supported while achieving economies whenever possible.

1. *Defence Terminology Bank* (*DTB*) record 34949.
2. Canadian Forces Joint Publication (CFJP) 4-0, *Support*, 1-3–1-4.

c. **Flexibility.** When developing sustainment plans, it must be borne in mind that unexpected events will almost always dictate changes to the plan and its execution. As a result, a flexible plan is required. The plan must be able to respond quickly, effectively and efficiently to changes in the operation. Sustainment must also be responsive to changing requirements and adaptable to new technologies and initiatives. In turn, sustainment planners need to show flexibility and initiative in using the resources entrusted to them to greatest effect. Ultimately, sustainment issues should not limit a commander's courses of action (COAs).

d. **Simplicity.** While the delivery of air power is a complex business, its sustainment must not be. Simple plans and orders as well as agile air-support organizations will minimize confusion and enhance sustainment effectiveness. Streamlined processes are always preferred over ones that are complex and labour intensive. The goal is to ensure that the sustainment plan is simple yet robust enough to be executed while adapting to changes in the operational plan. Furthermore, simple reporting chains facilitate the accurate and efficient dissemination of information to all those who require it.

e. **Cooperation.** Cooperation among all staffs and organizations will greatly enhance the provision of sustainment to the force. As such, commanders and staffs must ensure sustainment is closely planned and coordinated with higher and lower organizations. Units must feel confident that their sustainment will not fail them in an emergency. Cooperation is particularly important when the RCAF is involved in a multinational or joint operation where national or service interests and competition for scarce resources have the potential to undermine relationships.

CAF Photo: Cpl Angela Gore

f. **Self-sufficiency.** Self-sufficiency means that a force has all essential resources to conduct operations for a period of time. Often, the RCAF is the first element to arrive in a theatre of operations and, as such, must have a degree of self-sufficiency.

g. **Visibility.** A commander must have good situational awareness of force assets and inbound materiel in order to prioritize and optimize support effects. This is particularly important for critical supplies such as aviation fuel and aircraft spares.

h. **Responsiveness.** Responsiveness is characterized by the speed of the response to the needs of the operation. RCAF sustainment needs to be responsive to the operation whether the RCAF is in a lead or supporting role.

i. **Survivability.** Survivability means the capacity of the support framework to prevail in the face of potential or actual threats. In order to achieve success, the RCAF must be able to sustain operations in challenging environments.

CHARACTERISTICS OF SUSTAINMENT

While characteristics of sustainment are essential for all sustainment operations, their relative importance will vary depending on circumstances, and judgment is needed in their application. These characteristics are:

a. **Robustness.** Robustness ensures effective sustainment continues unimpeded for high-intensity, rapid-response operations when the threat of hostile acts and severe environmental conditions exist. Sustainment personnel must embrace the fighting spirit,[3] which includes effective leadership and requires a robust training regime, thus enhancing overall performance in the most demanding of conditions. Robust, rapidly deployable RCAF materiel, capabilities and systems that are capable of withstanding physical and electronic attack all help protect sustainment resources. Redundancies, backup capabilities and the elimination of single points of failure also help achieve the required robustness.

b. **Agility.** Agility is the characteristic that ensures the timely deployment, adaptive employment and resourceful sustainment of air power. Agility includes the versatility and resilience of sustainment personnel, systems and capabilities to anticipate and rapidly respond to both emerging situations and new tasks without major reorganization. Through responsive speed of action and complementary reaction, agility in sustainment permits air operations to withstand the unexpected.

c. **Scalability.** Scalability of the sustainment organization and plan, including personnel and materiel, permits resources to be efficiently reduced or increased in size or extent to adjust to a changing operational tempo and threat. Scaling up will usually occur at the commencement and termination of an operation

3. Fighting spirit is "the drive within every military member to do anything in their power, within the ethical principles and values of the profession of arms, to accomplish the assigned mission with enthusiasm, precision and unlimited liability to self." *DTB* record 37287.

or during increasing operational tempo at the main operating base (MOB) or deployed operating base (DOB), while scaling down is more likely to occur after other support arrangements have been put in place. Arrangements such as those provided by the Canadian Forces Contractor Augmentation Program (CANCAP), host-nation support (HNS), allies, other nations and the use of augmentees can also be put in place.

d. **Integration.** Integration is the characteristic that brings together or incorporates diverse sustainment parts into a common team, system or service. It is not just a combination of parts; integration creates a synergistic effect, especially during joint and multinational operations whereby the net benefit is much greater than its constituent parts. As part of this characteristic, one key element is the ability to generate sustainment components that are capable of merging with and/or supporting other government departments (OGDs), non-governmental organizations (NGOs), allies, international partners and commercial elements.[4]

e. **Reliability.** Reliability ensures the consistency and dependability of sustainment effects—whether it is the persistent sustainment of the MOB or DOB. It results from the effectiveness of the sustainment team; the competency and health of its personnel; the dependability of materiel, infrastructure and services; and the trustworthiness of information.

COMPONENTS OF SUSTAINMENT

The four components of sustainment—personnel, materiel, infrastructure and services (see Figure 2-1)—are required to sustain all operations regardless of their theatre or category[5] and throughout all of their phases. The components of sustainment enable air power delivery by regenerating personnel and providing the required material, infrastructure and services.

Figure 2-1. Components of sustainment

PERSONNEL

The availability of trained and dedicated personnel, in the right numbers and at all locations, is critical to achieving operational success. The personnel component is key to "getting it right" in sustaining the force and critical to the RCAF's ability to sustain air operations.

4. Integration is not to be confused with interoperability. Interoperability is achieved when sustainment components and information interface seamlessly with that of another service, government department, ally, coalition partner or OGD without noticeable degradation of operational effectiveness.

5. As described in B-GJ-005-300/FP-001, CFJP 3.0, *Operations* (September 2011), 2-1 and 7-3, operations are classified by their theatre (domestic, continental and international) and category (routine, contingency and rapid response).


CAF Photo: Sgt Yannick Bédard

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

The technological content and complexities of air power operations demand that sustainment tasks be conducted correctly and with due regard for economy and safety. This is critical with aircraft, where a seemingly minor error can quickly lead to the loss of life and a high-value weapon system. Systems and standards for employment qualifications, certifications and authorizations need to be based on realistic and complete job descriptions and documented accordingly.[6] More information on how the RCAF Personnel Management System defines and manages Air Force occupation specialties can be found in B-GA-407-001/FP-001, *Air Force Personnel Doctrine*.

Fitness requirements for RCAF duty stem from the particular and demanding nature of air operations. Personnel contribute to operational success only when they are fit and prepared to work in all theatres and categories of operations. The suitability of personnel for operational employment depends on physical, mental and medical fitness; competence in general-military and trade-specific skills; and appropriate theatre-and-mission specific training (TMST). Personnel not adequately prepared for or

6. As an example, the Department of National Defence (DND) / Canadian Armed Forces (CAF) Airworthiness Program is based on the fundamental principle that airworthiness-related activities are completed to accepted standards, performed by authorized personnel, accomplished within accredited organizations and done using approved procedures. These fundamental principles are common to the application of airworthiness and aviation safety programmes worldwide.

capable of carrying out their role in the manner expected pose a danger to themselves and others and can, ultimately, jeopardize the success of the operation. Military fitness[7] for RCAF personnel is a chain-of-command responsibility and is managed and tracked through the Annual Personnel Readiness Verification (APRV) process.

MATERIEL

Materiel is "all equipment, stores, packaging and supplies used by the military forces."[8] It includes the resources used in support of air systems as well as the equipment that facilitates the provision of support. It comprises large fleets and inventories encompassing, for instance, special purpose vehicles, communications and information management systems, security systems and equipment, warehousing equipment, weapons and medical equipment. It also includes the computers, radar, maps and other items necessary to maintain operations. Consumable items—like petroleum, oils, and lubricants (POL); ammunition; rations; and building materials—are all part of the materiel component.

CAF Photo

The control, movement and delivery of materiel are major considerations for the mission-support staff. The prompt provision of materiel is an essential element of economy. It may be stockpiled at MOBs, deployed and prepositioned forward or held in reserve. Ultimately, the aim is to ensure that sufficient materiel exists, without waste, at the right time at the correct destination.

7. Military fitness includes, but is not limited to, weapons qualification, first aid training, physical fitness, etc. Additional guidance on this is available in B-GA-407-001/FP-001, *Air Force Personnel Doctrine* (29 April 2010), 2-6, accessed September 10, 2015, http://w08-ttn-vmweb01/CFAWC/en/doctrine/b-ga-407-001-air-force-personnel-doctrine.asp.

8. *DTB* record 43416.

Materiel is acquired on the basis of needs that originate from operational, economic or legal requirements; these needs are generally expressed in documents such as statements of operational requirements, post-operation reports, unsatisfactory condition reports, cases for action and business cases. Since most materiel holdings entail acquisition and life-cycle costs, in-depth analyses are conducted to validate a stated requirement (usually from a pan-RCAF or CAF perspective) to acquire the materiel under the most favourable conditions. Materiel needs are satisfied through a variety of means suited to the situation. It can be as simple as borrowing an item from another unit or as complex as a capital acquisition project managed by Assistant Deputy Minister (Materiel) [Adm(Mat)].

Most materiel is centrally managed via supply managers and life cycle materiel managers. Processes and procedures are established on a life-expectancy basis for materiel-management functions such as replenishment, replacement, warehousing, distribution, operation, technical support, training support, maintenance, configuration, supply, movement, disposal and costing. Moreover, of greater significance, the acquisition, life-cycle management and use of materiel directly associated with aircraft are subject to higher standards and levels of control than apply to most other materiel.[9]

Treasury Board Policy on Management of Materiel

- Requires that "materiel be managed by departments in a sustainable and financially responsible manner that supports the cost-effective and efficient delivery of government programs."[10]
- Expected result is a federal materiel-management regime that:
  - respects ministerial accountability;
  - embodies sound materiel-management practices;
  - demonstrates due diligence;
  - generates maximum long-term economic advantage to the Crown;
  - protects and preserves Canadian heritage and the environment;
  - is fair, transparent and financially responsible; and
  - is compliant with relevant federal legislation and policies.[11]

Sustainment planners have important roles and responsibilities for materiel that include, but are not necessarily limited to:

a. maintaining the minimum level of all materiel required for the operational tempo;

b. ensuring materiel is delivered and located in accordance with the principles and characteristics of sustainment so that it is available when and where needed;

9. For example, the DND/CAF Airworthiness Program controls the design, manufacture, maintenance, materiel support and operational usage of aeronautical products to ensure they remain airworthy throughout their life.

10. Canada, Treasury Board of Canada Secretariat, "Policy on Management of Materiel," accessed August 24, 2015, http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12062&section=HTML.

11. Ibid.

c. ensuring asset visibility by confirming that appropriate tracking and control processes and procedures are established and adhered to;

d. employing equipment for its intended purpose and ensuring personnel are properly trained and qualified to operate and maintain it;

e. complying with special terms and conditions for the use of materiel (e.g., lease conditions) to ensure packaging, handling, storage and transportation requirements are met; and

f. protecting materiel from malicious damage, criminality and hostile acts.

Finally, the supply-chain management aspect of effective materiel sustainment means that information (such as quality, quantity, destination, delivery time and sequence) must be maintained on each item so that transportation and infrastructure requirements can be estimated and sequenced. Furthermore, each item must be clearly traceable to the needs and objectives of an air operation; this will ensure that only materiel necessary to sustain operations is acquired and managed.

CAF Photo: MCpl Angela Abbey

INFRASTRUCTURE

Infrastructure includes "fixed and permanent installations, fabrications and facilities, including plants, buildings, works, real property, immoveables, and natural and cultural environments."[12] The maintenance (including updating and modernization in accordance with operational requirements) of existing RCAF infrastructure is a major ongoing activity. Similar to materiel, the concept of life expectancy is applied to infrastructure to allow for the proper sequencing of construction and maintenance as well as the development of demolition plans.

Infrastructure challenges are generally more difficult for short-term operations in remote, austere environments. Because of fixed-wing aircraft's dependence on runways and other support facilities, there is an ongoing requirement to provide a certain

12. *DTB* record 4534.

amount of infrastructure to allow air operations to proceed. Furthermore, it is more difficult to determine the needs for housing, feeding, warehousing, roads and utilities when the size, scope and length of the operation are uncertain. In these instances, solutions tend to favour temporary installations that can be transported, installed, disassembled and reused.

CAF Photo: Cpl Pierre Létourneau

Whenever possible, well-found bases should be used to minimize the use of non-permanent infrastructure and, thus, take advantage of already existing utilities, structures and facilities. This has the added benefit of minimizing, when feasible, the deployed sustainment footprint and reducing the amount of materiel and number of temporary structures that must be moved into theatre. In addition, the sustainment planner should investigate and exploit any potential for cooperative logistics, HNS, joint and coalition initiatives as well as similar mutually beneficial infrastructure opportunities.

SERVICES

Sustainment services are provided in the four supporting elements of operations support, aircraft-weapon-system maintenance, mission support and specialist support. Services bring the other three components of sustainment together at the right place and time. It is reasonably straightforward to identify the services required to sustain an air operation in pursuit of its objectives. It is more difficult, however, to identify the best ways to deliver those services when the operational situation and tempo are in flux and there is a likelihood of hostile acts. A change to service delivery may stem from developments in the air operation, but changes could also be attributed to the security environment, technology and the availability of certain human and materiel resources.

Sustainment providers must keep in mind the principles and characteristics of sustainment when defining the service provided to air operations. Sustainment providers must also apply sound management practices, such as:

a. establishing performance levels and measurement techniques for the services provided;

b. defining, via service-delivery plans, how services are to be provided;

c. implementing objective performance measurement in support of service-delivery management;

d. changing the service-delivery system in response to the various change factors impinging on the air operation and sustainment operations; and

e. as part of continuous improvement, systematically identifying and evaluating all means of service delivery.

From the command perspective, it is important for higher-level staffs to always keep the big picture in mind when changes to service delivery are being contemplated. As much as changes may be logical, sustainment practitioners are cautioned that such changes can be a very sensitive subject, particularly if they affect long-standing relationships and responsibilities. Changes in a localized area of service delivery can have serious, unintended consequences that may extend throughout the RCAF and even CAF. Therefore, it is equally important to manage the manner in which a change in service delivery is implemented as it is to justify the change in the first place.

CAF Photo: MCpl Brandon O'Connell

RCAF units, regardless of operating location, must be sustained if they are to have any enduring effect. Ideally, any size of unit, including a single aircraft and crew, would not be deployed without prior planning for its support and careful consideration of requirements, such as the health and welfare of personnel (including casualty evacuation and treatment) as well as the maintenance and/or replacement of materiel and infrastructure.

TRAIN AS YOU FIGHT—FIGHT AS YOU TRAIN

RCAF sustainment champions the well-known axiom "train as you fight—fight as you train," as this represents the optimal approach to sustainment for air and other military operations. By organizing, equipping and training as it conducts operations, the RCAF can deliver and maintain air power more effectively. This method also supports the efficient task tailoring of assets to accomplish a specific objective. Most importantly, this approach to sustainment facilitates a seamless and rapid transition from home-based to deployed operations and vice versa.

Leaders and planners at every level of the RCAF must accurately assess preparation, training, movement, sustainment and replenishment needs. Related to this assessment is the need for common organizational structures and consistent standards for equipment and training, so that mission requirements, including aircraft and munitions configurations, can be determined. This information also facilitates the proper prioritization of personnel, materiel and other resources being transported from one location to another.

CAF Photo: MS Steeve Picard

CHAPTER 3

SUPPORTING THE RCAF

CAF Photo

INTRODUCTION

The preceding chapters provided an overview of sustainment as well as its principles, characteristics and components. This chapter focuses on three areas: supporting activities (operations support, aircraft-weapon-system maintenance, mission support and specialist support), unique support situations (support to tactical-aviation and maritime-air operations) and support service-delivery options (military assets, contracted services, host-nation support (HNS) and cooperation with other nations).

Support

The administrative and logistic aid provided to a formation, to a unit or to an individual.[1]

Supporting a force consists of the activities and processes related to the broad support and/or overall sustainment of military forces, including maintaining and repairing equipment, moving and controlling operational materiel as well as administratively supporting personnel and infrastructure that directly enable field-force operations. Supporting a force is a critical foundational activity that underpins force employment and force generation and is the focus of many existing organizations but currently has no central oversight beyond those niche capabilities provided by Canadian Joint Operations Command (CJOC).

1. *Defence Terminology Bank* (*DTB*) record 1361.

Most Royal Canadian Air Force (RCAF) support resources are devoted to supporting operations from main operating bases (MOBs) as well as the many force-generation and operational activities at RCAF wings. A large percentage of RCAF personnel are employed in operations-support, aircraft-maintenance and mission-support organizations. Although missions and operations conducted from MOBs are vital to the defence of Canada, it is important that the RCAF be capable of projecting air power around the world. This means that air operations need to be sustained in deployed locations where many of the resources normally found at an MOB are unavailable.

CAF Photo

SUPPORTING ACTIVITIES

In its broadest form, RCAF force sustainment includes the key components of personnel, materiel, infrastructure and services necessary to deliver air power. At the micro level and as illustrated in Figure 3-1, all air operations require four supporting activities: operations support, aircraft-weapon-system maintenance, mission support and specialist support. These supporting activities are carried out on an ongoing basis at RCAF MOBs and are also a critical part of supporting an air task force (ATF) during operations.

Figure 3-1. Supporting activities

OPERATIONS SUPPORT

Operations support is the provision of assistance that directly enables air operations. Operations-support units, namely operations-support elements (OSEs), primarily provide those personnel and services essential for conducting flying operations at MOBs and deployed operating bases (DOBs). The role of the OSE is to provide the enablers that allow operations to be conducted safely and effectively.

The operations support's force-sustainment capabilities include armament and munitions management as well as airfield damage repair (ADR).[2] Also, at smaller MOBs and DOBs, it is not uncommon for the aircraft-maintenance and engineering capabilities to be included under the operations-support units.

Armament and munitions management

Effective munitions support depends on the clear and timely communication of requirements. Establishing safe and effective munitions support for air operations depends on timely production and delivery as well as storage capabilities. These require extensive pre-planning to consider net-explosive-quantity distance clear zones that may limit explosive storage and aircraft parking capabilities as well as interrupt munitions support.

2. It is important to note that OSE units' capabilities are also an integral part of other RCAF functions. For example, Sense-function capabilities include meteorology, oceanography and intelligence; Command-function capabilities include aerospace control as well as operations planning and coordination; and Shield-function capabilities include airfield defence, policing as well as security of airfields and aircraft.

Due to the inherent risks involved with munitions operations, a large infrastructure footprint (clear zones) is normally required for safety reasons. Explosive separation requirements necessitate a large area to minimize destruction and loss of mission capability in the event of an accident or sabotage.

Airfield damage repair

To conduct safe and effective air operations, the RCAF requires airfields which are free from hazards and are in a good state of repair. A maintenance service team, which normally resides within the construction engineers, assesses the airfield and repairs damage.

During operations, airfield-engineering activities centre on four major areas:

a. damage definition and assessment—inspecting and assessing damage;

b. explosive ordnance disposal (EOD)—reconnaissance and clearance of unexploded ordnance;

c. repair of aircraft operating surfaces; and

d. essential services repair.

AIRCRAFT-WEAPON-SYSTEMS MAINTENANCE

Aircraft weapon systems must be maintained in a state which will allow the fulfilment of their role in all types of operations. The maintenance of aircraft weapon systems is directed and carried out by trained personnel, working within the Canadian Armed Forces (CAF) command structure. Maintenance activities are performed at wings, at deployment sites, aboard ships, with the land force in the field and at contractor facilities. Maintenance organizations vary according to the environment and the operational role and mission being supported. Maintenance activities and organizations should be structured to allow for a smooth transition to deployed operations.

CAF Photo

Maintenance objectives. The fundamental maintenance objectives, in their descending order of priority, are:

a. safety of flight / satisfaction of airworthiness requirements;

b. optimum aircraft operational availability;

c. efficient use of manpower resources; and

d. minimum cost (including logistic support).

Principles of maintenance. In association with the four fundamental maintenance objectives, the following set of principles are the foundation of aircraft-weapon-systems maintenance:

a. The maintenance of aircraft weapon systems shall comply with CAF policies, directives and instructions.

b. Maintenance shall be based on the principle of personal accountability, in that personnel shall be responsible for and certify all work that they have undertaken in any aspect of that maintenance and for which they have been trained and are qualified to necessary standards.

c. Maintenance shall be responsive to the approved operational requirements and shall be organized in a manner which will provide a smooth transition from home-based to deployed operations.

d. First- and second-level maintenance tasks are normally performed by CAF personnel to ensure a capability exists to support deployed operations.

e. The respective functions of operations and maintenance in a modern aircraft weapon system are so interrelated that it is counterproductive to consider each as a separate, isolated element. Flying and maintenance schedules shall be developed using inputs from both operations and maintenance staffs, with the object of achieving the optimum sustainable capability with the available resources.

f. When assigning the level of maintenance to be accomplished by each maintenance organization, operational requirements and the economical use of resources shall be considered.

g. Standards and procedures shall be established, monitored and enforced to ensure optimum quality and efficiency in the performance of all maintenance tasks, the health and safety of personnel and the safety of equipment.

h. A CAF capability to undertake third-level tasks shall be maintained in cases where civilian industrial support does not exist and cannot be developed economically or where such a capability is essential for the support of operations.

i. Civilian industry shall be allotted third-level work to an extent which will maintain an effective and efficient industrial base able to provide maintenance support to augment service capability and to ensure industrial preparedness for rapid expansion during periods of high-tempo operations.

Levels of Maintenance

Readers should not confuse levels of sustainment with levels of maintenance. As defined in Canadian Forces Administrative Orders (CFAO) 36-45, Maintenance of Materiel Level Three Maintenance:

> The term "level of maintenance" refers to the type or depth of maintenance authorized relative to the availability of knowledge, skills, technical data, special tools, test equipment and/or time. The full range of maintenance is divided into three levels. Level one and level two maintenance primarily address preventive maintenance and servicing, fault diagnosis and corrective maintenance by replacement or restoration of parts, assemblies or components, and is normally time limited. Level three maintenance encompasses more extensive maintenance activities such as, but not restricted to, replacement or restoration of parts, assemblies or components, rebuild and overhaul of equipment, mid-life improvements, life extension programs … and lengthy activities that require specialized facilities to complete.[3]

A distinction is also drawn between levels and lines of maintenance. Whereas level refers to the type or depth of maintenance to be performed, line refers to the organization or organizational level where the maintenance is performed. Thus, first-level maintenance is normally carried out by a first-line organization.

CAF Photo: Sgt Gaétan Racine

Organizations

Aircraft-maintenance resources are frequently detached and deployed from their wing to support various air operations. The maintenance organization required to support an operation may vary widely and will depend upon specific circumstances. It may range from an entire squadron carrying out autonomous maintenance operations to no on-site maintenance capabilities, coupled with a requirement for support by mobile repair parties. Some detached operations may be established permanently, be conducted routinely or be a one-time exercise or operation.

3. CFAO 36-45, Maintenance of Materiel Level Three Maintenance, accessed August 25, 2015, http://corpsec.mil.ca/admfincs/subjects/cfao/036-45_e.asp.

Squadron and wing maintenance. In order to accomplish the different levels of maintenance activities, the organizations that perform the work are defined in terms of lines of maintenance as follows:

a. **First-line maintenance.** Maintenance resources of a squadron organization, or first-line maintenance, will perform aircraft and armament servicing and first-level preventive maintenance and minor corrective maintenance.

b. **Second-line maintenance.** Wing maintenance organizations provide level-two maintenance support (including preventive and corrective maintenance as well as fault diagnosis) and, when required, give assistance to squadron maintenance organizations on deployed operations.

c. **Third-line maintenance.** Third-line maintenance organizations (usually civilian industry) perform level-three maintenance activities, which are major maintenance activities such as rebuilds, equipment overhauls and life-extension programmes.

CAF Photo; MCpl Shilo Adamson

MOB maintenance support. Aircraft-weapon-systems-maintenance organizations at MOBs are capable of all first- and second-level maintenance as well as some third-level maintenance. Major overhaul, reconditioning and repair of aircraft assemblies and components (third-level maintenance) will normally be done by civilian industry. The capabilities of squadron and wing maintenance organizations are determined by the test equipment, tools, qualified personnel and maintenance facilities available. The proximity and quantity of spares as well as the ability to move repairable equipment are also key elements in aircraft maintenance support.

Deployed aircraft-maintenance support. During deployed operations, aircraft-maintenance resources are integral to the squadrons or air detachments (air dets). The OSE will normally have an air-maintenance staff officer to advise the commander and to perform a coordination function for maintenance activities. Depending on the size of the ATF and the number of air dets, there may also be an A4 Maintenance staff officer within the ATF headquarters (HQ). When maintenance resources are not

available at the air det, detachment personnel must use the proper deployed chain of command to coordinate and obtain the required resources (i.e., avoid back channels to their home squadron/unit unless provided direct liaison authority [DIRLAUTH]).

Headquarters maintenance support. The effective management of each aircraft fleet requires HQ organizations that are responsible for maintenance policy, airworthiness and fatigue management, configuration control, management of repairable items and financial-resource management. In addition, the HQ must address coordination requirements related to equipment-failure resolution and priority, supply, equipment/facilities, software support, publications, quality assurance and personnel establishments.

An engineering capability is required to support the maintenance function and all aircraft weapon systems or related equipment-acquisition programmes. The engineering effort is primarily focused on assessing the need for, and the development of, modifications, life-extension studies, technical investigations, nonstandard repairs and engineering studies in various fields.

Civilian contractors. Third-level maintenance is normally accomplished through contractual arrangements with Canadian industry. Civilian contractors may be asked to provide a wide range of engineering services and industrial support and should be organized and managed to be responsive to CAF requirements. Contractor facilities must possess technical, managerial and quality-assurance capabilities that are acceptable to CAF and are measurable by CAF on-site representatives.

Specialized maintenance units. Some maintenance activities may require the formation of specialized units where functional control is exercised by a maintenance HQ. These units provide a variety of engineering and maintenance research, experimentation, development, software support and limited production services.

CAF Photo

Management

Aircraft maintenance programme. For each aircraft weapon system, a maintenance concept should be derived from the approved concept of operations. A maintenance programme must be developed to span the life of the system. It is required for defining and implementing procedures, tasks, techniques, standards, tools and equipment to establish a capability and improve the effectiveness of aircraft maintenance.

When an aircraft weapon system is brought into service, maintenance plans are developed, covering servicing and calibration as well as corrective and preventive maintenance. An integrated logistics support plan is critical in ensuring the logistics resources needed to carry out the maintenance plans are available when required. It is common practice to have some aspects of the integrated logistics support and maintenance plans included in the contract with the introduction of a new aircraft-weapons-system fleet. The combination of these plans results in a coherent maintenance programme that details the work that must be accomplished to achieve, restore and maintain the serviceability, availability and operational capability of the aircraft weapon system.

Modifications may be necessary to improve the reliability, maintainability or capability of aircraft weapon systems. When developing a maintenance programme, it is essential that modifications are both anticipated and responded to. This is achieved by analysing operational and maintenance data so that inspection criteria, content and frequency are optimized.

Requirements for major maintenance projects to extend the useful life of aircraft weapon systems can be determined by reassessing operational commitments and by conducting equipment-life extension studies. This accumulated data should then be documented in a weapon system development plan (WSDP).

Routine and emergency maintenance

During periods of routine operations, inspection and repair procedures may be more conservative than those applied during high-intensity deployed operations, as the

CAF Photo: LS Dan Bard

acceptable level of risk is lower. Rapid repair techniques, including aircraft battle damage repair (ABDR), and abbreviated maintenance schedules are available for use during emergency situations when the time available may preclude the use of standard operating procedures. ABDR techniques are intended to provide the best repair possible in the time available and are aimed at making an aircraft capable of performing, as a minimum, one additional mission.

The emergency-operations inspection package is intended to provide maintenance authorities and operational commanders at all levels sufficient flexibility to respond to rapidly changing circumstances. If the on-site authority has the time and resources to complete more thorough inspections and repairs, then additional tasks to increase aircraft serviceability and availability should be performed.

CAF Photo: Operation CARIBBE

Since these emergency maintenance procedures do not conform to the high standards which govern standard maintenance practices and, therefore, introduce an element of risk which would be unacceptable under normal circumstances, they should only be applied in exceptional circumstances, with the approval of the appropriate authority.

Maintenance facilities

Sufficient infrastructure must be provided for air-maintenance organizations to support each aircraft fleet in accordance with the requirements of the operational role. Required infrastructure includes hangars, shops, laboratories, offices and tarmac areas as well as their associated utilities, industrial services and communications services.

Sustainability

The ability of a force to maintain the necessary level of combat power for the duration required to achieve its objective is a critical consideration in formulating maintenance programmes.


CAF Photo: LS Alex Roy

Sustainability is predicated on:

a. sufficiently large aircraft fleets to absorb predicted losses, yet continue fighting;
b. the ability to repair and return to service damaged aircraft;
c. the ability to maintain aircraft under austere conditions;
d. adequate stocks of logistics supplies and the ability to replenish these stocks; and
e. trained personnel to replace casualties.

Standardization

Canada has entered into a number of bilateral and multilateral international agreements for collective defence. These agreements require, in part, standardization of weapon systems and procedures so that the forces of allied nations can fight effectively together. Maintenance activities should aim to achieve and maintain the most effective levels of compatibility, interoperability, interchangeability and commonality with allied forces.

Loss-prevention programmes

Mitigating risk through the use of loss-prevention programmes is an important component of the RCAF's loss-prevention strategy. There are two main elements to preventing loss and damage: Department of National Defence (DND) / CAF safety programmes and the RCAF's Environmental Stewardship program.

Safety programmes. High-risk situations will be encountered during routine training exercises and combat missions. A number of DND/CAF and RCAF loss-prevention programmes are established to ensure that limited resources are not needlessly lost. The Airworthiness, Flight Safety and General Safety programmes all contribute to mitigating the accidental loss of RCAF resources throughout a system's life cycle. These programmes enable the generation and employment of operational capabilities, while reducing the accidental attrition of personnel and materiel.


CAF Photo: Cpl Jax Kennedy

Environmental stewardship. Due to the potential to negatively affect the physical environment during Air Force training and operations, steps have been established to minimize environmental degradation. "The Air Force Environmental Vision and Strategy"[4] aims to lessen the impact of Air Force operations and activities on the environment. This initiative focuses on resolving legacy issues; ensuring compliance with environmental laws, both at home and abroad; and reducing the Air Force environmental footprint by exploring and implementing emerging environmental-protection and -management practices.

Airworthiness program

Airworthiness is "the fit and safe state for flight that is achieved when an aeronautical product conforms with its approved type design, is manufactured and maintained in compliance with standards and is operated within its design limits."[5] The authoritative document for both civil and military aviation safety in Canada is the Aeronautics Act. As a statute of Canada, the Act is a law that places upon the Minister of Transport (MOT), the Minister of National Defence (MND) and the Chief of the Defence Staff (CDS) under the direction of the MND, the responsibility for developing and regulating aeronautics and supervising all matters related to aeronautics. Implementation of its provisions is not optional; it is a legal responsibility for DND and CAF. The MND has directed that DND and CAF develop and implement an airworthiness programme to fulfil this obligation. The Airworthiness Program contributes to aviation safety by mandating standards for aeronautical products and their operation. The Airworthiness Program (see Figure 3-2) consists of an entire range of aviation activities including design, manufacture, maintenance, material support, facilities, personnel and operations. The operations staff is responsible for the operation of aerodromes, navigational equipment and support equipment; operator, controller and maintainer training and proficiency; and the conduct of flying

4. Canada, Department of National Defence, "The Air Force Environmental Vision and Strategy," accessed June 23, 2017, http://w08-ttn-vmweb01/cms/Libraries/Wing_Env_-_Documents/AF_ENVIRO_pamphlet090923.sflb.ashx.

5. *DTB* record 36707.

operations (including aerospace control, aircraft utilization and aviation weather). Furthermore, the operations staff ensures that all facilities, personnel and operations are in compliance with airworthiness policies, regulations, orders and standards. Similarly, the technical staff is responsible for the design, manufacture, maintenance and material support of aeronautical products; development and maintenance of facilities; and training and qualification of technical personnel. Accordingly, the Airworthiness Program has been similarly split into operational and technical areas of responsibility. This division of responsibility has given rise to the Operational Airworthiness Program and Technical Airworthiness Program. The Airworthiness Investigative Program has been added to monitor the Airworthiness Program and to investigate aviation safety-related issues and occurrences.

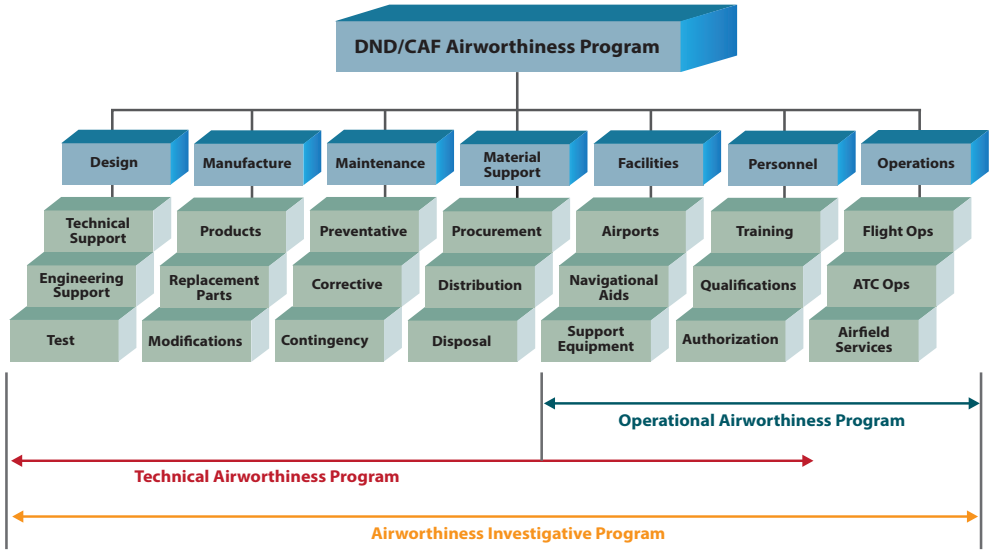


Figure 3-2. DND/CAF Airworthiness Program[6]

Pursuant to the Ministerial Airworthiness Direction of 18 July 2005, the CDS may designate airworthiness authorities for the DND/CAF Airworthiness Program and delegate necessary powers, duties and functions. The following five designated airworthiness authorities for the DND/CAF Airworthiness Program were established by CDS orders issued on 20 December 2005:

a. **Airworthiness Authority** (AA) is assigned to the officer holding the position of Chief of the Air Force Staff (C Air Force). The AA exercises overall supervision and management of the DND/CAF Airworthiness Program;

b. **Operational Airworthiness Authority** (OAA) is assigned to the officer holding the position of Commander, 1 Canadian Air Division;

c. **Technical Airworthiness Authority** (TAA) is assigned to the officer holding the position of Director General Aerospace Equipment Program Management;

6. "Airworthiness - Airworthiness Coordination Cell," Director Air Readiness & Plans, DND, accessed June 23, 2017. http://rcaf.mil.ca/assets/RCAF_Intranet/docs/en/d-air-plans/airworthiness/a-ga-005-000-ag-001-10-11.pdf.

d. **Airworthiness Investigative Authority** (AIA) is assigned to the officer holding the position of Director Flight Safety; and

e. **Aerospace Medical Authority** (AMA) is assigned to the officer holding the position of RCAF Surgeon.

Flight safety. Proper maintenance is necessary to minimize the accidental loss of aircraft, the injury or death of people and the loss of other resources. The creation and preservation of air-combat capability, therefore, requires that aircraft maintenance is performed in a manner that eliminates the potential for accidental loss of aircraft resources, not only in peacetime but also in war or emergency.

MISSION SUPPORT

Mission support is "the provision of logistical, technical and administrative support to [air] operations."[7] The mission support's force-sustainment capabilities include, but are not necessarily limited to: airfield and construction engineering, telecommunications and information systems, supply-chain operations, mobile-support-equipment operations and air movements, Royal Canadian Electrical and Mechanical Engineering, food services, personnel management, financial services, postal services, public affairs and chaplain.

For air operations conducted in Canada, mission-support services are normally provided by a wing—one of the RCAF's MOBs in Canada.

During deployed operations, a mission-support element is typically responsible for providing and coordinating mission-support services for the RCAF.

CAF Photo: Cpl Stuart MacNeil

7. *DTB* record 34911.

Airfield and construction engineering

MOB facilities and services established to support air operations at both fixed and deployed locations are provided, operated and maintained by Canadian Military Engineering (CME) units. Mobile construction-engineering units are formed to support deployed operations and to provide maintenance and minor construction capability. Engineering services provided to support air operations include firefighting and crash rescue, emergency utility repair, damage assessment, repair of aircraft operational surfaces (e.g., runways, runway lighting systems, etc.), containment and disposal of hazardous spills, repair of facilities, explosive ordnance services, and a limited design capability.

During hostilities, airfields are often designated as high-priority targets and subject to air or ground attack from any weapon in the enemy's arsenal. Some form of damage to an airfield and its installations would inevitably result from an attack, the severity of which would depend largely upon the adequacy and preparedness of air and ground defences. The installation commander's post-attack priority is to restore the airfield to operational status should aircraft launch and recovery capabilities be denied because of damage to airfield facilities. Under combat conditions, engineering functions must be carried out by military personnel; however, in minimum threat areas and during peacetime, civilians can be employed in a variety of engineering-support activities.

Telecommunications and information systems

Telecommunications and information services (TIS) in the support context is defined as the use of electronic devices and the electromagnetic spectrum for the acquisition,

transfer, storage, processing, analysis and display of information. It is the primary means by which commanders exercise command and control over air operations, and as a result, it should be integral to the organization it supports.

The term "telecommunications" is synonymous with air "communications and electronics" (C&E). It excludes the telecommunications accomplished by devices associated exclusively with airborne weapons platforms (e.g., flight-control system), land-based electromechanical devices (e.g., runway lights and flags) and postal service (e.g., letters).

Telecommunications support includes trained personnel to provide the services required for air operations. To ensure the availability of these services when required, they should be owned, wherever possible, by the military and must be controlled and maintained by trained personnel under the command of the air commander.

Resources

General. Telecommunications equipment may stand alone or be arranged into facilities that are connected as networks to form command and control systems. While pre-planned actions and procedures can provide alternate forms of control, the direct capability provided by telecommunications will normally be the preferred method.

Equipment. Telecommunications are provided by electronic devices that can be static, portable, mobile or orbiting. To achieve force multiplication through telecommunication support, commanders require real-time services. Communications equipment is categorized by the function performed and includes radio, telephone, radar, facsimile and telemetry. Many of these systems are software dependent, and they use a wide variety of transmission media, including microwave, fibre optic and satellite.

Facilities. When equipment is combined with personnel resources, capabilities such as command centres, control towers and sensor sites are derived. Hardware and software are required to integrate equipment into a useable capability.

Systems. Distributed networks of facilities and equipment form systems which can be categorized as strategic, tactical and non-tactical according to use.

Principles of employment. Telecommunications support must be able to continue functioning when conducting operations under adverse conditions. Telecommunications-support considerations are:

a. communications security;

b. electronic warfare (EW);

c. mobile tactical communication; and

d. information technology.

Communications security

The vulnerability of telecommunications to exploitation by enemy forces must be reduced to the lowest level possible through vigilant application of communications security (COMSEC) equipment and procedures. The five COMSEC measures


CAF Photo: Cpl Patrick Drouin

include transmission, cryptographic and emission security, as well as physical and personnel security.

The telecommunications-support organizations at all levels should play an active role in continuously monitoring the COMSEC posture of all air operations. All personnel must be reminded of the importance of COMSEC through educational awareness programmes.

Electronic warfare

The adversary will use EW to attempt to exploit or deny the use of the electromagnetic spectrum. By intercepting and analysing signals radiated by allied telecommunications, the adversary can assemble a database that describes the friendly command and control system and, thereby, have easy access to the parameters needed to disrupt it. Facilities and procedures must include highly classified war reserve modes that are not used during training but that can be implemented on operations. Good emission control (EMCON) will minimize the time available to the enemy to capture signal parameters.

Once the adversary obtains an allied signal's parameters, it may be jammed or infiltrated with deceptive information. The location of allied telecommunications equipment may be determined and then destroyed by the adversary with conventional or directed beam weapons. Science and technology has developed equipment that can provide automatic authentication and whose signals are resistant to jamming. Alternatively, authentication and EMCON by users decrease the risks on unprotected equipment.

Mobile tactical communications

Mobile-tactical-communications facilities should be capable of interoperability with other agencies and providing secure communications. Deployment areas could include

airfields or any other locations that require mobile tactical communications. Mobile-tactical-communications facilities should be capable of operating in all conditions of light, weather and EW as well as all chemical, biological, radiological and nuclear (CBRN) states.


CAF Photo: Cpl Patrick Drouin

The capabilities provided by mobile tactical communications include air traffic control, navigation aids, airfield facilities, mobile operations shelters, medium-range high-frequency (HF) communications, satellite communications and other associated communications.

Information technology

Telecommunications systems can provide vast quantities of information from many different sources. Information technology converts this data into a useable form that can provide commanders with information superiority over the adversary. Creating and modifying systems by connecting various facilities can be performed much more quickly than acquiring new equipment, provided technical expertise in network interconnection and software support exists.

Information technology can provide essential information superiority for command-centre personnel. Battle-management information systems and simulators utilizing this technology require ongoing software support.

Supply operations

Supply operations involve "the acquisition and distribution of items of supply to a user in order to satisfy stated requirements. [This] includes, in a broader sense, resupply and replenishment activity."[8] Within the CAF/RCAF supply chain, there are many key stakeholders, including industry, supply depots, wing supply organizations, squadron stores and maintenance sections. An integrated supply chain is vital to the successful sustainment of air operations. The RCAF integrated supply chain includes doctrine that provides a conceptual framework for the development of plans, policy and procedures and is founded on the fundamental support principles within which the supply chain operates. Supply doctrine undergoes revisions when required by changing technology and programmes.

The key role of the supply chain is materiel replenishment in support of operations. This does not change regardless of CAF's posture (e.g., peacetime, wartime, etc.); however, the frequency and intensity of supply activity will logically and proportionally increase during heightened stages of an operation.

In line with the North Atlantic Treaty Organization (NATO) and our allies, within CAF and the RCAF there are, as shown in Table 3-1, 10 recognized classes of supply/materiel.

8. *DTB* record 3238.

CLASS OF SUPPLY	DESCRIPTION
Class I – Rations and Water	Operational holdings are maintained at supply depots and wings. The RCAF does not preposition high-readiness holdings of Class I materiel. Both commodities can be obtained on short notice if required.
Class II – General and Technical Stores	Operational clothing, personal protective equipment and general consumable stores are available through wing supply clothing stores and local purchase order (LPO) activity.
Class III – POL	Limited holdings of bulk and packaged petroleum, oils, and lubricants (POL) products, including aviation fuel, are commonly held at MOBs. For expeditionary operations, maximum use of HNS and civilian contracts should be used where practical.
Class IV – Construction Engineering (CE) and Defensive Stores	CE stores are normally available from a wing CE section or from national sources. The RCAF holds limited quantities of defensive stores; when required, additional defensive stores may be obtained on short notice from national sources.
Class V – Ammunition	Ammunition is a centrally managed commodity, and the release authority is CJOC. Both small arms and aircraft-specific munitions require CJOC coordination and release.
Class VI – Amenities	Amenities and welfare items are a Director General Morale and Welfare Services (DGMWS) responsibility. For expeditionary operations, amenities and welfare are normally planned and developed by CJOC with input from DGMWS.
Class VII – Major Equipment	Major equipment items—such as engines and major assemblies—are controlled stores held at third or fourth line. The release authority for major end items is normally the formation HQ's A3 Operations.
Class VIII – Medical	Medical stores are provided through a separate and independent health services support (HSS) supply chain. The Canadian Medical Equipment Depot (CMED) is the medical supply depot where medical stores are held, distributed from and accounted for. Due to their sensitive and technical nature, medical and dental stores require tight controls and specialized management, as shelf life is often limited.
Class IX – Repair Parts	The types and quantities of aircraft spares are fleet specific and are held by the respective air dets and MOB maintenance organizations.
Class X – Materiel Support to NGO	These items are used to support non-governmental organizations (NGOs) and humanitarian operations. The scope of items authorized to support these projects is controlled by CJOC.

Table 3-1. Classes of supply/materiel

Procurement and contracting. The procurement of goods and services is governed by DND policies that adhere to Treasury Board guidelines. Local procurement and contracting, while a vital activity in support of operations, is normally tightly controlled by supply and comptroller staffs. A force multiplier and specialized function, contracting may be performed by a variety of acquisition card holders and supply personnel at all levels of command, depending on the dollar amount of the transaction, delegation of authorities and approval levels granted. Close coordination

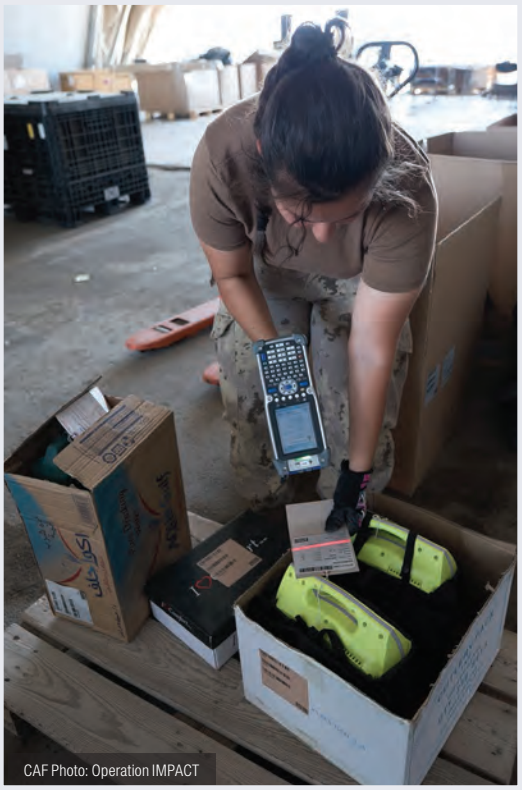
between operations and support staffs is critical to ensure procurement activities are successful in meeting the operational requirement in a timely manner.

It can sometimes be challenging for procurement specialists to satisfy the operational need in the time required while fully adhering to Treasury Board and DND guidelines. This is due, in part, to a lack of foresight by operations and support planners and the fact that, in its entirety, the contracting process can be lengthy.

The contracting process

In general, the process comprises several steps including contract request, requirement review, procurement plan, solicitation, evaluation, contract approval/award, contract management, payment and closure.[9]

While competition and bid solicitation are required by Treasury Board policy, exceptions to this rule may be used in certain circumstances, including a true emergency situation where the time available precludes competition and where delay would be injurious to the public interest. Contracting officers should consult A-PP-005-000/AG-002, *Procurement Administration Manual (PAM)* for detailed and precise information, as it is the mandated DND procedure manual for all procurement and contracting activities.



CAF Photo: Operation IMPACT

Cataloguing. "Canadian federal government departments and agencies use the Canadian Government Cataloguing System (CGCS) for the codification of materiel-in-use for identification and data management assignment purposes and as an item validation tool to aid in maintaining their department/agencies' inventory management and accounting policies and practices."[10] All materiel and equipment brought into service is catalogued and inventoried in order to properly classify and identify materiel. The material is identified either with a NATO stock number (NSN) or with a Permanent System Control Number (PSCN) that is assigned through the CGCS.[11] The reasons for cataloguing include providing a standard

9. For additional information, see A-PP-005-000/AG-002, *Procurement Administration Manual* (14 February 2005, Revision 67, April 2015), 279–99, accessed June 26, 2017, http://materiel.mil.ca/assets/MAT_Intranet/docs/en/business-functions-procurement-contracting/procurement-administration-manual.pdf.

10. A-LM-007-100/AG-001, *Supply Administration Manual*, July 3, 2015, Chapter 3.2, Materiel Identification, accessed October 2, 2015, http://materiel.mil.ca/en/business-functions-materiel-management/supply-administration-manual-sam.page.

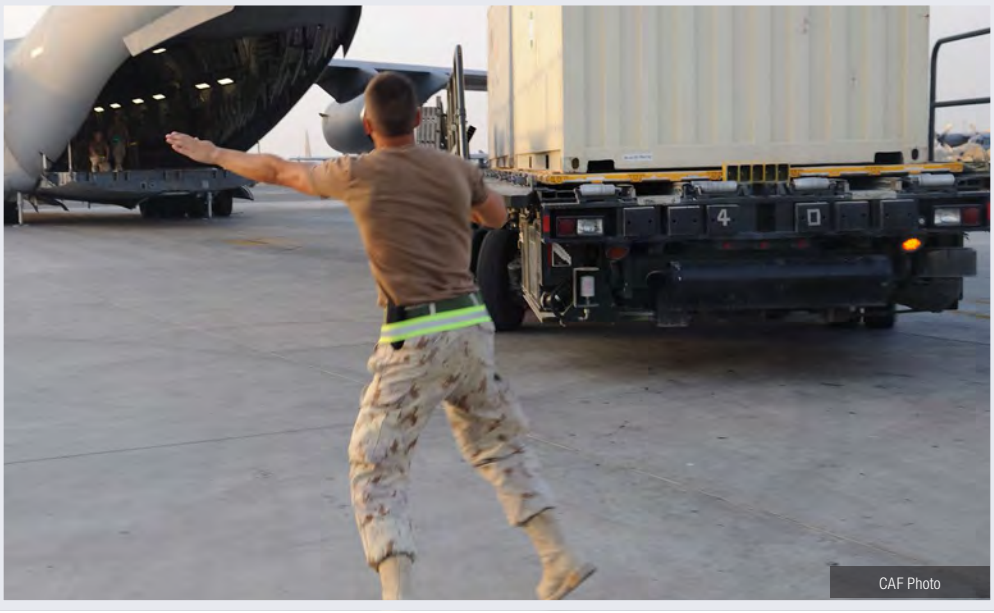
11. A-PP-005-000/AG-002, *Procurement Administration Manual*, paragraph 5.10 (a).

means of item identification and facilitating interoperability among both national and allied forces. The cataloguing function is the genesis of effective asset management, materiel control and visibility within CAF and the RCAF.

Repair and disposal. The repair and disposal (R&D) function provides a conduit for non-serviceable items to be returned from service to the supply system, while at the same time providing a mechanism to acquire a replacement item. At an MOB, this function is performed by supply R&D sections, which are responsible for receiving and processing, sending for repair or condemn and disposing of the item. If the item is condemned and disposed of, the unit/squadron normally has authority to requisition a replacement.

Mobile-support-equipment operations and air movements

An effective transportation system is essential to support the worldwide deployment and employment of RCAF forces. The transportation network must be capable of functioning and operating at every level of conflict—strategic to tactical. The transportation network includes roads, rail, air, inland waters, sea and pipelines and is a vital part of the logistics supply chain for deployed military operations.



CAF Photo

In order to provide effective support to air operations, transportation resources are located on wings in wing transportation (a component of wing logistics and engineering), air-movements squadrons as well as strategic- and tactical-transport squadrons (loadmasters, who are employed as aircrew). 1 Canadian Air Division has corresponding staffs with A4 Mobile Support Equipment, A4 Movements and the Combined Aerospace Operations Centre's Air Mobility Division. A4 Movement combined with CJOC J4 Mov are responsible for the strategic planning for air movements.

The transportation system that supports air operations encompasses two distinct functions: mobile-support-equipment operations and air movements, including airlift support.

Mobile-support-equipment operations. Wing transportation is the organization responsible for a wide variety of mobile-support-equipment capabilities and services on the wing. It provides equipment and drivers for tasks such as freight hauling, snow and ice control (SNIC), runway grip testing, road/runway sweeping, aircraft refuelling and personnel transport such as buses. Mobile-support-equipment safety is the component of Wing Transportation, Electrical and Mechanical Engineering (TEME) concerned with collision prevention through training and licensing drivers and investigating collisions. Fleet management is concerned with ensuring other organizations on the wing have sufficient mobile support equipment to complete their tasks with the minimum excess.

Air movements. Air movements is the specialty within the transportation domain that supports all CAF environments. The RCAF's air-movements organizations provide airlift; process equipment and passengers; inspect cargo; and prepare, load, unload, secure and rig all payloads, including patient movement and staging (the basis of the aeromedical evacuation system). Air-movements units also process incoming cargo for onward movement to its final destination.

CAF Photo: Cpl Rod Doucet

In order to provide direction, guidance and authority for the preparation and loading of materiel, personnel and equipment, air-movements plans are required. Air-movements plans are developed from a bottom-up perspective and are initially based on the unit movement staff table (UMST), which lists a unit's materiel and equipment that will be moved by air. The UMSTs for all units in a task force are consolidated into a task force movement table (TFMT), which consolidates and prioritizes the materiel and equipment by location and sub-subunit.[12] A loading plan, the TFMT "presents in detail all instructions for the arrangement of personnel, and the loading of equipment for one or more units or other special grouping of personnel or material moving by highway, water, rail or air transportation,"[13] and consequently, the TFMT helps determine the total airlift resources required to move a task force.[14]

12. *DTB* record 15856.

13. *DTB* record 4684.

14. Amplifying details are found at B-GJ-005-404/FP-000, *Joint Movement Support* (2002-09-01), Chapter 3.

Royal Canadian Electrical and Mechanical Engineering

The effective maintenance of MSE is a critical enabler to successful air operations, as the RCAF requires that emergency and rescue vehicles, flight-line and aircraft servicing equipment as well as runway clearance vehicles be in serviceable condition at all times.

The maintenance of land-based equipment consists of four lines of maintenance organizations[15] and three levels of maintenance, with each line performing a progressively higher level of maintenance:

a. **First-line maintenance organizations** provide the lowest level of support and consist of a Royal Canadian Electrical and Mechanical Engineering (RCEME) organization within a unit. An example of this is an MSE maintenance organization on an operation. A first-line maintenance organization generally performs recovery and repairs of limited duration.

b. **Second-line maintenance organizations** perform tasks of a longer duration than first-line organizations. They generally have access to a greater range of parts and tooling. Since most MOBs and other operating locations are immobile, a second-line organization (e.g., a wing RCEME maintenance organization) usually supports multiple squadrons.

c. **Third-line maintenance organizations** augment second-line organizations and provide support to the materiel management and distribution system. The repair facilities of third-line maintenance organizations are more robust and static in nature, and repair resources are dedicated to production rather than battlefield survivability.

d. **Fourth-line maintenance organizations** are static facilities outside the theatre of operations, such as 202 Workshop Depot, civilian manufacturers, contractors, etc.

The Land Equipment Management System (LEMS), in its entirety, is applicable to all land-based equipment used by all CAF components.[16]

Food services

Food-services operations are an essential element in sustaining the RCAF. Planners must consider the concept of food-service support and be able to coordinate its execution. The food-service options range from meals on the economy, to providing fresh or hard rations by national sources, to leveraging host- or lead-nation support. The type of food-services support provided will vary with the operational environment as well as the availability of rations, personnel and equipment.

Food services are responsive to the physiological and psychological needs of RCAF personnel within a particular operational context. A high standard of food-service support contributes to personnel motivation, operational readiness and increased morale.

15. For additional information, see B-GL-300-004/FP-001, *Sustainment of Land Operations* (2010-12-13), 4-2–4-3.

16. For a complete description of LEMS, see B-GL-342-001/FP-000, *Land Equipment Management Systems* (2001-09-10).

Personnel management

The successful maintenance of an RCAF force and its capabilities requires an effective, efficient and responsive personnel-management system. The CAF military personnel-management system, therefore, must be capable of maximizing the operational effectiveness of CAF personnel, thereby contributing towards mission success.[17] The five components[18] of the CAF military personnel-management system are:

a. **Recruit**—attract, recruit and select personnel;

b. **Train and educate**—timely delivery of trained and educated professional military personnel;

c. **Prepare**—includes the medical, dental and spiritual well-being of military personnel;

d. **Support**—includes casualty support, family support, fitness, sports, insurance, compensation and benefits; and

e. **Honour and recognize**—the timely and appropriate recognition of serving, retired and deceased CAF personnel and their families.

17. For a complete, detailed description of the personnel-management system and its components see B-GA-407-001/FP-001, *Air Force Personnel Doctrine* (2010-04-29).

18. Military Personnel Command Order 1000-6, CMP Policy Management Framework, accessed October 1, 2015, http://cmp-cpm.mil.ca/en/policies/mpco.page; and Canada, DND, "Chief of Military Personnel," accessed October 1, 2015, http://www.forces.gc.ca/en/about-org-structure/chief-military-personnel.page.

Personnel are the RCAF's most valuable resource and the most important part of any military capability. Ensuring the well-being of personnel in a manner that considers the members' desires while achieving operational success is one of the primary factors contributing to operational effectiveness.

At the strategic level, Chief of Military Personnel (CMP) aims to have the correct individual with the right qualifications, in the right place at the right time.

At the operational level, C Air Force personnel-management staff interprets strategic and operational policy and disseminates it to the divisions, wings and squadrons. The roles of the C Air Force personnel-management staff are to:

a. develop and monitor the RCAF human resources (HR) plans and HR-management frameworks;

b. as required, make recommendations to division commanders on Regular force manning priorities;

c. provide civilian-staffing guidance and direction;

d. as required, review/recommend the priorities for Air Reserve initiatives; and

e. make recommendations about the allocation priorities for HR resources (military person-years [PYs] as well as Air Reserve and civilian salary and wage envelope [SWE] funding resources).

Financial services

Financial services are a key element in the sustainment of military operations, and they are closely linked to procurement and contracting. All financial activities are conducted in accordance with national policies and directives, and they normally fall into two categories: public funds and non-public funds (NPF).

Public funds includes the pay and allowances of individuals as well as control of funds spent on training and operations. NPF includes the accounting for unit canteens, messes and institutes.

Whether conducting operations at home or abroad, it is important that the appropriate delegation of authorities has been established and that the correct financial framework is in place to support the operation. As noted above, financial services and the delegation of authorities are directly linked to the performance of contracting activities, so it is essential that authorities are delegated early on to allow goods and services to be procured in a timely manner and in compliance with existing policy and regulations.

Aircraft commanders may need to draw an advance of public funds to support their particular mission / air tasking order. In these situations, advice from the pay accounting office coupled with completion of financial certification training should help ensure mission success, while protecting both public funds and the aircraft commander.

During an operation, a senior finance officer is normally part of the formation HQ staff (the A8/J8), and they will provide financial advice/guidance to the force-employment commander. The primary goal of the finance staff is to enable operational requirements while ensuring adherence to existing policy and regulations.


CAF Photo

Postal services

The Canadian Forces Postal Services are responsible for providing scalable postal support, both domestically and abroad. Postal clerks are employed in mail-distribution-point support operations by receiving, despatching and sorting incoming and outgoing mail. Military post offices are authorized retailers for Canada Post Corporation's goods and services. As such, military postal clerks are knowledgeable in domestic and international postage, expedited parcel and letter services, money orders and philately.

Postal support for deployed operations is controlled by the operational authority and CJOC J4 Postal; it is a function of the joint task force support component (JTFSC). If postal support is established for a mission by the operational authority, it will take one of the following forms:

a. **One-way mail**. Mail that is destined for deployed operations is processed by the Canadian Forces Postal Unit and forwarded to the DOB via commercial carrier or sustainment flight. Mail only moves one direction and cannot be sent back from theatre. This is the most common form of postal support; or

b. **Two-way mail**. Mail is processed in an identical fashion to one-way mail, but the presence of a postal clerk in theatre permits mail to be sent back to Canada. This type of mail service is normally reserved for long-term, large-scale operations; however, missions with one-way mail may request a postal technical assistance visit to establish temporary two-way service.

Public affairs

Public affairs (PA) play an important role in the successful conduct of CAF and RCAF operations and inform the public of policies, programmes, services, activities and operations. It is important to integrate the principles of openness, transparency and accessibility into the day-to-day operations of CAF and DND, while respecting

the constraints to openness imposed by legislation and regulation.[19] A comprehensive and proactive PA approach will normally be used, and the public affairs officer (PAO) will usually engage the news media during the conduct of the operation.

While PA policy is controlled at the strategic and operational levels, all airmen/airwomen are normally authorized to speak with the media about their occupation and specific area of expertise.

Chaplain

A chaplain is an individual who "attends to the spiritual needs of people through conducting religious services; counselling; encouraging individuals in understanding themselves; interpreting theological/moral issues and ethical questions; educating others in such areas as ethics, anger management, suicide prevention etc.; and visiting and caring for the sick and the troubled. Chaplains often work on ecumenical or interfaith teams."[20] The spiritual and moral welfare of all ranks, and especially the spiritual comfort of the sick and wounded, are the responsibility of the chaplain. The role of the chaplain is an important one, particularly during combat operations.

The chaplain has a broad range of ministries including, but not limited to, worship and sacraments, parish ministry (encompassing the whole military community), hospital and detention ministry, crisis intervention, pastoral support and counselling, deployment on operations, moral and ethical advisor, visitation, teaching ministry (ethics, marriage preparation, suicide prevention, etc.), social action, administration and supervision, the conduct of religious services, battlefield casualty identification and burial services.

Chaplains will normally be assigned to units and at different levels of HQ, as it is vital they be identified as members of those units. This approach helps the chaplain fully integrate into the unit and breaks down stereotyping and perceived barriers, making them more approachable and accessible for airmen/airwomen when required.

Senior chaplain's positions established at various headquarters and command levels are responsible for the general supervision and administration of chaplains within all RCAF units, stations and bases.

SPECIALIST SUPPORT

Within CAF there are highly specialized occupations that require professional designations to attain certification. These are commonly referred to as specialist occupations. The services commonly grouped in this category include health (medical and dental) and legal.

Health services support

The Canadian Forces Health Services Group (CF H Svcs Gp)—a vital component in ensuring operational effectiveness—provides timely and reliable HSS to CAF/RCAF members.

19. DAOD 2008-0, Public Affairs Policy (1998-03-01), accessed August 26, 2015, http://intranet.mil.ca/en/defence-admin-orders-directives/2000/2008-0.page.

20. "Royal Canadian Chaplaincy Service," Canada, DND, accessed August 26, 2015, http://cmp-cpm.mil.ca/en/support/chap-gen/chaplaincy-index.page.

CAF Photo: Cpl Mark Schombs

The CF H Svcs Gp is responsible for force generating effective and coordinated HSS capabilities for CAF operations. The preservation of personnel takes several forms, including preventing illness and injury as well as saving life and limb. During training and operations, the safe and timely return to duty of the sick and wounded is the ultimate objective. Finally, HSS operations involve evacuating from a theatre of operations those who are not expected to return to duty within a reasonable period of time.

The HSS capabilities required to support an operation will be identified during the operations planning process conducted prior to the start of the operation. HSS organizations will be force generated by the CF H Svcs Gp, and those assets will normally be assigned operational command (OPCOM) to the national command element (NCE) or joint task force commander. The force-employment commander assigns HSS elements to various levels of the force to provide adequate and necessary medical support.

HSS framework. The basic HSS structure within an operational context is comprised of the following levels:

a. **Strategic-level support.** Canada-based HSS formations and units provide strategic-level HSS. In exceptional circumstances, the strategic level may be supplemented by allied military and foreign national definitive-care capabilities.

b. **Operational-level support.** The operational level of support is normally provided by the HSS elements within a theatre of operations.

c. **Tactical-level support.** The tactical level is normally provided by HSS elements organic to formations, squadrons and units.

HSS roles. HSS is based on treatment capabilities that play a specific part in preventive medicine and dental processes, progressive treatment, hospitalization as well as the evacuation of the sick and injured. These capabilities are referred to as roles, which are unique to HSS. Each successive role includes some or all of the treatment capabilities of the previous role. The HSS roles, as they pertain to medical services, are:

a. **Role 1** includes locating casualties, providing them with first aid and emergency medical care, evacuating them from the site of injury to a safer location, sorting them according to treatment precedence, stabilizing them and, if required, preparing them for evacuation.

b. **Role 2** emphasizes efficient and rapid evacuation of stabilized casualties from supported elements and en route sustaining care. Emergency lifesaving resuscitative procedures and damage-control surgery may be performed. Casualties who require minor care may be held for short periods and returned to duty. Medical resupply may be provided to supported role 1 facilities.

c. **Role 3** provides resuscitation, damage-control surgery (if not done in a role 2 facility), post-operative care as well as short-term surgical and medical inpatient care. Diagnostic services (such as x-ray and laboratory) and limited scope internal medicine and psychiatric services are available. In-theatre reception and storage of medical supplies (including blood) and distribution to supported units is provided. In addition, repair of medical equipment within the area of operations is carried out.

d. **Role 4** includes reconstructive surgery, definitive-care hospitalization and rehabilitation. It also includes storage and distribution of national medical stocks as well as major repair or replacement of medical equipment.

During operations, the first two HSS roles will normally be provided by Canadian resources in the area of operations (AO). Role 3 services may also be provided by Canadian resources or through negotiations with allies or other foreign nations. Likewise, role 4 could be provided through negotiations with allies or by military and civilian resources in Canada.

Legal

Canadian military law is divided into three main areas or pillars, those being military administrative law, operational law and military justice. The mission of the Judge Advocate General is to deliver "independent, operationally focused, solution oriented legal advice and services across the full spectrum of military law, and superintends the administration of military justice."[21] Legal services include, but are not limited to:

a. legal advice to commanders and staffs on all matters of domestic, foreign, international and military law, particularly the law of armed conflict;

b. supervision of the administration of military justice;

c. legal guidance on government contracts, military personnel matters and the utilization of non-appropriated funds; and

d. advising commanders and commanding officers on military-justice matters.

Within CAF, legal services are provided through regional offices located on selected bases/areas in each of the regions in Canada as well as the United States and Germany. Through these offices, the Deputy Judge Advocate General (DJAG) is responsible for providing general legal support to the chain of command. The senior legal officer at each level provides the advisory function to the commander and maintains close liaison with other legal officers employed throughout the RCAF and CAF.

During operations, the legal advisor's role "is to facilitate the lawful conduct of operations by providing timely and accurate legal advice to the commander at the strategic, operational, and tactical levels during all phases of an operation."[22] As CAF operations have increased in complexity and intensity, it is vital that the legal advisor be included during appropriate phases of an operation to ensure the lawful and successful conduct of operations. It is particularly important that RCAF commanders consider legal advice when planning operations, particularly when it pertains to the targeting process and selection of lawful targets.

21. "Office of the Judge Advocate General," Canada, Department of National Defence, accessed August 26, 2015, http://jag.mil.ca/index-eng.asp.

22. "Operational Law," Canada, DND, accessed August 26, 2015, http://jag.mil.ca/oplaw-loiop/index-eng.asp.

CAF Photo: Sgt Paz Quillé

UNIQUE SUPPORT SITUATIONS

SUPPORT TO TACTICAL-AVIATION OPERATIONS

"The role of tactical aviation is to support land force operations through the provision of aerial firepower, reconnaissance and mobility."[23] In practical terms, the provision of mission support for tactical-aviation units is similar to that of other elements within a formation task force. A robust first-line support capability is critical to tactical-aviation units' ability to operate effectively. Second-line mission-support services may be provided by either the supported land force or the RCAF through the air expeditionary wing's (AEW's) mission-support element (MSE). If provided by the land force, the doctrinal foundation is B-GL-300-004/FP-001, *Sustainment of Land Operations*; however, this will depend on the administrative relationship assigned. While the majority of operations-support functions (less force protection) are provided by the RCAF, most mission-support requirements may be provided by either the RCAF or the supported land force. When second-line mission support is provided by the RCAF, the MSE is likely to be activated and employed. In either situation, support will normally include LEMS, materiel management and distribution (MMDS), personnel-support services (PSS) and HSS to the tactical-aviation unit. The specific activities, maintenance tasks, repair parts, tools and test equipment required at each line to support tactical-aviation elements need to be clearly articulated to ensure aviation units are properly supported.

23. B-GA-440-000/AF-000, *Tactical Helicopter Operations*, Change 1 (February 24, 1999), 1. Tactical-aviation resources in combination with HSS are the basis of the forward-aeromedical-evacuation system, which evacuates injured personnel within and from the battlefield.

Maintenance of the CH146 Griffon is provided by a combination of first-line resources located at the unit and second-line maintenance resources through 400 Tactical Helicopter Squadron. CH147 Chinook maintenance is provided by first- and second-line resources within 450 Squadron. An integrated logistics support (ILS) package forms part of the maintenance support for both of these platforms.

RCAF-specific support issues (such as operations support, flight safety, airworthiness, aircraft maintenance, spare parts and aviation fuel) are addressed at the tactical and operational levels by RCAF staff planners. To do this effectively, RCAF staff work closely with the supported land-force and tactical-aviation chains of command.

While supporting land operations, a forward arming and refuelling point (FARP) may need to be established to support helicopters operating in forward locations. A FARP is necessary when the lines of communication have been stretched to the extent that tactical-aviation assets are unable to return to their base to refuel. This situation may occur when a land formation is advancing rapidly while conducting offensive operations. In this scenario, second-line support is usually provided by the land formation's second-line support organization (service battalion)[24] due, in part, to force-protection concerns and the lack of tactical land equipment integral to RCAF units. Third-line support is normally achieved through access to a theatre logistics base (TLB) or a replenishment point (RP), established by the responsible third-line support organization. Third-line support resources may be provided through various means, including the JTFSC,[25] lead/host nation or prearranged contracts and agreements with local industry.


CAF Photo

SUPPORT TO MARITIME-AIR OPERATIONS

Air power employed in the maritime environment extends the reach of maritime operations, facilitates manoeuvre and enhances awareness through air power's characteristics of elevation, speed and reach.[26] Maritime helicopters (MHs) detached from the RCAF to the Royal Canadian Navy (RCN) are employed as "maritime aviation." This term is traditionally used to identify rotary-wing assets that are operating in a maritime role but are still under OPCOM of non-naval forces.

24. For more information, see B-GL-345-001/FP-001, *Combat Service Support (CSS) Units in Operations* (2013-02-28).

25. The JTFSC is the task-tailored support organization that serves as the link between the third/fourth-line support capabilities provided by national support organizations and the first/second-line capabilities found within the mission-support element.

26. B-GA-403-000/FP-001, *Canadian Forces Aerospace Shape Doctrine* (March 2014), 43.

The maritime-aviation assets provide the capability of conducting a number of different missions, including antisurface warfare, anti-air warfare and underwater warfare.[27]

Unlike air power employed within the land environment (primarily tactical aviation), the use of air assets in the maritime environment does not normally involve activation of the AEW and its OSE/MSE. As a result, mission support is usually provided by the RCN, often by a forward logistics site (FLS).[28]

At the operational level, the RCAF retains responsibility for RCAF-specific and longer-term support issues such as aircraft fleet management, operations support, flight safety and management of the airworthiness programme.

SUPPORT SERVICE-DELIVERY OPTIONS


CAF Photo: Sgt Matthew McGregor

When developing the support plan, resources may be derived from any combination of military assets, contracted services, HNS and cooperation with other nations. At the tactical level, support is provided through the MSE and OSE respectively. If operating within a joint context, the MSE will coordinate with the JTFSC, which draws support from a number of sources, including other military assets, contracted services, HNS and cooperation with allies. At the operational and strategic levels, support from Canada is provided through the strategic lines of communication (SLOC) via CJOC, supply and ammunition depots, National Defence Headquarters (NDHQ) group principals and industry. While desirable to maintain a dedicated military capability to support the deployed force, the practical requirement to optimize the sustainment footprint will likely result in the use of a combination of different resources.

MILITARY ASSETS

Military assets include all air-support elements deployed from the MOB in support of the operation. The level of deployment will be based on an estimate of the requirement balanced against the availability of resources from non-military sources. Inevitably, there will be pressure to minimize deployed military support assets to reduce costs; this must be balanced against the certainty of support provided by dedicated military resources. In addition to the initial deployment of military support assets, a surge of resources may be required, particularly during theatre activation

27. Ibid.

28. An FLS is a "shore-based support organization established in a theatre of operations to coordinate in-theatre sustainment of a naval task group." *DTB* record 6315.

and redeployment phases. Military assets offer the greatest flexibility and reliability, but by their very nature, they may be the scarcest resource and may need to be augmented by other resources.

Leveraging external sources to secure materiel and services can create valuable efficiencies by potentially reducing the strain on limited strategic airlift for use in transporting high-priority items. This is particularly important during the initial phases of an operation, where the demand for strategic airlift often outstrips capacity.

CONTRACTED SERVICES

In most cases, contracted services can act as a force multiplier rather than as a replacement for an existing RCAF support capability. Such alternative services can help to enhance the sustainment of the operation. Within Canada, this involves using commercial contractors, while for international operations, it can provide a Canadian or international labour pool to lessen the strain on military resources. Contracted services become more crucial in the sustainment of long-term operations and when consumption rates elevate as the operational tempo increases.

CAF Photo: Pte Gerald Cormier

The international marketplace is an increasingly important source of contracted services. The RCAF must directly or indirectly support the marketplace from which it expects to draw required resources. In particular, various modes of transportation are frequently contracted to deploy and sustain military forces. Furthermore, while the overall airlift capacity of CAF has increased, in most cases, augmentation from commercial airlift is still required to meet the needs of a specific operation. Commercial airlift can also be an effective means of moving oversized cargo during deployment, sustainment and redeployment of CAF units.

HOST-NATION SUPPORT

HNS is a valuable resource that can be leveraged during DOB operations. Not applicable to MOB operations, HNS is the civil and military assistance rendered by a host nation (HN) to military forces that are located on, operating on/from, or in transit through the HN's territory during peacetime, crises, emergencies or war. Such support is based on agreements mutually concluded between the HN and the military forces.

The breadth of HNS available in terms of personnel, equipment, services and resources may allow the RCAF to reduce its sustainment footprint. The types of support that can be obtained from an HN include facilities, transportation, civilian labour, security and protection, materiel and equipment, health services, airlift and port services, POL, food, and maintenance services. Planners must carefully identify, evaluate and select HN sources of supplies and services that will be used during the operation. At the same time, they must assess the reliability and compatibility of the supplies and services offered. Finally, by utilizing HNS, the possibility of providing an economic stimulus to the HN is increased. This can build goodwill within the HN and assist with any "hearts and minds" campaign, but it can also have negative consequences, depending on political and social conditions in the HN.

COOPERATION WITH OTHER NATIONS

Cooperation with other nations, including allies and coalition partners, also offers the opportunity to reduce costs and enhance efficiency. There are obvious issues concerning integration and compatibility of systems, but with close allies, particularly within NATO, these may be overcome. The RCAF must maintain positive control and ensure that effective sustainment is achievable, regardless of where or how the support is provided. Specifically, when making support arrangements in a deployed location, planning staffs must be aware that many military forces are restricted as to the nature of support they can accept from and/or provide to their coalition partners.

Using allies, other government departments (OGDs) or coalition partners as sources of support has inherent risks. The use of allies and other resources may impact the degree of control of the entire sustainment strategy. Therefore, it is important to maintain positive control on external service providers as well as on the products/services being provided.

CAF Photo: Cpl Valerie Côté

CONCLUSION

Each source of support will entail a different level of risk, cost, flexibility and effectiveness. These variables must be analysed for each commodity before the overall support package is finalized; however, there is rarely a choice in the support package's composition.

CHAPTER 4

SUPPORT TO OPERATIONS

CAF Photo

INTRODUCTION

The preceding chapters examined the fundamentals of sustaining and supporting the Royal Canadian Air Force (RCAF). This chapter focuses on support to operations, including a look at the importance of the main operating base (MOB) in supporting operations. Although usually described in terms of theatre of operation[1] (domestic, continental and international) and category[2] (routine, contingency and rapid response), the RCAF has special considerations for single-environment (RCAF), expeditionary and North American Aerospace Defence Command (NORAD) operations.

In the Canadian Armed Forces (CAF), the force-employment process includes all activities required to plan, conduct and review CAF operations. On behalf of the Chief of the Defence Staff, the commanders (comds) of the Canadian Joint Operations Command (CJOC) and the Canadian Special Operations Forces Command (CANSOFCOM) are responsible for planning and executing CAF operations,[3] while the Comd Canadian NORAD Region (CANR) is responsible for conducting NORAD operations on behalf of CAF.

MOB SUPPORT TO OPERATIONS

An MOB is "a base responsible for supporting the generation, employment and sustainment of assigned forces."[4] MOBs are active installations with air operations occurring on a continual basis. This is true even when a flying squadron is deployed, as there remain home-based missions and operations that must be sustained. An MOB generally supports a number of flying units, and consequently, the entire support capability required for a deployed operation can never be generated from a single MOB.

MOB support organizations should be structured and managed in such a way that forces can be deployed without unduly affecting MOB operations. Ideally, RCAF organizations will be capable of transitioning easily between home and deployed operations, and support personnel will possess the skill and mindset needed to effectively perform their job under any circumstance.

Operations are most easily supported from an MOB, as it offers the infrastructure and services required to conduct and support operations. Given this fact, standardization between MOBs to enhance operational-support efficiency is clearly advantageous. Differences in supporting structures between wings conducting similar functions can result in reduced efficiency, flexibility and interoperability. Learning curves for transferred personnel become needlessly high, resulting in an unfavourable effect on

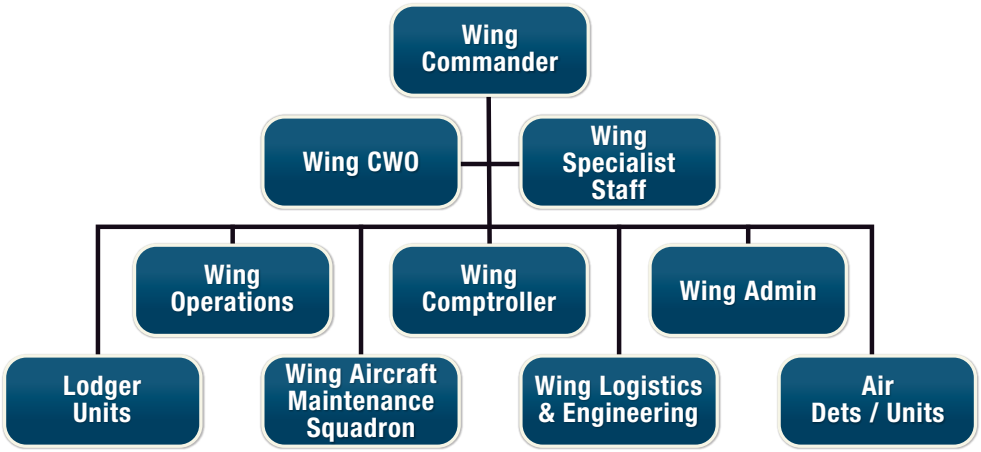
1. B-GJ-005-300/FP-001, Canadian Forces Joint Publication (CFJP) 3.0, *Operations* (2011-09), paragraph 0206.
2. Ibid., paragraph 0612.
3. Further details regarding chain of command and main responsibilities can be found in ibid., Chapter 2.
4. *Defence Terminology Bank* (*DTB*) record 41464.

efficiency. Therefore, MOB organizations should, where possible, conform to the organization chart in Figure 4-1, and air expeditionary wings (AEWs) should follow the standard pattern described in Figure 4-2. While it will never be possible to achieve complete standardization due to the unique nature of different aircraft fleets, the pursuit of wing standardization in common areas should be a goal to strive for. This is particularly true in the areas of:

a. organizational structures, to make it easier for personnel transition and integration when relocating from one wing to another;

b. training and operating procedures, so that support personnel from different MOBs can be easily assigned to deployed locations; and

c. organizing and training as it fights, to enhance the RCAF's delivery of air power.



Notes:

1. Environment/general safety may be a part of wing headquarters (HQ) / specialist staff. Wing flight safety officers are part of wing HQ staff.
2. Wing medical and dental detachments are commanded by the Commander Canadian Forces Health Services Group, while the military police are operational command (OPCOM) to Military Police Services Group.
3. Lodger units are normally administrative control (ADCON) to the wing commander but are OPCOM to their operational chain.

Figure 4-1. Typical MOB organization

MOBs operate using a combination of military, civilian and contractor personnel. Because military personnel must be deployable, military planners regularly face the challenge of making the most efficient use of limited personnel resources, while ensuring that skill sets are maintained and that the necessary personnel are available to conduct operations. The requirement to deploy military personnel can put a significant strain on MOB support capabilities, and as a result, it may be necessary to increase reliance on contractors and temporary civilian personnel while concurrently sustaining a deployed operating base (DOB).

MOBs designated to support a deployed unit / air task force (ATF) are vital to operational success. They carry the dual role of supporting air operations at home and preparing elements (e.g., operations-support element [OSE], mission-support element [MSE] and command element [comd elm]) for expeditionary operations. Increases to Reserve funds and/or the salary wage envelope are two ways of augmenting wing/MOB support capabilities during the deployment of integral support components, though this is always subject to resource availability.

SINGLE-ENVIRONMENT (RCAF ONLY) OPERATIONS

As noted above, the only force employers within CAF are Comd CJOC, Comd CANSOFCOM and Comd CANR. Notwithstanding this fact, there are some situations where there is a leading and predominant environment conducting the operation; these are called single-environment operations. In general terms for the RCAF, these operations tend to be routine in nature and occur at regular intervals. Operation BOXTOP, which resupplies Canadian Forces Station Alert, is one example of an RCAF operation that is largely routine in nature and occurs at regularly scheduled times.

While best supported from an MOB, it may also be necessary to activate the ATF/AEW with its OSE and MSE to support an RCAF single-environment operation from a DOB or forward operating location (FOL). Activating an ATF/AEW will depend on the circumstances or geographic region involved (e.g., when operating in the North).

During RCAF operations, it is the air staff that must plan, coordinate and execute the sustainment plan. This plan must include all possible support necessities, including operations- and mission-support requirements. In most situations, reachback to national-support organizations (through the joint task force support component [JTFSC] if deployed) should form part of the overall sustainment plan.

CAF Photo: Cpl Rod Doucet

EXPEDITIONARY OPERATIONS

Expeditionary operations are defined as "the projection of military power over extended lines of communication into a distant operational area to accomplish a specific objective."[5] The two types of expeditionary operations are allied[6] and coalition[7] operations; allied operations are normally joint, multinational operations based on previously existing agreements, procedures and standards, and coalition operations are normally joint, multinational operations based on ad hoc agreements, standards and procedures.

The RCAF uses the term "expeditionary" to describe any air operation conducted at a destination other than that at which the aircraft and related personnel are normally based. Given the absence of a consistent definition across allied nations, the RCAF's expeditionary forces can be described as task-tailored air assets, deployed for the accomplishment of a specific objective, able to operate and sustain themselves at a location other than their MOB.

CAF Photo: Cpl Eric Girard

5. *DTB* record 34907.

6. An allied operation is "a multinational operation based on formal agreements, standards and procedures." *DTB* record 35677.

7. A coalition operation is "a multinational operation based on agreements, standards and procedures specific to that operation." *DTB* record 35678.

Referring to an air operation conducted within Canada as "expeditionary" can cause confusion, specifically if the operation is being conducted from an MOB. For example, when 4 Wing Cold Lake deploys CF188s to Canadian Forces Base Comox to satisfy NORAD alert requirements, 4 Wing is conducting an expeditionary operation—even though it is being conducted from another MOB.

SUPPORT TO EXPEDITIONARY OPERATIONS

Expeditionary operations will either evolve in a planned, deliberate manner or as a rapid-response operation. The ability to support both of these scenarios means that support resources need to be adequately maintained.

Supporting an expeditionary operation can be defined as the ability of the RCAF to support operations effectively at home and abroad.[8] In order to do so, the RCAF must be able to rapidly deploy assets to a wide range of destinations—nationally and abroad. It must also be able to activate, operate and sustain either a DOB or FOL. This necessitates having the doctrine, personnel, infrastructure, equipment, training and mindset to be able to conduct air operations at destinations other than home base and in environments that may present various levels of threat and hazards. Expeditionary support requires an organizational mindset that ensures RCAF support assets are always prepared for operations. Since most of the force-generation and support resources (such as personnel and equipment) reside with the wings, the two methods generally used to satisfy the support requirements for expeditionary operations are through incremental tasks and/or employing an ATF and an AEW if necessary.

8. Supporting an expeditionary operation will mean that certain support services are provided by CJOC or the Canadian Forces Joint Operational Support Group (CFJOSG). For example, theatre activation tasks—including beddown, buildup of theatre stocks, arranging for contracts and host-nation support HNS)—and activation of the strategic lines of communication (SLOC) are a few examples of tasks that are normally coordinated and executed by CJOC. Close coordination with both organizations is crucial to ensure all aspects of the support plan are addressed at the appropriate level.

For larger operations, the ATF/AEW is the primary organizational model employed. It is an operationally oriented task force consisting of several organizational components under the appointed comd. Its purpose is to conduct and sustain air operations. The primary components, as illustrated in Figure 4-2, include a comd elm, an OSE, an MSE and the air detachment(s) [air det(s)].[9]

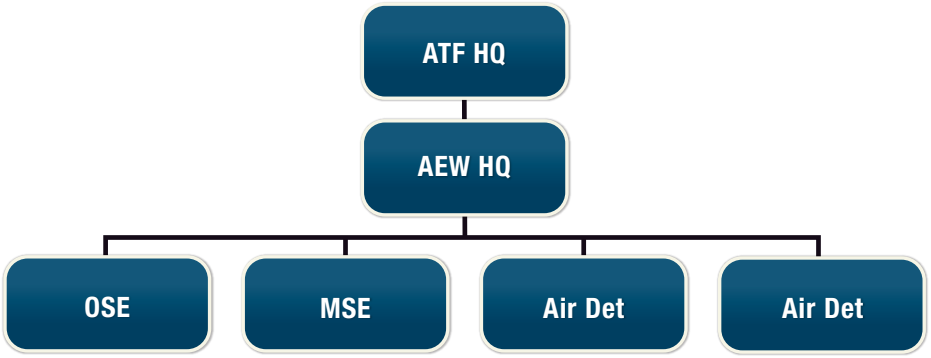


Figure 4-2. Typical ATF/AEW structure[10]

The OSEs and MSEs needed to mount and sustain air operations are drawn mostly from permanent MOB organizations.[11] Maintaining the mandated readiness levels required by the RCAF necessitates continuation training, equipment maintenance and personal readiness. For example, in addition to their MOB responsibilities, OSE/MSE members must maintain a prescribed level of personal readiness and participate in exercises so that they can deploy on short notice to any destination. This preparedness for military duty—combined with the speed, reach and flexibility of airlift—gives the RCAF a unique ability to project air power where and when required.

After the initial (or vanguard) air expeditionary force has been established and when it is due for rotation, the comd elm, OSE and MSE will be relieved by organizational components sourced from designated wings in accordance with the RCAF's Managed Readiness Plan.

Incremental tasks are tasks for individuals or very small contingents of personnel to provide services in support of training/operations or other requirements away from their home wing. They are used to augment the support complement assigned to an ongoing operation, event or activity. Within the RCAF, these tasks are controlled at the operational level and are assigned to wings on an equitable basis. Although incremental tasks need to be used for many situations, they have serious shortcomings in areas such as organizational unity, orientation of personnel, economy, morale and load sharing.

9. In certain circumstances, the ATF structure may include the force protection element as a separate subunit. Additional details will be promulgated in B-GA-402-005/FP-001, *Expeditionary Air Operations*.

10. This is not a command and control (C2) relationship.

11. 2 Wing normally provides the vanguard core staff for an OSE and MSE.

DOB CONSIDERATIONS

A DOB is "an expeditionary base that supports the employment and sustainment of deployed forces."[12] The fragility and support dependency of aircraft create a requirement to concentrate forces in as few locations as possible, so the number of DOBs within a theatre of operations is usually limited.

The activation of an airfield is normally synonymous with the deployment of air power and is one of the primary considerations when operating from a DOB. When conducting sustainment operations from a DOB, there are a number of important tasks—such as theatre activation and sustainment activites—that must be conducted. This includes, among other things, establishing theatre-level and RCAF support systems; arranging for HNS or bilateral agreements (normally a JTFSC role), including support provided by allied forces; and arranging for civilian contracted support.

Depending on the DOB's level of maturity, infrastructure and services may have to be brought in or constructed in order to make it suitable for supporting operations.

STAFF AND LINE RELATIONSHIP

Supporting any operation is easier with a good understanding of the RCAF and national-level support agencies. This knowledge is fundamental to both operational-level HQ support planners and unit support personnel alike. Likewise, the functional support sections at an MOB—such as wing supply, transport or Royal Canadian Electrical and Mechanical Engineers (RCEME) sections—must be familiar with their technical chains to ensure the mission/operation is supported in the best manner possible.

The link with the JTFSC is especially important during expeditionary operations, as it provides certain common operational-support requirements to the theatre of operations. In basic terms, the HQ staff develops support concepts and plans while wings and squadrons execute the assigned tasks. In an expeditionary operation, the ATF staff support the commander by developing support plans, and the MSE, as the "line" unit, executes the assigned tasks.

Effective support plans are never developed in isolation, and HQ staff should seek advice and input from wings and squadrons to determine the best way of resolving a support problem. This cooperative "line and staff" relationship is crucial, as it enables support planning and task execution to be conducted simultaneously at the operational and tactical levels. While the tactical level is executing support tasks, the operational level is planning future support activities.

Air component support staff, the MSE and the task force (TF) / joint task force (JTF) HQ need to coordinate support-planning efforts so that all players know what services each will provide, to whom and how. All of the supporting components must familiarize themselves with the capabilities and limitations of the JTFSC at the start of each operation, as JTFSC capabilities could vary from one operation to the next.

12. *DTB* record 30809. A DOB could be a forward operating base (FOB) and/or FOL.

NORAD OPERATIONS

NORAD is an American and Canadian binational organization charged with the missions of aerospace warning and aerospace control for North America. Aerospace warning is "a warning based on the detection, assessment and validation of an impending or actual intrusion into an airspace of interest by aircraft, missiles or spacecraft."[13] Aerospace control is "the implementation and coordination of the procedures governing airspace planning and organization in order to minimize risk and allow for the efficient and flexible use of airspace."[14]

The RCAF and CJOC do not control NORAD operations. Operational control is ceded to Commander NORAD (CDRNORAD) who is responsible to the Governments of the United States and Canada, through the Joint Chiefs of Staff and Chief of the Defence Staff (CDS) respectively. There is often a requirement to cover a vast area; frequently, missions are conducted over the seas, on the coasts or in the far North. The fragility and support dependency of aircraft make it very difficult to disperse over such a wide area. Even with speed and reach, extended missions will quickly become difficult to sustain.

SUPPORT TO NORAD OPERATIONS

The Comd 1 Canadian Air Division serves as the Comd CANR, and as such, 1 Canadian Air Division is responsible for providing CANR with air forces to meet Canada's commitment to the defence of North America. Supporting a NORAD operation involves significant coordination with the United States Air Force (USAF) to ensure support considerations are addressed while avoiding a duplication of effort. Thus, a clear C2 arrangement and support-responsibility delineation is necessary to ensure mission and operations support are provided but do not overlap. It may be necessary to use an MOB, FOL or even both, depending on the operation.

One example of this coordination is the telecommunications support to the NORAD aerospace control mission, which includes a network of satellites, ground-based radar, airborne radar and fighters to detect, intercept and, if necessary, engage any air threat to Canada and the United States. The continued maintenance of these networks is vital for an effective air-defence system that is capable of functioning properly, and this maintenance is a shared responsibility between Canada and the United States. Also critical to a successful aerospace defence system is the ability to achieve inter-operability between Canadian and American forces.

Pre-existing supporting arrangements between Canada and the United States help enable the effective execution of NORAD missions. With the provision of mission support, particular attention has to be given to the type of air forces Comd CANR may be assigned or made available for air defence of the Canadian region, as these aircraft may have varied and unique support requirements that differ from RCAF aircraft fleets.

13. *DTB* record 44191.
14. *DTB* record 3422.

FORWARD OPERATING LOCATION

Because of the high probability that NORAD operations within the Canadian region will be conducted in the North, it is prudent to examine how operations in the Canadian arctic are supported.

The support concept for northern operations is based on the tenets of: self-sufficiency; using temporary, forward support installations; prepositioning specific types of materiel; and, where possible, obtaining support from other government departments (OGDs) or local industry. Supporting operations in the Canadian arctic comes with inherent risks and challenges due to many factors, including the harsh climate and geography, a general lack of supporting infrastructure and technological challenges with communications.

The most common method of supporting air operations in the arctic is by using an FOL. While FOLs can technically be located anywhere, they are generally referred to as locations in the Canadian arctic that are not normally occupied and that are able to support CF188 operations. The use of an FOL to support NORAD operations has both its advantages and challenges. Whereas the FOL provides a location to operate from that may be closer in proximity to the potential threat (thereby extending an aircraft's reach and agility), it conversely offers limited infrastructure and resources with which to support an operation; this is particularly true of an operation that is of a longer duration. Even the sustainment of the FOL, itself, can be a challenge if it is a high-intensity operation.

CHAPTER 5

SUPPORT PLANNING

CAF Photo

INTRODUCTION

Planning is foundational to the successful delivery of air power, and support planning is an essential part of the operations planning process (OPP). Support planning must be complementary to the mission's/operation's aim and be fully integrated with all phases of the overall planning process. Support planners must be familiar with methods for estimating requirements for personnel, materiel, infrastructure and services required to enable air operations. This demands a good understanding of the air operation being supported and an appreciation that some aspects of air operations are rarely predictable or repeatable. As a result, the support plan must adjust accordingly, often with great haste. As a result, this chapter introduces the Canadian Armed Forces (CAF) OPP; provides an overview of support planning, the support estimate and its planning factors; and discusses support planning during operations and considerations for reconstitution.

THE CAF OPERATIONS PLANNING PROCESS

Air-operations planning is based on the CAF OPP, which is a coordinated process to determine the best method of accomplishing assigned operational tasks and planning for possible future tasks. The planning process is designed to optimize logical, analytical steps of decision making in conditions of uncertainty and ambiguity and can be adapted to the scope, intensity and criticality of the operation. When time permits, a deliberate planning process is followed; whereas, when time is critical and information and resources are not readily available, rapid-response planning can be employed.

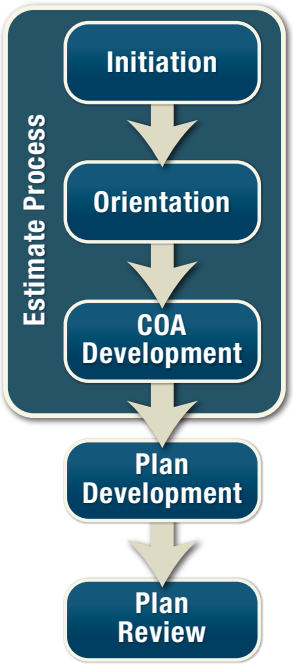


Figure 5-1. The CAF OPP[1]

As depicted in Figure 5-1, the OPP consists of five steps: initiation, orientation, course of action (COA) development, plan development and plan review. At the tactical level, the first three steps are also known as the estimate process. In its full form, the CAF OPP is a sophisticated and highly structured strategic planning tool that is intended for execution by an experienced staff that is supported with ample resources. It incorporates advanced features such as specific role assignments; detailed situational analysis; multi-option identification, analysis and evaluation; and records of decision. The CAF OPP is not limited to large-scale planning activities, and modified forms of it can be used for planning at all levels. For additional information on the OPP, see B-GJ-005-500/FP-000, Canadian Forces Joint Publication (CFJP) 5.0, *The Canadian Forces Operational Planning Process*.

1. Modified from Matthew Lauder, "Systemic Operational Design: Freeing Operational Planning from the Shackles of Linearity," *Canadian Military Journal* 9, no. 4 (2009), 2, accessed September 23, 2015, http://www.journal.forces.gc.ca/vo9/no4/08-lauder-eng.asp.

SUPPORT PLANNING

Table 5-1 illustrates how support-planning activities fit within the steps of the OPP.

OPP Step	Major OPP Activities	Support-Planning Activities
Initiation	• Receive task • Initial assessment • Gather staff • Gather info	• Assess the directive that initiated the planning process • Activate the planning team • Gather planning tools and baseline information • Identify, where possible, essential support tasks • **Initiate support estimate**
Orientation	• Mission analysis • Planning guidance • Warning order	• Identify and analyse key support considerations • Identify, as early as possible, major support limitations • Analyse the mission • Prepare the warning order's support paragraph • Analyse tasks to determine essential, assigned and implied support tasks • Conduct staff checks of the support implications while analysing the tasks
COA Development	• Develop COAs • Information brief • Refine COAs • Compare COAs • COA war game • Decision brief	• Continue analysis task • Staff check the supportability of the COAs being considered • Produce a concept of support and outline plan for each COA as they mature • Produce individual support concepts when COAs are markedly different • Develop an outline concept of support (including an estimate of force elements and resources required to support them) for each COA • Assess support risk for each COA • Evaluate support concepts during the OPP's COA-comparison and war-gaming activities • Complete, as required, additional staff checks and/or subordinate estimates to cater to changes • Identify key shortfalls and issues • Synchronize support-planning activities with operations and other staffs to ensure that the concept of support for each COA remains valid
Plan Development	• Plan development • War game • Issue orders	• Resolve issues identified in the COA-development step • Confirm the support and dependency matrices that link the support requirements to the operational plan in terms of time, quantities, locations and priorities • Synchronize with support formations/units to resolve outstanding issues • **Complete the support estimate/plan** • Refine the selected COA's concept of support into the support paragraph or annex of the operation order or develop it as a separate administrative order
Plan Review		• Continually review and update plans as required

Table 5-1. CAF OPP and support-planning activities[2]

2. Adapted from CFJP 4.0, *Support*, Table 4-1: Support Planning and the Operational Planning Process, 4-4.

SUPPORT ESTIMATE

The support-estimate process is used to verify the viability of proposed COAs and provides the basis of the support concepts for all COAs under consideration. The support estimate's development will be a cooperative endeavour, conducted by the support staff and fully integrated with the planning activities conducted by the operations staff. The depth of detail and accuracy of analysis will often increase as the planning process unfolds. The support estimate may be limited to a few staff checks, or it may be a more complex process of melding several individual support estimates.

The support estimate's three key activities are:

a. **Analyse mission.** Mission analysis must consider the end state, assigned and implied tasks, constraints and restraints as well as the intentions of the higher commander.

b. **Evaluate factors.** The evaluation of factors must be exhaustive and each deduction thoroughly analysed for both subsequent deductions and the impact on the aim. This analysis leads to the development of different COAs.

c. **Develop and compare COAs.** The supportability of each COA is confirmed, and the support concept and plan are developed once a COA is selected by the commander at the end of the estimate process.

Military planners have identified five key factors that generally apply when planning the support requirements for a military operation. These factors are destination, demand, distance, duration and risk. Properly assessed, they enable planners to determine the number of personnel, quantity of materiel, type of infrastructure and variety of services required to achieve assigned objectives. These factors apply equally to operations conducted at home or abroad and for increases in operational tempo and/or severe environmental conditions. They should be formally addressed in major planning activities and also taken into account even in minor planning activities.

DESTINATION

The destination where operations will be conducted determines the environment in which support activities will be carried out. It is essential that planners have knowledge of the destination and surrounding area, including available infrastructure; the level of support to be provided by the host nation and coalition partners; and climate and terrain. Regardless of whether the destination is a well-established military facility or an austere base where facilities and support services are limited, there are always unknowns, and if possible, a reconnaissance should occur before detailed planning begins. From this, the length and difficulty in maintaining the lines of communications (LOC) can be determined. Some of the critical variables that must be examined as part of destination include:

a. **Infrastructure**. Infrastructure encompasses many different types of facilities and capabilities such as naval ports and airports. Critical factors for air operations include the runways, ramps, system for storing and distributing aviation fuel, explosive ordnance disposal (EOD) and ammunition-storage areas, water sources as well as materiel-staging and -storage areas.

b. **Host-nation support (HNS) and coalition partners**. For international operations, HNS and the support that can be provided by coalition partners must be taken into account. As described in Chapter 3, the range and reliability of HNS available in terms of personnel, equipment, services and resources may allow a reduction in the support footprint.

c. **Climate and terrain**. Climate and physical geographical characteristics of the destination will likely impact the performance and safety of personnel and the functioning of equipment. These factors may affect resource consumption rates, aircraft operations and the support footprint.

The environment needs to be taken into account in determining the type and quantity of spares required to support the operation. For example, operating aircraft in dry and dusty environments for an extended period of time can result in accelerated wear on many components. Also, it may be necessary to rotate aircraft more frequently if certain maintenance facilities are not available at the deployed destination.

DEMAND

Demand is the quantity of materiel (or commodity) needed to support the operation. Typically, the demand for supplies or commodities is divided into three categories:

a. **Surge demand** is normally dictated by the timeline and operational tempo of the mission. As it is usually difficult to predict, surge demand requires rapid reaction and maximum flexibility to ensure effective maintenance of air power.

b. **Steady-state demand** reflects continuous usage of commodities such as rations and potable water, which can be accurately predicted.

c. **Cyclical demand** represents changes in consumption rates due to changing weather or operational posture. Fuel and ammunition are examples of cyclical-demand commodities.

Although the preventive-maintenance concept applied to aircraft makes the demand for aircraft parts somewhat predictable, significant failure rates associated with older aircraft and the requirement to operate in unforgiving environments can also lead to surge demand.

The type of air mission and its tempo will affect the demand for personnel, materiel and the type of infrastructure that is needed. For commodities, demand is influenced by destination, distance, duration and the type of air platform being employed. The operational tempo may vary from supporting a single airplane conducting one flight per day to multiple aircraft types conducting air operations around the clock. Thus, the demand for personnel, materiel, infrastructure and services can vary significantly from operation to operation, and therefore, it is essential that materiel and commodities are scaled appropriately.

DISTANCE

The distance to and within the theatre of operations will not only determine the length and capacity of the LOC but also dictate transit times and the need to establish an operational support hub (OS Hub). For deployed operations, an OS Hub located close to the theatre of operations may be required to ensure an efficient flow of resources to and from the deployed operating base (DOB). This, in turn, will affect the size and structure of the sustainment pipeline. Distance may vary as air operations develop; thus, there must be sufficient sustainment resources available to readjust and extend the LOC to maintain operational freedom.

Distance could also be a factor in deciding whether to forward base other resources such as test equipment and specialized tools. Although portable automated test equipment that can be forward based may be available for a certain aircraft type, other considerations such as the capability of the main operating base (MOB) to support local operations also have to be taken into account.

Air Transportation

There are several destination, demand and distance considerations when selecting between surface and air transportation. First, transport aircraft (e.g., CC177 and CC130) possess a global capability to deliver loads over great distances and, combined with speed, provide the ability to rapidly project air power on a global basis. Even though air transportation can be more costly, it cannot be blocked or delayed by surface obstructions en route to the destination. Hence, it might be the only means of supplying isolated bases and communities, particularly in siege or disaster relief situations such as exemplified by the Berlin Blockade from June 24, 1948, to May 11, 1949. Second, air transportation can also be of key importance for reaching remote, land-locked countries. The distance and flight profile of the air route will affect payload capacity and delivery rate. Although the payload that can be carried by aircraft may be limited in weight and volume, it can be delivered faster than that carried by surface transportation systems. The relatively high speed of air transportation greatly reduces the person-days lost in transit and allows rapid and timely resupply. It can also allow a high sortie rate that can, in part, compensate for limited load-carrying capability. Finally, air transportation can be of crucial importance in helping to establish and maintain a presence in order to contain a rapidly developing crisis.

Finally, it must be noted that there are several destination, demand and distance considerations when selecting between air, land and sea transportation:

a. **Air transportation** is the most costly, and it is generally used for high-priority cargo and/or when movement can be blocked or delayed by surface obstructions.

b. **Land transportation** is the main mode of transport used domestically in support of MOBs. In a deployed scenario, land transport is generally used from the airport of debarkation (APOD) / seaport of debarkation (SPOD) to the DOB.

c. **Sea transportation** is of lower cost when conducting a strategic move and is primarily used for lower-priority cargo.

DURATION

The duration of any military operation, along with the variety and demand for supplies required to support it, will determine the overall volume of materiel required, the corresponding transportation requirements and, consequently, the overall extent of the sustainment task. Although a commander may give guidance concerning duration, in reality, its unpredictability places an additional demand on sustainment practitioners. Duration also determines the need to rotate or replace personnel and equipment. If the operation is of short duration, at a well-established destination where local support is reliable and easily available, then it may require minimal support. Conversely, if the operation is likely to extend over several months or years, in a hostile and austere destination, the requirement for sustainment will likely include a wide range of services, necessitating substantial materiel injects that result in a larger footprint.

Long-duration operations also have a significant impact on the MOB. Although a number of aircraft with supporting elements may be deployed for several months, activities at home must continue. The tempo of MOB activities may be reduced, but flying operations to support assigned objectives, as well as force generation, must continue. Consequently, the Royal Canadian Air Force (RCAF) must maintain a suitable sustainment capability to support such operations. Major activities such as aircraft-maintenance schedules (e.g., for periodic inspections) may have to be adjusted to ensure that aircraft with maximum hours and the right mission kits are available for rotation into theatre. Lengthy deployments may also require backfilling by Reservists, casual employees and contractors for deployed personnel.

RISK

The risks to sustainment include any factor that compromises the ability to provide the required support to achieve the assigned objectives; therefore, the level of risk to sustainment operations must be assessed so that appropriate countermeasures can be put in place and so that requirements such as infrastructure-repair capabilities and medical-treatment facilities can be anticipated. If the enemy is capable of severing the LOC or destroying forward stocks, the commander will have to evaluate whether additional force protection will be necessary. Hostile activities can impede movement, destroy logistic stockpiles as well as close airports and seaports or affect their throughput capabilities.

The air platform itself imposes a risk to sustainment due to its inherent fragility and support dependency. Aircraft are more easily damaged than other major weapon systems such as ships and tanks, and the likelihood of loss of life due to seemingly minor sustainment problems is also greater (e.g., contaminated fuel is not likely to cause the loss of a land vehicle or ship but could readily cause an aircraft to crash). The storage and handling of complex and costly weapons, especially in a deployed context, can add additional risk to the operation. Air operations are frequently tied to fixed installations that provide runways as well as maintenance and fuel facilities. This limited range of operating locations, thus, increases risks to air operations. To minimize this risk to the greatest extent practical, the CAF / Department

of National Defence (DND) Airworthiness Program includes sophisticated risk-management processes so that commanders can make well-advised decisions concerning operational risk.

SUPPORT-ESTIMATE PLANNING FACTORS

When completing the support estimate, each of the four components of sustainment—personnel, materiel, infrastructure and services—has a series of planning factors that must be considered. For each planning factor the following are considered: requirements, availabilities, priorities, restrictions, deductions, courses open and plan. In turn, the components provide a convenient way of grouping the results of individual analysis into a concept of operations or plan. Each planning factor might be examined as a single entity but, more likely, will comprise a number of subordinate analyses. Each analysis must reflect the support requirements of the parent COA. Where multiple (or very different) COAs are under consideration, it may be necessary to conduct separate analyses by COA. In a complex operation, it may be necessary to examine each planning factor by operational phase.

Though far from exhaustive, Table 5-2 provides a suggested list of planning factors and possible deductions for each component of sustainment. These planning factors should be considered in combination with the key factors of destination, demand, distance, duration and risk to ensure a thorough estimate is completed.

CAF Photo: Hope Smith

Components of Sustainment	Planning Factors	Deductions
Personnel	• Environmental threats (disease, toxins, etc.) • Personnel administration services • Mortuary affairs • Expected intensity of operations • Duration of mission • Health services support (HSS) / medical	• Current personnel status and replacement plans • Casualty estimate and effect on combat readiness • Personnel replacement priorities and controls • Reconstitution plan and deficiencies • Morale issues • Enemy prisoner of war • Refugees • Evacuees
Materiel	• Lines of communication • Theatre-level stocks • Evaluate classes of supply (I–X) • Sustainment/replenishment cycle • Procurement authorities/policies • Enemy threat	• Availability by class of supply, including reserves • Distribution methods • Mission configured loads—where and when • Emergency-resupply procedures • Reporting requirements • Reconstitution • Support from higher formation • Fuel: current status, bulk storage requirements, bulk refuelling capability, distribution plan, allocations and risk • Ammunition: requirements vs availabilities, ammunition storage sites, restrictions and risk • Rations and water: hard or fresh rations, crew-served meals, bulk water delivery, bottled water and water points
Infrastructure	• Infrastructure available • Telecommunications networks and architecture • Utilities • Runways	• Temporary or permanent facilities • Requirement versus availability • Power generation and electrical distribution • Water and sewage system • Availability and serviceability
Services	• Maintenance • Transportation • Laundry/bath/decontamination • Disposal of grey/black waste • Legal • Chaplain	• Repair-parts availability • Transport requirements • Movement control • Route use and priority traffic • Traffic control • Trailer transfer points • Alternate modes available • Security of location

Table 5-2. Support-estimate planning factors

The planning staff must be oriented towards the requirements of all new or revised operations. Support planning for air operations must be an integral part of the overall planning process, starting by identifying and analysing the nature of the operation and scoping out, in broad terms, the support necessary to achieve the stated objectives. Staff representatives for each functional area or discipline will then develop a comprehensive requirements "inventory," consisting of the personnel, materiel, infrastructure and services needed to achieve each possible COA. Depending on the degree of accuracy required for the inventory and other limiting factors such as time constraints, sophisticated estimating techniques and modeling may be used.

Planners must estimate the quantity of materiel required and determine not only its final destination but also its delivery time. This information will be of use in planning for infrastructure. There should also be clear traceability for each support requirement to the needs and objectives of the air operation—if it is not needed to support the operation, it should not be there. The services needed and their delivery frequency will be primary factors in determining the number of support personnel required. Once the overall support requirements have been determined and a COA has been selected, the specialist staffs will develop means of satisfying them.

SUPPORT PLANNING FOR OPERATIONS

A deliberate operation consists of five operational phases—warning, preparation, deployment, employment as well as redeployment and termination. Air operations, whether part of a joint or multinational force, follow the same operational phases, and support planning occurs throughout all five phases.

WARNING

The warning phase is when planning staffs are first made aware that a new operation (or significant change to an existing operation) is being considered and may be initiated in the coming days or months. During this phase, the commander's intent and vision are communicated so that planning activity can commence. Support planners need to anticipate and assess potential requirements—and should start liaising with other organizations—so that other staffs can also begin preparations and that command and control (C2) arrangements can be clarified. Considerable lead time may be needed to address some requirements, so as discussed earlier, it is vital that planners apply foresight and anticipate support needs to the greatest extent possible.

PREPARATION

The preparation phase of an operation may last only a few days, as in the event of an emergency response, or may extend over many months. During this phase, the CAF OPP will be followed and the operational plan finalized; however, the main effort is on theatre-activation and theatre-opening activities. Canadian Joint Operations Command (CJOC) through the Canadian Forces Joint Operational Support Group (CFJOSG) and the joint task force support component (JTFSC) will coordinate and execute many of the theatre-opening tasks, such as establishing theatre-level infrastructure; coordinating multinational or host-nation support; selecting staging areas; and conducting reception, staging, onward movement and integration (RSOI) of the incoming force. The support plan will be addressed in the service-support paragraph of the operation order, and extensive detail will be found in the administration order. Work must begin to address the myriad support details so that the deployment milestones are met in a timely manner. Specific issues that must be addressed include personnel and equipment readiness, assembly of all materiel and commodities in preparation for movement, finalization of movement priorities so that initial operating capability can be achieved as soon as possible, and finalization of contracts and other support arrangements to ensure a steady replacement of consumables. A comprehensive reconnaissance of the intended deployment location,

with appropriate representation from subject matter experts, should be carried out early on in the preparation phase. The preparation phase normally ends with the deployment of an advance party.

DEPLOYMENT

While there will likely be overlap between the phases of an operation, in the context of air operations, deployment is normally synonymous with the activation of an airbase at a deployed location. While actual theatre activation is the purview of the CFJOSG and its theatre activation team, the mission-support element and the air expeditionary wing activation team (AEW–AT) provide the RCAF with an activation capability. The AEW–AT, a component of 2 Air Expeditionary Squadron, helps facilitate AEW activation through experience and knowledge of the air and joint environments. When executing the deployment plan, close coordination with other stakeholders (e.g., CJOC and CFJOSG) is key to ensuring successful theatre and capability activation while avoiding a duplication of effort. During theatre activation, activities may include some or all of the following:

a. activating the strategic lines of communication (SLOC) and establishing strategic deployment routes; these are normally CJOC's/CFJOSG's responsibilities;

b. activating the theatre; this is normally a CFJOSG responsibility;

c. deploying the force and materiel in accordance with previously determined priorities (if a joint operation, this will be a CJOC responsibility);

d. establishing the DOB and associated facilities, infrastructure and other services which will enable the deployed forces to operate;

e. conducting RSOI (coordination with JTFSC is necessary if a joint operation);

f. implementing HNS and other contracting arrangements (must be closely coordinated with JTFSC if a joint operation); and

g. establishing reachback mechanisms for support of air operations.

EMPLOYMENT

When the first elements of the force are in place and initial operating capability has been achieved, operations will commence. Proper planning will ensure that all of the required components of sustainment (personnel, materiel, infrastructure and services) are in place to enable operations. As the operation continues, ongoing adjustments will need to be made to account for changing and unanticipated circumstances. As such, it is important that the four components of sustainment (personnel, materiel, infrastructure and services) are continually monitored to ensure the commander's objectives are met and mission success is achieved.

REDEPLOYMENT AND TERMINATION

Redeployment is "the relocation of a deployed force to a new area of operations."[3] It involves the process of preparing for and executing the relocation of units, equipment and materiel for the next operation. Redeployment activities may take place over a significantly long period of time and continue well after the force has left the deployment area. Restoration of sites to their original condition (and often to a state better than their original condition) may be necessary due to legal, environmental and sometimes political pressures. The main effort during termination is on theatre deactivation and termination activities. During termination, the effort will focus upon five main activities:

a. mission closure (cessation of military operations);

b. drawdown or the graduated orderly reduction of forces and materiel from the theatre;

c. redeployment;

d. theatre deactivation; and

e. mission termination.

RECONSTITUTION

While not one of the operational phases, reconstitution is a deliberate and significant activity designed to return redeploying units to a state of operational readiness. It encompasses those activities needed to restore the desired level of combat effectiveness to units, personnel and materiel following a major operation. The main objectives of reconstitution include establishing control over resources returning from a theatre of operations, maintaining the integrity of units and formations to the greatest extent possible, maximizing asset recovery and preparing the returning forces for future operations in minimum time. Consequently, reconstitution activities normally start at the conclusion of a campaign or operation when personnel are reintegrated and materiel is repatriated.

For joint and multinational operations, some reconstitution activities will likely be coordinated by CJOC and the CFJOSG. Generally, the initial reconstitution begins in the theatre of operations under direction of a theatre- or mission-closure team. This team will perform stock verifications and report to CJOC. More specifically, the movement from the theatre, the verification and determination of the condition of the materiel and equipment as well as the return of stocks to units will normally involve the CFJOSG, Canadian Materiel Support Group (CMSG), life cycle materiel managers and MOB staffs.

MOBs play a significant role in reconstitution, and they must be equipped to provide a multitude of services to RCAF units and personnel redeploying from operations. Health and personnel-support services may include honours and awards, physical and mental health care as well as assistance for reintegration into MOB activities

3. *Defence Terminology Bank* record 36932.

and home routines. MOBs must also be capable of replenishing depleted commodities and repairing or replacing equipment in preparation for future operations. Depending on the condition of the returning aircraft and equipment, considerable time and effort may be required to reconstitute a unit's capabilities, retrain its personnel and regain its full readiness capability.

A key leadership issue associated with redeployment and reconstitution is ensuring that personnel are properly reintegrated into their parent units. Ideally, personnel would deploy and redeploy as part of formed units, but the reality is that many personnel deploy as augmentees. Reintegration of augmentees brings additional challenges, and failure to consider the legitimate needs of these individuals can result in degraded morale and loss of operational effectiveness.

Reconstitution can mean different things to different support organizations. The following are a few examples:

- For aircraft maintainers, it may mean accelerating periodic inspections to re-establish a normal maintenance schedule.
- For logisticians, it can mean all aspects of stock administration, including replenishment and repair and/or replacement of certain equipment.
- For electrical-and-mechanical-engineering staff, it may mean second- and third-level vehicle maintenance and/or replacement.
- For administrative staffs, it can mean reintegration of personnel, pay, leave and health services.

CAF Photo

GLOSSARY

The definitions contained in this glossary are derived from a number of sources. Where this publication is the source of a definition, no source is indicated. Definitions taken from other sources are indicated in parentheses at the end of each term, utilizing the following abbreviations:

a. ADN 14/01 – Air Doctrine Note 14/01, RCAF Air Task Force Commander: Considerations for the Employment of Air Power in Joint Operations, found online at http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/doctrine-adn-14-01.page;

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

c. CFJP 4.0 – B-GL-005-400/FP-001, Canadian Forces Joint Publication 4-0, *Support*, found online at http://cjoc-coic.mil.ca/sites/intranet-eng.aspx?page=3560.

aerospace control (AC)

The implementation and coordination of the procedures governing airspace planning and organization in order to minimize risk and allow for the efficient and flexible use of airspace. (*DTB* record 3422)

Aerospace Medical Authority (AMA)

The designated individual who has the responsibility for ensuring that all activities associated with aerospace medicine capabilities of the DND/CF are conducted appropriately, safely and by qualified and authorized personnel.

Note: The Chief of the Air Staff and the Chief of Military Personnel have designated the Medical Advisor to the Chief of the Air Staff as the Aerospace Medical Authority. (*DTB* record 41378)

aerospace warning

A warning based on the detection, assessment and validation of an impending or actual intrusion into an airspace of interest by aircraft, missiles or spacecraft. (*DTB* record 44191)

air detachment (air det)

A fleet-specific combat force package that generates aerospace power.

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

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

air expeditionary wing (AEW)

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

air movements
The preparation, loading, and unloading of personnel and materiel for airlift. (*DTB* record 41382)

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

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

air task force (ATF)
A temporary grouping of Royal Canadian air Force operational/tactical formations, squadrons, units or detachments formed for the purpose of carrying out a specific operation, mission or task. (ADN 14/01)

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

airworthiness
The fit and safe state for flight that is achieved when an aeronautical product conforms with its approved type design, is manufactured and maintained in compliance with standards and is operated within its design limits. (*DTB* record 36707)

Airworthiness Authority (AA)
The designated individual who has the authority to approve airworthiness-related policy and is responsible for the development, promotion, supervision and management of the Airworthiness Program for the DND/CF.

Note: The Minister of National Defence, under the provisions of the Aeronautics Act, has delegated this authority to the Chief of the Air Staff. (*DTB* record 41386)

Airworthiness Investigative Authority (AIA)
The designated individual who has the authority to regulate the airworthiness aspects of the Flight Safety Program, independently investigate airworthiness-related occurrences and monitor the Airworthiness Program to identify deficiencies and recommend preventive measures.

Note: The Minister of National Defence, under the provisions of the Aeronautics Act, has delegated this authority to the Director Flight Safety. (*DTB* record 41388)

allied operation
A multinational operation based on formal agreements, standards and procedures.

Note: "Allied operation" (with capital A) is used specifically for NATO. (*DTB* record 35677)

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

coalition operation
A multinational operation based on agreements, standards and procedures specific to that operation. (*DTB* record 35678)

command and control (C2)
The exercise of authority and direction by a commander over assigned, allocated and attached forces in the accomplishment of a mission. (*DTB* record 5950)

concept of operations (CONOPS)
A clear and concise statement of the line of action chosen by a commander in order to accomplish an assigned mission.

Note: A CONOPS normally consists of the commander's intent, the scheme of manoeuvre, the desired end state and the main effort. (*DTB* record 3862)

course of action (COA)
In the estimate process, an option that will accomplish or contribute to the accomplishment of a mission or task, and from which a detailed plan is developed. (*DTB* record 20891)

deployed operating base (DOB)
An expeditionary base that supports the employment and sustainment of deployed forces. (*DTB* record 30809)

expeditionary operation (exped op)
The projection of military power over extended lines of communications into a distant operational area to accomplish a specific objective.

Notes: 1. In the context of air operations, an expeditionary operation is any operation conducted away from the main operating base.

2. Expeditionary operations may be conducted from a domestic, continental or international theatres. (*DTB* record 34907)

fighting spirit
The drive within every military member to do anything in their power, within the ethical principles and values of the profession of arms, to accomplish the assigned mission with enthusiasm, precision and unlimited liability to self. (*DTB* record 37287)

first-line support
Support capabilities that are organic or allocated to a ship, unit or squadron. (CFJP 4.0)

force employment (FE)
1. At the strategic level, the application of military means in support of strategic objectives.

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

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

forward logistics site (FLS)
A shore-based support organization established in a theatre of operations to coordinate in-theatre sustainment of a naval task group. (*DTB* record 6315)

forward operating base (FOB)
An expeditionary base, located in the combat zone, that supports the employment and sustainment of deployed forces. (*DTB* record 28933)

forward operating location (FOL)
Any location at which materiel has been prepositioned and services prearranged to support the employment and sustainment of expeditionary air forces. (*DTB* record 37296)

fourth-line maintenance
Maintenance, which is beyond the capability of other lines of maintenance (e.g. first, second or third lines) and which is provided by resources administered by National Defence Headquarters. This line of maintenance is applicable to the land forces only and is performed by 202 Workshop Depot, manufacturers and contractors. (*DTB* record 46967)

fourth-line support
Support capabilities provided by strategic-level resources, such as national depots, contractors and industry. (CFJP 4.0)

host nation (HN)
A nation that, by agreement, allows:

a. another nation's forces to operate on or from, be located on or transit through its territory; or

b. another nation's materiel to be located on or transported through its territory. (*DTB* record 4465)

host-nation support (HNS)
Civil and military assistance rendered by a nation, in time of peace, crisis, or war, to a force that is located on, operating in/from, or is transiting through that nation's territory. (*DTB* record 4466)

hub-and-spoke method
A method of sustaining outlying locations, formations and units from a central and secure position. (*DTB* record 43593)

infrastructure
Fixed and permanent installations, fabrications and facilities, including plants, buildings, works, real property, immoveables, and natural and cultural environments. (*DTB* record 4534)

integrated operation
An operation involving the coordinated and complementary efforts of military and non-military organizations to achieve a common goal. (*DTB* record 37297)

joint operation
An operation executed by a temporary grouping of elements from at least two components, in which the application of capabilities is coordinated to achieve a common objective. (*DTB* record 35629)

joint task force (JTF)
A temporary grouping of elements from more than one component, under one commander, formed for the purpose of carrying out a specific operation or mission.

Note: Typical components are maritime, land, air, special operations and support. (*DTB* record 31012)

level of maintenance
A classification of maintenance based on the extent and complexity of the tasks to be performed. (*DTB* record 15757)

lines of communications (LOC)
All the land, water, and air routes that connect an operating military force with one or more bases of operations, and along which supplies and reinforcements move. (*DTB* record 814)

line of maintenance
Term that describes where, organizationally, an activity will occur as part of the overall approved maintenance program. (*DTB* record 36777, modified)

loading plan
All of the individually prepared documents which, taken together, present in detail all instructions for the arrangement of personnel, and the loading of equipment for one or more units or other special grouping of personnel or material moving by highway, water, rail, or air transportation. (*DTB* record 4684)

main operating base (MOB)
A base responsible for supporting the generation, employment and sustainment of assigned forces. (*DTB* record 41464)

materiel (mat)
All equipment, stores, packaging and supplies used by the military forces. (*DTB* record 43416)

mission support (msn sp)
In air operations, the provision of logistic, technical and administrative support to operations.

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

mission-support element (MSE)
The task-tailored component of an air expeditionary wing that provides the wing's mission support.

multinational operation
An operation conducted by forces of two or more nations acting together. (*DTB* record 3826)

Operational Airworthiness Authority (OAA)
The designated individual who has the authority to regulate all flying operations and facilities, operational procedures, flight standards, operator training, qualification and licensing, aerospace control operations, aviation weather services, and determine the airworthiness of aeronautical products prior to granting an operational airworthiness clearance.

Note: The Minister of National Defence, under the provisions of the Aeronautics Act, has delegated this authority to the Commander 1 Canadian Air Division. (*DTB* record 41426)

operational support hub (OS Hub)
Within a pre-established global hub-and-spoke network, an operational support node situated on or at the terminus of the strategic lines of communication. (*DTB* record 47834)

operations planning process (OPP)
A decision-making process employed by a commander and staff. (*DTB* record 21039)

operations support (ops sp)
Within an air force, the provision of assistance that directly supports air operations.

Note: Operations support includes force protection capabilities (including an airfield security force, limited recuperation functions, explosive ordnance disposal capability, improvised explosive device disposal capability as well as chemical, biological, radiological, and nuclear defence assets) and operations assistance (including planning and coordination, intelligence, meteorology, host nation liaison as well as air management and control). (*DTB* record 34914)

operations-support element (OSE)
The task-tailored component of an air expeditionary wing that provides the wing's operations support.

reachback
The means by which a deployed force receives support from organizations external to the area of responsibility. (*DTB* record 37303)

reception, staging, onward movement and integration (RSOI)
The process that enables joint task force elements, on arrival in a theatre of operations, to attain full operating capability as part of a joint or multinational force. (CFJP 4.0)

reconstitution
Measures taken to restore a formation or unit to an acceptable level of readiness. (*DTB* record 35053)

services
The logistical, administrative, technical and professional skill and expertise provided to RCAF personnel in the areas of mission support, operations support, aircraft maintenance and specialist support.

single-environment operation
An operation carried out by forces from only one service of a single nation. (*DTB* record 32020)

specialist support
The provision of highly specialized professional support to operations.

strategic lines of communications (SLOC)
All the land, water and air routes that connect a deployed force with the home nation, and along which sustainment activities occur, as well as the activities themselves.

Note: The lines of communications include the transportation nodes. The associated activities include reception, staging, onward movement and integration (RSOI); third-location decompression and medical evacuation. (*DTB* record 41456)

strategic-level sustainment
The mobilization, national acquisition, force readiness, force generation and force projection of military forces. (CFJP 4.0)

supply
The operations normally involved in the acquisition and distribution of items of supply to a user in order to satisfy stated requirements. Includes, in a broader sense, resupply and replenishment activity. (*DTB* record 3238)

support (sp)
The administrative and logistic aid provided to a formation, to a unit or to an individual. (*DTB* record 1361)

support estimate
The logical process of reasoning by which a commander considers all the circumstances affecting the military situation and decides on a course of action to support the military activity.

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

sustainability
The ability of a force to maintain the necessary level of combat power for the duration required to achieve its objectives. (*DTB* record 5474)

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

tactical-level sustainment
Actions taken to provide the necessary materiel and services to a military force at the tactical level.

task force (TF)
A temporary grouping of units, under one commander, formed for the purpose of carrying out a specific operation or mission. (*DTB* record 1457)

task force movement table (TFMT)
A table, based on data from the unit movement staff table, indicating priorities for movement by location and by sub-sub unit. (*DTB* record 15856)

Technical Airworthiness Authority (TAA)
The designated individual who has the authority to regulate the technical airworthiness aspects of the design, manufacture, maintenance and materiel support of aeronautical products, and determine the airworthiness of those products prior to granting a technical airworthiness clearance.

Note: The Minister of National Defence, under the provisions of the Aeronautics Act, has delegated this authority to the Director General Aerospace Equipment Program Management. (*DTB* record 41444)

theatre of operations (TO)
A geographical region in which one or more military campaigns are conducted. (*DTB* record 1470)

third-line maintenance
For the air environment, that maintenance beyond the established capabilities of second line maintenance organizations and normally provided by resources administered by NDHQ (e.g. depots and contractors). (*DTB* record 47203, modified)

unit movement staff table (UMST)
Inventory of the transport resources required to move the entire unit; includes vehicles, weapons, major equipment items, loose cargo (weight and cube) and personnel down to the sub-sub-unit level. (*DTB* record 15883)

ABBREVIATIONS

1 Cdn Air Div	1 Canadian Air Division
AA	Airworthiness Authority
ABDR	aircraft battle damage repair
AEW	air expeditionary wing
AEW–AT	air expeditionary wing activation team
air det	air detachment
ATC	air traffic control
ATF	air task force
C2	command and control
CA	Canadian Army
CAF	Canadian Armed Forces
C Air Force	Chief of the Air Force Staff
CANR	Canadian NORAD Region
CANSOFCOM	Canadian Special Operations Forces Command
CDS	Chief of the Defence Staff
CF H Svcs Gp	Canadian Forces Health Services Group
CFJOSG	Canadian Forces Joint Operational Support Group
CFJP	Canadian Forces Joint Publication
CGCS	Canadian Government Cataloguing System
CJOC	Canadian Joint Operations Command
CMP	Chief of Military Personnel
COA	course of action
comd	commander
comd elm	command element
COMSEC	communications security
CWO	chief warrant officer
DGMWS	Director General Morale and Welfare Services
DND	Department of National Defence
DOB	deployed operating base
DTB	*Defence Terminology Bank*

EMCON	emission control
EW	electronic warfare
FARP	forward arming and refuelling point
FG	force generation
FLS	forward logistics site
FOB	forward operating base
FOL	forward operating location
HN	host nation
HNS	host-nation support
HQ	headquarters
HR	human resources
HSS	health services support
JTFHQ	joint task force headquarters
JTFSC	joint task force support component
LEMS	Land Equipment Management System
LOC	lines of communications
MND	Minister of National Defence
MOB	main operating base
MSE	mission-support element
NATO	North Atlantic Treaty Organization
NDHQ	National Defence Headquarters
NGO	non-governmental organization
NORAD	North American Aerospace Defence Command
OGD	other government department
OPCOM	operational command
OPP	operations planning process
ops	operations
OSE	operations-support element
OS Hub	operational support hub

PA	public affairs
POL	petroleum, oils, and lubricants
R&D	repair and disposal
RCAF	Royal Canadian Air Force
RCEME	Royal Canadian Electrical and Mechanical Engineers
RCN	Royal Canadian Navy
RSOI	reception, staging, onward movement and integration
SLOC	strategic lines of communication
sp	support
TFMT	task force movement table
UMST	unit movement staff table

REFERENCES

A. DND. *Air Force Expeditionary Capability Concept of Operations*. Revision 1. February 2, 2012. Accessed June 8, 2017, http://17wing.winnipeg.mil.ca:1400/1cad/intranet/DMCS18451.HTM.

B. ———. A-LM-007-100/AG-001, *Supply Administration Manual*, Chapter 3.2, "Materiel Identification." July 3, 2015. Accessed June 8, 2017, http://materiel.mil.ca/en/business-functions-materiel-management/supply-administration-manual-sam.page.

C. ———. A-PP-005-000/AG-002, *Procurement Administration Manual* (2005-02-14). Revision 67 (April 2015). Accessed June 8, 2017, http://materiel.mil.ca/en/business-functions-procurement-contracting/procurement-administration-manual.page.

D. ———. B-GA-403-000/FP-001, *Canadian Forces Aerospace Shape Doctrine*. March 2014. Accessed June 8, 2017, http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/doctrine/ad-b-ga-403-000-fp-001.page.

E. ———. B-GA-407-001/FP-001, *Air Force Personnel Doctrine*. April 29, 2010. Accessed June 8, 2017, http://w08-ttn-vmweb01/CFAWC/en/doctrine/b-ga-407-001-air-force-personnel-doctrine.asp.

F. ———. B-GJ-005-300/FP-001, CFJP 3-0, *Operations*. Change 1 (September 2011). Accessed June 8, 2017, http://cjoc-coic.mil.ca/sites/intranet-eng.aspx?page=3560.

G. ———. B-GJ-005-400/FP-001, CFJP 4-0, *Support*. February 24, 2014. Accessed June 8, 2017, http://cjoc-coic.mil.ca/sites/intranet-eng.aspx?page=3560.

H. ———. B-GJ-005-404/FP-000, CFJP 4-1, *Joint Movement Support*. September 1, 2002. Accessed June 8, 2017, http://cjoc-coic.mil.ca/sites/intranet-eng.aspx?page=3560.

I. ———. B-GJ-005-500/FP-000, CFJP 5-0, *The Canadian Forces Operational Planning Process (OPP)*. Change 2 (April 2008). Accessed June 8, 2017, http://cjoc-coic.mil.ca/sites/intranet-eng.aspx?page=3560.

J. ———. B-GL-300-004/FP-001, *Sustainment of Land Operations*. December 13, 2010. Accessed June 8, 2017, http://acims.mil.ca/sp/CADTC_DAD_AEL/DoctrineLibrary/B-GL-300-004-FP-001.pdf.

K. ———. B-GL-342-001/FP-000, *Land Equipment Management Systems*. September 10, 2001. Accessed June 8, 2017, http://acims.mil.ca/sp/CADTC_DAD_AEL/DoctrineLibrary/B-GL-342-001-FP-000_E.pdf.

L. ———. B-GL-345-001/FP-001, *Combat Service Support (CSS) Units in Operations*. February 28, 2013. Accessed June 8, 2017, http://acims.mil.ca/sp/CADTC_DAD_AEL/DoctrineLibrary/B-GL-345-001-FP-001.pdf.

M. ———. Canadian Forces Administrative Order 36-45, Maintenance of Materiel Level Three Maintenance. Accessed June 8, 2017, http://corpsec.mil.ca/admfincs/subjects/cfao/036-45_e.asp.