

CANADIAN FORCES AEROSPACE SUSTAIN DOCTRINE



National
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CANADIAN FORCES
**AEROSPACE
SUSTAIN
DOCTRINE**



PREFACE

This manual provides the operational-level doctrine for the Sustain function of the Canadian Air Force. While intended primarily for the operational level, it also describes fundamentals applicable at the strategic and tactical levels. This manual has been designed for use by the following:

- a. Canadian Forces (CF) schools and academies that train, indoctrinate, and develop personnel in the sustainment and support of aerospace operations and activities;
- b. CF aerospace units and headquarters (HQ); and
- c. Other CF elements proposing to command or support CF aerospace forces.

This manual is presented in three chapters:

- a. **Chapter 1 – Fundamentals.** An overview of the Sustain function includes the principles and characteristics, and the four components of sustainment.
- b. **Chapter 2 – Sustainment.** Air Force sustainment focuses on the effective provision and sustainment of the personnel, materiel, infrastructure, and services components.
- c. **Chapter 3 – Sustaining Aerospace Operations.** The sustainment of both a main operating base (MOB) and a deployed operating base (DOB) is examined within the context of the five phases of an aerospace operation, as well as the sustainment factors to be considered by sustainment practitioners.

The manual is to be used in conjunction with:

- a. B-GA-400-000/FP-000, *Canadian Forces Aerospace Doctrine*;
- b. B-GA-401-000/FP-001, *Canadian Forces Aerospace Command Doctrine*;
- c. B-GA-402-000/FP-001, *Canadian Forces Aerospace Sense Doctrine*;
- d. B-GA-403-000/FP-001, *Canadian Forces Aerospace Shape Doctrine*;
- e. B-GA-404-000/FP-001, *Canadian Forces Aerospace Move Doctrine*;
- f. B-GA-405-000/FP-001, *Canadian Forces Aerospace Shield Doctrine*;
- g. B-GA-407-000/FP-001, *Canadian Forces Aerospace Generate Doctrine*.

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

The Commander 2 Canadian Air Division is the ratification authority for this doctrine.

KEYNOTES

These keynotes are the fundamental beliefs upon which Sustain doctrine is built:

- ✦ The Sustain function encompasses the four components—personnel, materiel, infrastructure, and services—that must be both provided and sustained for all types and categories of aerospace operations to maintain aerospace power and the operational effectiveness of the force.
- ✦ Overall sustainability requires sufficient operations support and mission support organizations within the force structure at any destination¹ for all types and categories of operation.
- ✦ The application of the following five principles increases the probability of a successful sustainment plan and the effective conduct of sustainment operations: primacy of operations, economy, flexibility, simplicity, and cooperation.
- ✦ The following five characteristics should be incorporated in all sustain components to optimize sustainability: robustness, agility, scalability, integration, and reliability.
- ✦ The following five key factors apply when planning the sustainment requirements for a military operation: destination, demand, distance, duration, and risk.
- ✦ Reconstitution is a key sustainment activity planned and implemented to restore a desired level of combat effectiveness to Air Force 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, and the application of commonly applied prioritization criteria for personnel and materiel resources used to provide sustainment.

¹ Destination is defined as any location where personnel, materiel, infrastructure, and/or services are provided to regenerate and maintain capabilities in support of operations. See also chapter 3, page 48, Destination.

TABLE OF CONTENTS

PREFACE	ii
KEYNOTES	iii

CHAPTER 1 FUNDAMENTALS

Introduction	1
Principles and Characteristics	4
Principles	5
Characteristics	8
Components of Sustainment	10
Personnel	10
Materiel	12
Infrastructure	15
Services	15
Summary	17

CHAPTER 2 SUSTAINMENT

Introduction	19
Levels of Sustainment	19
Types of Sustainment	23
Overall Sustainability	23
Support Organizations	24
Train as You Fight—Fight as You Train	26
Supporting Agencies	27
Resources for Sustainment	28
Military Assets	29
Contracted Services	29
Host-nation Support	30
Cooperation with Other Nations	31
Summary	32
Annex A – Supporting Agencies	33
Canadian Forces Agencies	33
Air Force Agencies	38

CHAPTER 3 SUSTAINING AEROSPACE OPERATIONS

Introduction	43
Sustaining Main Operating Bases.....	43
Sustaining Deployed Operating Bases	46
Sustainment Planning.....	47
Introduction	47
Sustainment Factors.....	47
Phases of an Aerospace Operation.....	53
The Planning Process	53
Contingency Planning	55
Master Implementation Plans.....	56
Sustainment and the Operational Phases	56
Warning	56
Preparation.....	57
Deployment	57
Employment	58
Redeployment	58
Reconstitution	58
Summary.....	60

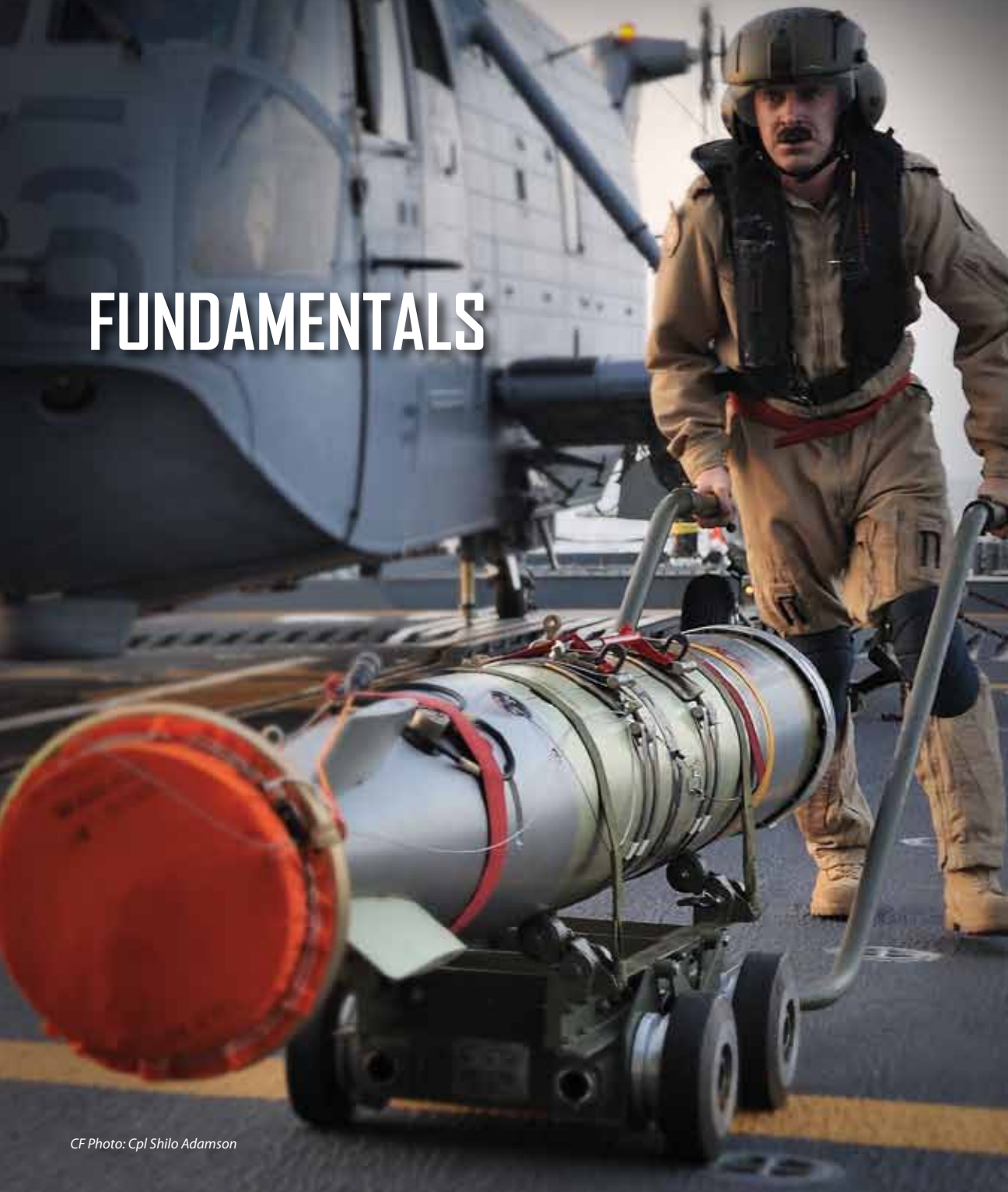
GLOSSARY	61
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LIST OF ABBREVIATIONS.....	65
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LIST OF REFERENCES	68
---------------------------------	-----------

CHAPTER 1

FUNDAMENTALS



INTRODUCTION

Air forces exist to exercise aerospace power on behalf of the nation. This is accomplished primarily through the exploitation of the air and space environments to achieve assigned

objectives. A century of air warfare has demonstrated that all effective air forces, whether they are large or small, are capable of performing a number of specific functions. These functions are influenced by the physical possibilities and limitations imposed by the environments, and by each other. One cannot efficiently or effectively work without the other; however, it is the unique capabilities of each function that when integrated with the other functions, ensure the proper application of aerospace power. Aligned with Canadian Forces (CF) doctrine, Canadian aerospace doctrine consists of the following six functions:

SUSTAIN

The function that regenerates and maintains capabilities in support of operations.

COMMAND ■ ACT¹ ■ SENSE ■ SUSTAIN ■ SHIELD ■ GENERATE

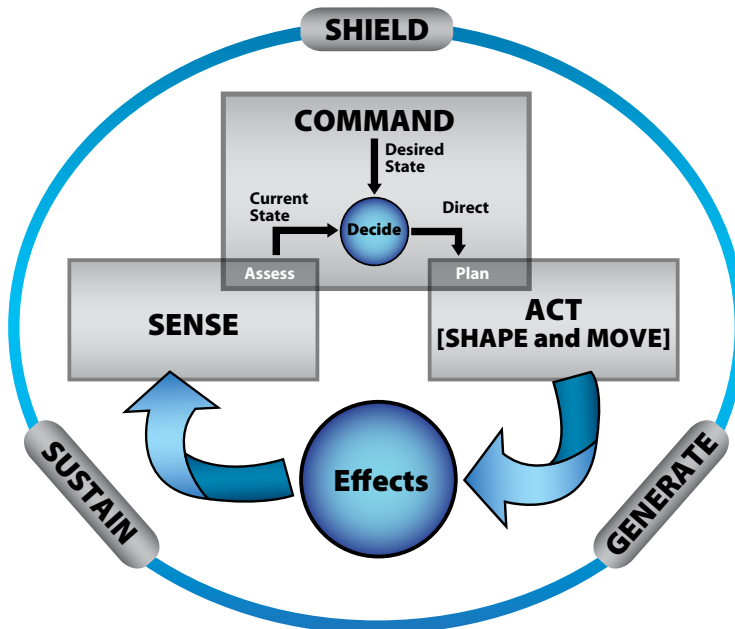


Figure 1-1. The Air Force Functions²

¹ The Act function comprises the two sub-functions of Shape and Move.

² Refer to the keystone operational aerospace doctrine handbooks for a detailed discussion of the other Air Force functions or sub-functions.

In order to conduct aerospace operations and activities, the core functions of Command, Act, and Sense operate within a continuous cycle of activities. The outputs of the Sense activities are assessed during the Command activities to determine the current state. After evaluating the current and desired states, Command activities direct and plan actions. The Act activities create effects that will achieve the desired state. Sense activities assess the results of these effects, and the cycle is repeated. As well, this cycle of activities will influence—or can be influenced by—the ongoing enabling function activities of Sustain, Shield, and Generate.

The Sustain, Shield, and Generate activities must be performed continuously in order to effectively maintain, protect, and develop Air Force assets and capabilities. Without the activities of these functions, the Command, Act, and Sense activities could be compromised or even eliminated. Consequently, a weakness in or failure of one function will negatively impact not only the other five functions but also the force's ability to achieve a desired state.

With the foregoing brief description of the Air Force functions, this doctrine handbook will now devote its focus to the Sustain function. Within the CF, Sustain is understood to be the capability to maintain fighting power. It has also been described as the operational function that integrates strategic, operational, and tactical levels of aerospace support to maintain a fighting force. In the Air Force, Sustain is the function that regenerates and maintains capabilities in support of operations.

There is also a particularly close relationship between the Sustain and Generate functions, and it is sometimes difficult to determine where one ends and the other begins. Whereas Generate function activities are primarily concerned with recruiting, education and training, and equipping (materiel acquisition and support [MA&S] activities such as procurement and life cycle support), Sustain function activities deal with many of the same personnel and materiel resources, but are primarily concerned with their day-to-day employment and management. Essentially, then, Generate function activities are necessary to prepare an aerospace force for employment, and Sustain function activities are needed to keep the Air Force employed and to maintain its operational effectiveness.

This manual will provide guidance for achieving overall sustainment of aerospace operations. In its broadest form the Sustain function is comprised of four components—personnel, materiel, infrastructure, and services—necessary to employ forces in the application of aerospace power. At the micro level, however, there are numerous sustainment activities that support any operation. Figure 1-2 illustrates the breadth, diversity, and uniqueness of activities usually included under the umbrella of the Air Force Sustain function. Most of these activities are carried out on an ongoing, day-to-day basis at Air Force main operating bases (MOBs), and subsets of these activities are an essential element of expeditionary operations.

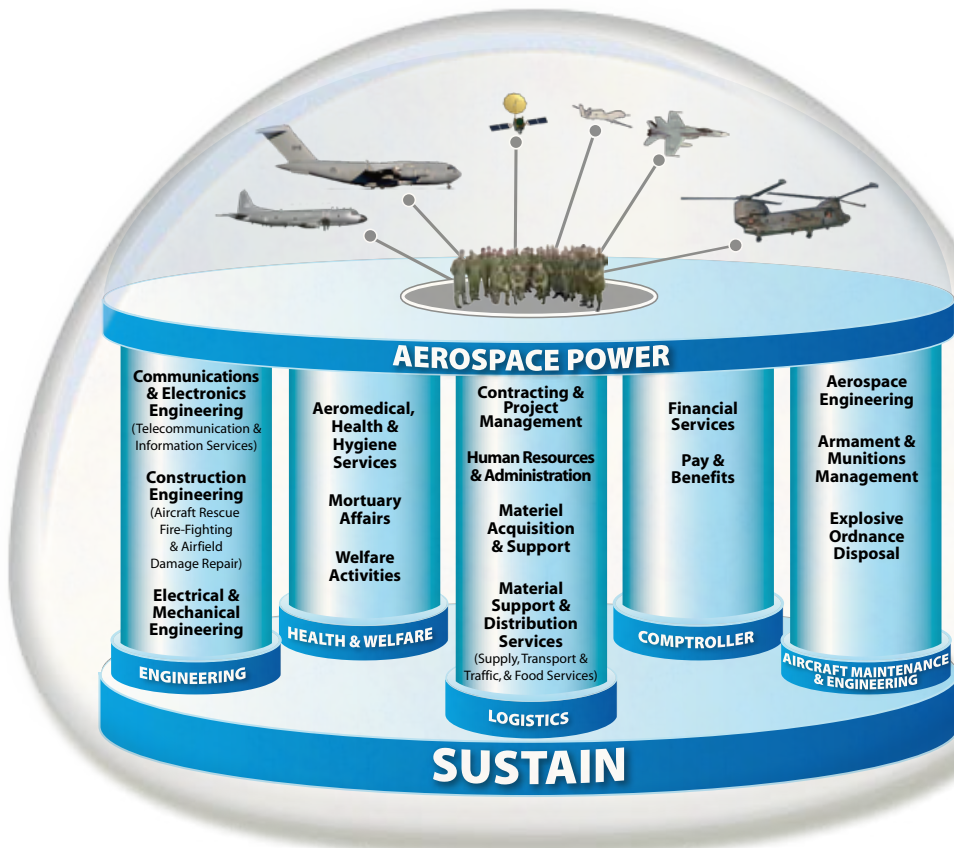


Figure 1-2. Sustain Activities

PRINCIPLES AND CHARACTERISTICS

The fundamental principles and characteristics of sustainment have evolved through experience and lessons identified during operations. These principles and characteristics are generally shared by the Army and the Navy, as well as the militaries of many other nations. They provide the basis upon which to measure the soundness of a sustainment plan. When adhered to / applied, the principles and characteristics should increase the probability of achieving mission success.



CF Photo: Cpl Lou Penney

PRINCIPLES

The following principles always apply and should be viewed as guidelines for the planning and conduct of sustainment:

- a. **Primacy of Operations.** Sustainment must be focused on ensuring the success of the operation while concurrently providing accountability to the Department of National Defence (DND) / CF and the Government of Canada. Sustainment must serve as an effective force enabler, and it should be seamlessly integrated into the operational structure. One key to achieving this goal is having a clear and unequivocal chain of command, with the operational commander having clearly designated, centralized control of overall sustainment responsibilities, while allowing for decentralized execution of sustainment activities.
- b. **Economy.** Sustainment assets and resources are often expensive and in short supply. The tendency toward excessive holdings must be avoided so that the unnecessary demanding, transport, storage, and even abandoning of resources do not occur. In addition to achieving economies, asset visibility ensures that the commander is provided with key information required to make decisions. Mutual sustainment mechanisms must be in place to ensure that such assets and resources are used in the most effective and efficient manner possible, keeping in mind operational imperatives. The goal is to achieve economies of scale, increased reserve capacity / capability, and to maintain the overall effectiveness of aerospace sustainment while simultaneously minimizing costs and the sustainment footprint.
- c. **Flexibility.** Operational plans must be developed, bearing in mind that unexpected events will almost always dictate changes to the plan and its execution. As a result, flexibility as well as foresight is particularly important when developing sustainment plans, which must respond quickly, effectively, and efficiently to even minor changes to the operation. Sustainment must also be responsive to changing requirements and adaptable to new technologies and initiatives. In turn, sustainment practitioners 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).



CF Photo: Cpl Roy MacLellan

- d. **Simplicity.** Simple plans and orders, and agile aerospace support organizations will minimize confusion, facilitate versatility, and enhance sustainment effectiveness. Simple and streamlined sustainment processes are always preferred over ones that are complex and labour intensive. The goal is to ensure that the sustainment plan is simple enough to withstand surprise while ensuring that the commander's requirements are met. 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 staff must ensure close cooperation is planned and coordinated. Units must feel confident that their support will not fail them in an emergency. Cooperation is particularly important for sustaining combined or joint operations where national or service interests and competition for scarce resources have the potential to undermine relationships.

CHARACTERISTICS

Several characteristics have been identified that should be incorporated in all sustainment components to optimize sustainability. Although all characteristics are desirable qualities, their relative importance will vary depending on circumstances, and when in conflict, judgement is needed in their application. These characteristics are:

- a. **Robustness.** Robustness is the characteristic that 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 expeditionary 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 Air Force materiel, capabilities, and systems that are capable of withstanding physical and electronic attack all help protect the sustainment network. Redundancies, back-up 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 aerospace 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. Moreover, sustainment practitioners should remain open-minded and develop intuitive reasoning skills that facilitate rapid situational understanding. Through responsive speed of action and complimentary reaction, agility in sustainment permits aerospace operations to withstand the unexpected.
- c. **Scalability.** Scalability is the characteristic of sustainment assets, including personnel and materiel resources, that permits them to be efficiently scaled up or down in the short- or long-term depending on the operational tempo and threat. Scaling up usually will occur at the commencement and termination of an operation or during increasing operational tempo at the MOB or DOB, while scaling down is more likely to occur after other support arrangements have been put in place. For deployed operations, arrangements such as those provided by the Canadian Forces Contractor Augmentation Program (CANCAP), host-nation support (HNS), allies, other nations, or the use of augmentees, can be put in place. Effective

³ Associated characteristics consist of but are not limited to: willpower, courage, commitment, tenacity, and stamina.

support can still be provided at an MOB, albeit at a reduced scale, even after parts of support organizations have been deployed.

- 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 combined 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 scalable and modular sustainment components that are capable of merging with and/or supporting other government departments (OGDs), non-government organizations, allies, international partners, and commercial elements.⁴
- e. **Reliability.** Reliability is the characteristic that ensures the consistency and dependability of sustainment effects—whether it is the persistent support to the MOB or the expeditionary sustainment of a DOB. It results from the effectiveness of the sustainment team, the competency and health of its personnel, the dependability of infrastructure, materiel, and services, as well as the trustworthiness of information.



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.

COMPONENTS OF SUSTAINMENT

The breadth of sustainment encompasses four main components that are equally relevant for MOB and DOB operations. Personnel, materiel, infrastructure, and services must all be provided for and sustained in any fighting force for all types and categories of operations.⁵ These four components, shown in Figure 1-3, are essential for sustaining a force during every phase of an operation, from warning and preparation, through deployment to and employment in theatre, to redeployment. At its simplest, these components provide the personnel to command, plan, execute, and control the sustainment of aerospace power, including the acquisition or construction, maintenance, operation, and disposal of materiel and infrastructure, and to acquire or furnish services necessary to receive, move, sustain, and redeploy the force.

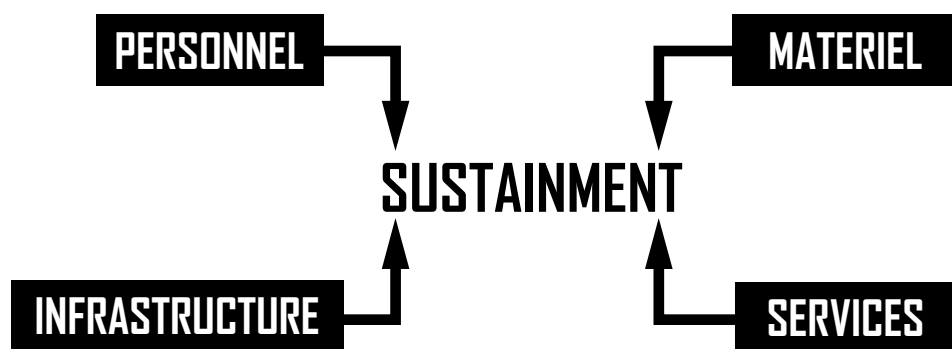


Figure 1-3. Components of Sustainment

PERSONNEL

The availability of trained and dedicated personnel, in the right numbers and at all destinations, is critical to achieving operational success. Simply put, getting the personnel component right is key to “getting it right” in overall force sustainment, and critical to the ability of the Air Force to sustain aerospace operations. Personnel needed to sustain aerospace operations can be categorized as military members, DND employees, or contractors.⁶

For some sustainment activities and services it is mandated that they be provided by a certain category of personnel, sometimes due to military shortages, but also to ensure that focus remains on the immediate needs of aerospace operations, and the primacy of operations. Furthermore, particularly in international operations, the status of forces, rules of engagement, or the local situation may exclude or make inappropriate the employment of civilian

⁵ As described in B-GJ-005-300/FP-001, *CFJP 3.0 Operations*, operations are described in terms of types (domestic, continental, and international) and categories (routine, contingency, and rapid response).

⁶ These can be further broken down as Regular/Reserve Force, occupational specialties and groupings, full/part-time employees, and national or local contractors.

personnel. As such, the Air Force relies on the total force concept in the provision of its DOB sustainment, as well as its MOB sustainment.

The Air Force must conduct aerospace operations under military leadership in a disciplined fashion. This places a premium on certain personnel qualities, such as fighting spirit,⁷ professional competency, and fitness for duty. These qualities earmark the professional service persons, and facilitate their ability to lead, and thereby to provide sustainment that is agile, reliable, and robust.

The high technological content and complexities of aerospace operations demand that personnel engaged in sustainment activities be fully competent in carrying out their assigned duties. Individual tasks must be conducted correctly and with due regard for economy and safety. This is critical in dealing 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.⁸ More information on how the Air Force Personnel Management System is used to define and manage all Air Force occupation specialties can be found in B-GA-407-001/FP-001 *Air Force Personnel Doctrine*.

Fitness requirements for Air Force duty stem from the particular and demanding nature of aerospace operations. Personnel contribute to operational success only when they are fit and prepared to work in all types, categories, and locations of operations. This encompasses personal, physical, mental, and medical fitness, as well as proper indoctrination into the nature of the mission and the military operation, work routines, environmental conditions, society and economy, and other preparations to cope with local hazards and potential hostile acts. The intangible quality of leadership must also be present in personnel sustaining aerospace operations. So many situations arise where one's willingness to step up and show the way can mean the difference between success and failure. Personnel not adequately prepared or not capable of carrying out their role in the manner expected pose a danger to themselves as well as to their teammates, and can ultimately jeopardize the success of any military operation. Military fitness⁹ for Air Force personnel is a chain of command responsibility and is managed and tracked through the Annual Personnel Readiness Verification (APRV) process.

7 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. (DTB Record 37287)

8 As an example, the DND/CF 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 programs worldwide.

9 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*, http://trenton.mil.ca/lodger/CFAWC/CDD/Doctrine/Pubs/Operational/407_Series/B-GA-407-001-FP-001.pdf (accessed November 17, 2010).

MATERIEL

Materiel is the term used to denote the systems, vehicles, aircraft, arms, parts, and materials used to sustain aerospace operations. Materiel includes the resources used in the direct and indirect support of aerospace systems, as well as the equipment to facilitate 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.

As an essential element of supply chain management, the control, movement, and delivery of materiel, as well as an understanding of the operation intensity, are major tasks and considerations for the mission support staff. The prompt provision of materiel is an essential element of economy. It may be stockpiled at MOB, 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.



CF Photo: Sgt Roxanne Clowe

Materiel is acquired on the basis of needs that originate from operational, economic, or legal requirements, and 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-Air Force or CF perspective) to acquire the materiel under the most favorable 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 National Defence Headquarters (NDHQ).

Most materiel is centrally managed via networks of operational, technical, and supply authorities. Processes and procedures are established on a life expectancy basis for materiel management functions such as replenishment, replacement, distribution and holdings, 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 for most other materiel.¹⁰



¹⁰ For example, the DND/CF Airworthiness Program controls the design, manufacture, maintenance, materiel support, and operational usage of aeronautical products to ensure they remain airworthy throughout their life.

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.”

Expected results: 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.**

Source: Treasury Board Policy on Management of Materiel effective November 1, 2006

Sustainment practitioners have important roles and responsibilities for materiel that include (but are not necessarily limited to):

- a. maintaining the minimum level of all materiel required to support the expected operation 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;
- 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, to achieve effective materiel sustainment, each item needs additional information such as quality, quantity, destination, delivery time, and sequence, so that transportation and infrastructure requirements can be similarly estimated

and sequenced. There should also be clear traceability for each item to the needs and objectives of an aerospace operation, so that only materiel necessary to sustain normal MOB activities and/or assigned objectives for deployed operations is acquired and managed.

INFRASTRUCTURE

Infrastructure is the term generally applicable for all fixed and non-permanent installations for the support and control of military forces. It includes runways, roads, telecommunication networks, and all types of utilities, such as power generation and electrical distribution, telecommunication ducting, natural gas networks, water and sewage systems, and relocatable temporary camps. The maintenance of existing Air Force infrastructure and MOBs is a major ongoing activity of aerospace sustainment, including its updating and modernization in accordance with operational requirements. Similar to materiel, the concept of life expectancy is applied so that plans for demolition can be developed, and construction and maintenance properly sequenced.

Infrastructure sustainment challenges are generally more difficult for short-term operations in remote, austere environments. Because of the dependence of fixed-wing aircraft on runways and other support facilities, there is an ongoing requirement to provide a certain amount of infrastructure to allow the military operation to proceed, but 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 re-used.

Finally, in keeping with the principle of economy, and when military operations permit, MOBs and well-found bases should be used and sought 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 optimizing and minimizing, when feasible, the deployed sustainment footprint, and reducing the amount of materiel and number of temporary structures that must be transported into or provided in theatre. In addition, the Sustain planner should investigate and exploit any potential for cooperative logistics, HNS, joint and coalition initiatives, and similar mutually beneficial infrastructure opportunities.

SERVICES

Sustainment services are provided in the broad areas of mission support, operations support, and aircraft maintenance. Services bring the other three components of sustainment together at the right place and time.

At any point in time, it is reasonably straightforward to identify the services required to sustain an aerospace operation in pursuit of its objectives. It is equally straightforward to establish service standards and criteria by which the effectiveness of these services can be measured. It is considerably more difficult, however, to identify the best ways to deliver those services on a continuing basis when the operational situation and tempo and the likelihood of hostile acts are in a constant state of flux. Optimal service delivery then becomes a constantly changing target, in some cases leading to rapid and dramatic changes to the sustainment posture. These changes may stem from developments in the aerospace operation or campaign, but they could also be precipitated by the security environment, technology, and the availability of certain human and materiel resources.

All sustainment providers must keep in mind the principles and characteristics of sustainment when defining the service or services they provide to aerospace operations, and to apply sound management techniques and 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 aerospace operation and sustainment operations; and
- e. as part of continuous improvement, systematically identifying and evaluating all means of service delivery.

Finally, 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 Air Force, and even the CF. Therefore, it is equally important to manage the processes by which a change in service delivery is implemented as it is to justify the change in the first place.

SUMMARY

This chapter introduced the Sustain function keystone doctrine manual. The five principles for the effective conduct of sustainment operations were also addressed. They are: primacy of operations, economy, flexibility, simplicity, and cooperation. Additionally, to optimize successful achievement in sustainability, there are five desired characteristics identified that should be incorporated in each of the Sustain components: robustness, agility, scalability, integration, and reliability. Finally, the components of sustainment—personnel, materiel, infrastructure, and services—are the constituent parts that must be both provided and sustained to maintain aerospace power and the operational effectiveness of the force.



CF Photo: Cpl Robert Bottrill

CHAPTER 2

SUSTAINMENT

INTRODUCTION

This chapter will focus on Air Force sustainment. It is important to understand that the combined capacity of trained personnel, materiel, infrastructure, and services systematically operating together enables the successful provision of all aerospace support and provides the genesis for sustainment. As part of this chapter, the CF levels of sustainment and the types of Air Force sustainability will be examined in the context of overall sustainability. Finally, the numerous interrelationships with other support agencies will be examined, and the main resources of sustainment will be described.

Air Force units, whether operating domestically, continentally, or internationally, must be sustained if they are to have any enduring effect. Ideally, any size of Air Force 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), and the maintenance and/or replacement of materiel and infrastructure. Whereas the Army and Navy may be able to conduct the majority of their operations from deployed locations, the Air Force will always conduct a significant number of operations from its MOBs. As such, the sustainment of the Air Force applies equally to that of a DOB (including a forward operating base [FOB] or forward operating location [FOL]¹), as it does to the ongoing sustainment of an MOB.

LEVELS OF SUSTAINMENT

To help understand Air Force sustainment, it is necessary to examine the levels of sustainment used within the CF. Canadian joint doctrine distinguishes between three levels of operations: strategic, operational, and tactical. Although a unified sustainment process extends through all three of these levels it is crucial to note that the focus of sustainment activities at each level is quite different. Accordingly, as illustrated in Figure 2-1, it is also useful to divide sustainment into levels that correspond to the operational levels. Each subordinate level draws from the higher level for its support.

¹ FOLs are a special type of DOB, and the term is normally used to describe sites in the Canadian Arctic, not normally occupied, that are able to support CF18 operations.

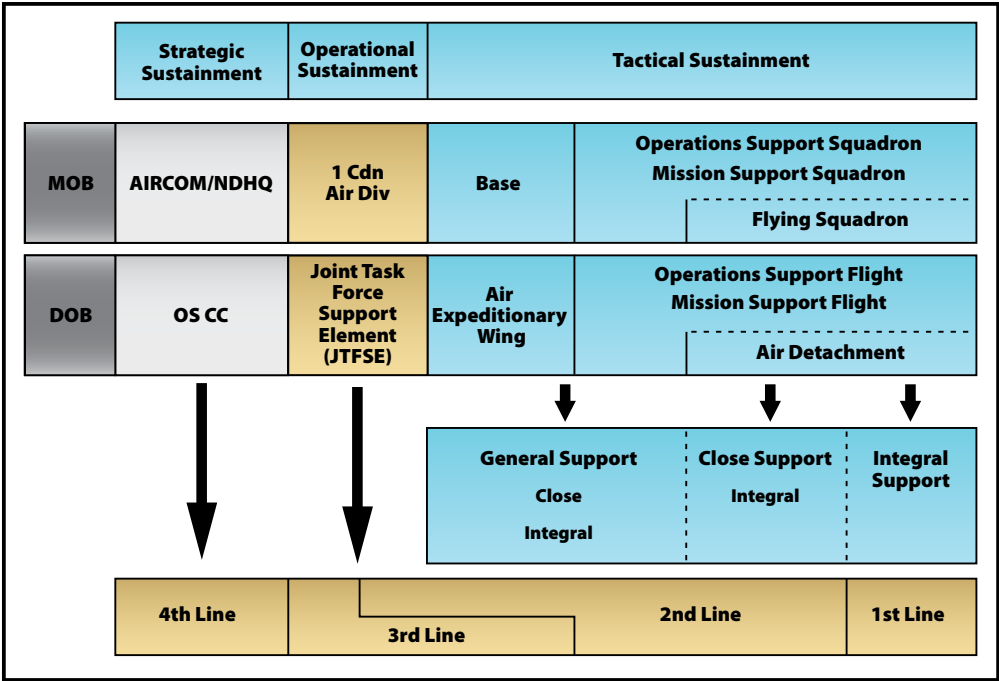


Figure 2-1. Levels of Sustainment²

The success of the CF, and subsequently the Air Force sustainment system, is dependent on the successful integration—whether within a joint or Air Force context—of the following three levels:

- a. **Strategic Level Sustainment.** In the broadest sense, strategy involves the employment of the nation’s resources to achieve the objectives determined to be in the national interest. Logically, the sustainment process at the strategic level is geared to support these national objectives. For deployed operations, the Operational Support Command Centre (OSCC) is primarily responsible for coordinating strategic sustainment for the CF. This level includes such activities as weapon and equipment design, construction of military installations and support facilities, the mobilization and movement of forces and materiel from Canada to the operational theatre, as well as the setting of any stock-holding policy. Projection of resources within the operational theatre falls into the sphere of the operational level. For MOB operations, Air Command (AIRCOM) and NDHQ organizations and agencies are primarily responsible for coordinating strategic sustainment for the Air Force.

2 Levels of sustainment were previously defined as first through fourth lines of support. Line terminology has been replaced by strategic, operational, and tactical levels of sustainment. While the four lines of support are still used throughout the CF, levels reflect the current doctrine. This figure illustrates the correlation of these concepts.

- b. **Operational-Level Sustainment.** At the operational level, the military activity is focused on the achievement of strategic objectives through the conduct of campaigns. 1 Canadian Air Division (1 Cdn Air Div) or the joint task force support element (JTFSSE), which consists of a myriad of long-term sustainment capabilities during deployments, supports all of these. During deployed operations, the operational level is confined to the operational theatre and does not extend beyond the supported Canadian formation, thereby linking the strategic and tactical levels of sustainment. Operational-level sustainment involves projection of resources provided from the strategic level as well as the coordination of support from civilian contracts, host nations (HNs), and coalition military partners. It encompasses all of the support activities which are beyond the scope of tactical-level sustainment, and augments the tactical level with those resources when required.

LEVELS OF SUSTAINMENT VERSUS LEVELS OF MAINTENANCE

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

- *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... 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... rebuild and overhaul of equipment, mid-life improvements, life extension programs... and lengthy activities that require specialized facilities to complete.*

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 carried out by a first-line organization.

- c. **Tactical-Level Sustainment.** At the tactical level, battles, engagements, and other actions are planned and executed to accomplish military objectives established by the operational-level commander. Tactical-level sustainment is concerned with maintaining all forces and it accomplishes this through the actual performance of a variety of sustainment tasks (including replenishment, infrastructure repair, health services, materiel management, and personnel administration). Tactical-level sustainment is divided into the following three categories of support:
- (1) **General Support (GS).** The support given to the supported force as a whole and not to any particular entity. It is the most centralized support relationship, and it is relatively static in nature, comprising time consuming or complex tasks. It includes such sustainment activities as base- / wing-level waste disposal, laundry, medical treatment and evacuation, and personnel support services. Such activities can use a combination of military, contractor, HN, or coalition support options, depending on the type of operations being supported. GS units must be capable of reinforcing close support (CS) capabilities, if required, and will therefore be structured to include a combination of tactically mobile and theatre support capabilities. In the Air Force, the base/wing/air expeditionary wing (AEW)³ support organizations will provide this category of support in conjunction with the specialized, nationally-controlled support services provided by the JTFSE.
 - (2) **Close Support (CS).** The support given to the supported component command to meet its unique requirements in order to deal with tasks of immediate concern to its commander's operations. This support is normally provided within a day and requires a high degree of responsiveness and mobility. In the Air Force, operations support and mission support organizations usually provide this support from a centralized location.
 - (3) **Integral Support (IS).** The support of an immediate and organic nature required to fulfill a unit's primary function. In the Air Force, operations support and mission support personnel, as well as air maintenance personnel assigned to a flying squadron (sqn) or air detachment (air det), provide this category of support.

³ Additional information about air expeditionary wings, operations support organizations, and mission support organizations can be found in the Air Force Expeditionary Capability Concept of Operations, 28 July 2009, <http://winnipeg.mil.ca/msnspcoord/documents/DMCS-13667.pdf> (accessed November 17, 2010).

TYPES OF SUSTAINMENT

Coordination across all levels is obviously necessary for the successful sustainment of aerospace operations and related military activities. Moreover, for truly effective Air Force sustainment of aerospace operations, emphasis has been placed on the following three types of sustainment, all of which must be equitably addressed by sustainment practitioners during any mission and all phases of an operation:

- a. **Operational sustainment** encompasses such activities as the mounting of an operation, the establishment of infrastructure and facilities, administrative, legal, and financial support, and providing overall support to operations. This type of sustainment will be of particular interest to operational commanders as it is essential to creating the environment required to generate the greatest operational freedom.
- b. **Tactical, or more precisely, airfield sustainment**, encompasses those activities required to supply and maintain the physical needs of the aircraft and the organizations that fly and support them. Its tasks include such activities as launching and recovering aircraft, refuelling vehicles, the maintenance of ground vehicles and equipment, and the receipt and dispatch of materiel.
- c. **Individual sustainment** covers all human resource requirements, and includes meeting individual physiological and welfare needs, and the implementation of a system for the treatment and evacuation of casualties. Moreover, as individual sustainment interacts with all levels of command and provides the means to maintain the fighting spirit and collective moral will to continue operations, it is therefore a vital type of sustainability that makes a significant contribution to effective application of aerospace power.

OVERALL SUSTAINABILITY

Maintaining aerospace power and operational effectiveness requires seamless interaction between operational, tactical, and individual sustainment. To achieve effective collective sustainment for operations, it is imperative that attention be paid to all aspects of sustaining operations, as a deficiency in any one type of sustainment could have a detrimental impact on overall operational effectiveness.

Command is the unifying function that ensures primacy of operations, including overall sustainability. Command is likely to be retained centrally to make efficient use of scarce resources. At the operational level, the

commander will identify priorities for sustainability during the planning process and these will be incorporated into a mission-specific sustainability concept by the commander's staff. Individual and airfield sustainment will be of particular interest to subordinate commanders, but they will also wish to be aware of the level of operational sustainment available to their units and formations. Equally, the operational-level commander will wish to quantify the likely demand for individual and airfield sustainment in order to provide and reinforce it through operational sustainment. Achieving overall sustainability requires sufficient support (i.e., mission support, aircraft maintenance, and operations support) organizations within the force structure at any location for all types and categories of operation.

SUPPORT ORGANIZATIONS

Collectively, the support organizations will attend to the many different activities that must be undertaken to achieve overall sustainability. In the provision of Air Force sustainment, the tactical-level organizations are divided into the categories of mission support, operations support, and aircraft maintenance. Whereas operations support units combine the activities from several functions to create a cohesive entity, mission support unit activities are comprised primarily of Sustain activities. An additional aspect is the dissociation between MOB support units and its operational units. That is, mission support and operations support units are designed



CF Photo

to be generic support units, and therefore do not necessarily support the deploying operational units from its MOB. As such, AEWs could be sustained at the deployed destination by support elements from one or more different MOBs.

Mission support is the provision of logistical, engineering, financial, and administrative support to aerospace operations. Mission support units, namely mission support squadrons (MSSs) and flights (MSFs), primarily provide and sustain personnel, materiel, infrastructure, and services essential for the running of the MOB or DOB respectively. The mission support sustainment capabilities include (but are not necessarily limited to) supply, transportation, food services, materiel acquisition, distribution and support, construction engineering, telecommunications and information services, electrical and mechanical engineering, comptrollership, contracting, contract and project management, mortuary affairs, welfare activities, human resources and administration, environmental management, aeromedical, aircraft rescue fire-fighting (ARFF), and health and hygiene.

Operations support is the provision of assistance that directly supports aerospace operations. Operations support units, namely operations support squadrons (OSSs) and operations support flights (OSFs), primarily provide and/or sustain those personnel and services essential for the conduct of flying operations at MOBs and DOBs respectively.⁴ The operations support sustainment capabilities include (but are not necessarily limited to) armament and munitions management, airfield damage repair (ADR), and



CF Photo: Cpl Henry Wall

⁴ Operations support Sense function activities include meteorology, oceanography, and intelligence. Operations support Command function activities include aerospace control, and operations planning and coordination. Operations support Shield function activities include airfield defence, policing and airfield security, and aircraft security.

explosive ordnance disposal (EOD). Additionally, at DOBs and smaller MOBs, it is not uncommon for the aircraft maintenance and engineering sustainment capabilities to be included under the operations support unit.

A thorough understanding of the sustainment capabilities that must be provided by deployed Regular/Reserve Force personnel will facilitate the optimization of MOB organizational structures and force generation processes needed to maintain those capabilities. A judicious and service-tailored combination of Regular/Reserve Force personnel, DND employees, and industrial/contractor support can facilitate ongoing sustainment of MOB operations while concurrently enabling the deployment of various sustainment capabilities to a DOB. For example, knowing that some sustainment activities, such as contracting, contract and project management, and mortuary affairs, that are not regularly practiced at the MOB but are critical during deployed operations, encourages the Air Force leadership to proactively train and develop a cadre of military specialists for such eventualities.

TRAIN AS YOU FIGHT—FIGHT AS YOU TRAIN

Air Force sustainment champions the well-known axiom “train as you fight—fight as you train,” as this represents the optimal approach to sustainment for aerospace and other military operations. By organizing, equipping, and training as it fights, the ability of the Air Force to maintain aerospace power and the operational effectiveness of a force is greatly enhanced. This approach also supports the efficient task-tailoring of aerospace assets for the accomplishment of a specific objective. Most importantly, this approach to sustainment facilitates a seamless and rapid transition from home-based to deployed operations and vice versa, and allows for effective application of the principles of sustainment.



CF Photo: Sgt Tim Jordan

As all four components of the Sustain function are themselves to be sustained in any fighting force, leaders and planners at every level of the Air Force must accurately assess preparation, training, movement, support, and replenishment needs. Related to this is the need for common organizational structures and consistent standards for equipment, and training across the Air Force, so that leaders and planners can best analyse mission and destination requirements, aircraft and munitions configurations, and thus determine the essential requirements to sustain an MOB or DOB. The availability of such information also facilitates the proper prioritization of personnel, materiel, and other resources being transported from one location to another.

SUPPORTING AGENCIES

Considering the type and nature of current and future deployed operations, it is unlikely that the Air Force will be the single military presence, but will, in all probability, be part of a larger joint and/or combined organization. To provide an adequate level of support to such operations, there are a number of CF- and Air Force-unique agencies that may contribute to the development of any sustainment plan. These agencies exist to augment and enhance—either directly or indirectly—overall sustainment, and their roles must be considered during the planning process for any aerospace operation.

Within a domestic context, the MOB provides a great deal of the support needed to sustain daily Air Force operations, but it cannot function in isolation without the support of numerous private and public agencies. The range of these support activities varies from the delivery of snow and ice control services by a local contractor to coordination with national authorities on the use of airspace and support of flying operations. MOBs and DOBs will continue to forge relationships and partnerships for the purchase of goods and services to sustain the Air Force now and into the future. As the Air Force and the CF increase the support partnerships for new weapon platforms, sustainment—wherever the destination—will be tied to agencies beyond the military framework. Expertise in contract management will continue to become a more critical activity of the sustainment process.

In the CF, the force employment process includes all activities required to plan, conduct, and review CF operations. On behalf of the Chief of the Defence Staff, the commanders of Canadian Expeditionary Force Command (CEFCOM), Canada Command (Canada COM), Canadian Operational Support Command (CANOSCOM), and Canadian Special Operations Forces Command (CANSOFCOM) are responsible to plan and execute all CF operations. Further details regarding chain of command and main responsibilities can be found in B-GJ-005-300/FP-001, *CFJP 3.0 Operations*.

The provision of sustainment to CF operations is sourced from a combination of support capabilities available in each environment and from CANOSCOM and its subordinate formations and units. It is important for planners to understand the roles and capabilities of these agencies in order to streamline the coordination process and thus minimize duplication of efforts. A list of the main CF and Air Force supporting agencies, and their principal responsibilities, can be found at Annex A.

RESOURCES FOR SUSTAINMENT

Although augmentation from the other support agencies should be considered in the overall development of any sustainment plan, it also requires equal consideration be given by the sustainment planner of all practical resources for sustainment. While important and probably desirable to maintain a dedicated military capability to support a commander's intent, the practical reality of optimizing the sustainment tail and deployed footprint will drive the need to seek alternative ways to ensure sustainability. Resources for sustainment, particularly when operating far from the MOB and/or within an area of limited means, as well as at an MOB, can be derived from any combination of military assets, contracted services, HNS, and cooperation with other nations.



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MILITARY ASSETS

Military assets include all aerospace 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 other sources. Inevitably, there will be pressure to minimize the level of military assets deployed to both reduce costs and the requirement to sustain the supporting infrastructure. Balanced against this is the certainty of support given by dedicated military assets. In addition to initial deployment, reinforcement from military assets could be enhanced if the level of deployed own resources is insufficient to support the operation. Military assets offer the greatest flexibility and reliability, but by their very nature they may be the scarcest resource and may need to be balanced by other assets.

Using other resources to secure required materiel and service support can free up vital mobility assets for use in transporting those items that cannot be procured from any other sources other than Canadian military sources. For example, POL is consumed in vast quantities in a modern air force. The need to ship such products from the MOB rather than procuring locally can be a limiting factor, and could quickly deplete valuable airlift capability.

CONTRACTED SERVICES

In most cases, contracted services can act as a force multiplier rather than as a replacement for existing aerospace support capability. Such alternative service support can help to enhance the sustainment for the operation. Within Canada, this involves using commercial contractors. For



CF Photo: MCpl Kevin Paul

international operations, CANCAP can provide either a Canadian or an international labour pool service to lessen the strain on military resources. Such service support can either augment or complement the military resources required to support the operation. Contracted support sources become more crucial in the sustainment of long-term operations and when consumption rates elevate as the operational tempo increases.

The international marketplace is an increasingly important source of contracted services. As both national and military resources are reduced, the international marketplace is seen more and more as a valuable source for sustainment resources. As such, the Air Force must directly or indirectly support the sustainment of a viable marketplace from which it expects to draw required sustainment resources. In particular, various modes of transportation are frequently contracted to deploy and sustain military forces. Furthermore, while the overall airlift capability of the CF is increasing, some operations may still require that air mobility assets be augmented by contracted civilian airlift to meet the needs of a specific operation, as well as to effectively move oversized cargo in deploying, sustaining, and redeploying CF units.

HOST-NATION SUPPORT (HNS)

HNS is also another valuable source for sustainment that can be leveraged during DOB operations. Not applicable to MOB operations, HNS is the civil and military assistance rendered by an 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 Air Force to reduce its sustainment footprint. The types of support and services 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. Careful consideration must be made by the planners to identify, evaluate, and determine HN sources of supplies and services to be used during the operation, while taking into account the respective reliability and compatibility of such resources. Finally, by utilizing HNS, the possibility of providing an economic stimulus to the HN is increased.⁵

⁵ This can build goodwill within the HN and assist with any "hearts and minds" campaign, but 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 the North Atlantic Treaty Organization (NATO), these may be overcome. The Air Force must maintain positive control and ensure that effective sustainment is available and delivered 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, OGDs, or coalition partners as sources of support has inherent risks. The sustainment planner must be cognizant that the employment of allies and other resources may impact on the degree of command and control of the entire sustainment strategy. Therefore, it is incumbent on the military sustainment specialist to maintain positive control on the external service providers, as well as the products being provided.

Examining the foregoing four resources for sustainment, it is obvious that each resource will entail a different level of risk, cost, flexibility, and effectiveness for the overall sustainment effort. While much will depend on the destination and the capacity of existing Air Force assets to effectively sustain the operation, these variables must be analysed for each resource before the overall sustainment package is put together. Often, there is not a great deal of choice in how the package is composed, and in such instances, the principles of sustainment should guide the sustainment practitioner.

SUMMARY

Sustainment focuses on ensuring that the Air Force has the necessary trained personnel, services, materiel, and infrastructure to conduct and sustain all types and categories of aerospace operations. It also includes supporting personnel, engineering, maintaining and repairing materiel and infrastructure, moving personnel, equipment, supplies and expendable commodities, the delivering and replenishing of services, as well as evacuating, treating, and replacing casualties. The high likelihood that the Air Force will be required to increase its MOB tempo or conduct expeditionary operations, potentially at short notice, means that force preparation and sustainment must be responsive and robust enough to ensure the availability of aerospace power where and when required.

Sustainment further requires the fostering of an Air Force expeditionary fighting spirit, and organizing, training, and equipping as it fights. The sustainment planner must understand the relationships with other supporting agencies, as one or more of these organizations could provide elements of sustainment and/or support for an MOB or DOB operation. Finally, the diversity and complexity of the main resources for sustainment illustrate its breadth, and the sustainment planner's task in planning for overall sustainability.

ANNEX A – SUPPORTING AGENCIES

The Air Force is not entirely self-sustaining and relies on sustainment from other DND and CF agencies and units. The intent of this Annex is to highlight several of the key organizations and units—both external and internal to the Air Force—that contribute to overall Air Force sustainment.

CANADIAN FORCES AGENCIES

The two main organizations external to the Air Force are Assistant Deputy Minister (Materiel) [ADM(Mat)] and CANOSCOM.

ADM(Mat). This organization serves the DND and the CF as a central service provider and functional authority for all defence materiel and equipment programs. The ADM(Mat) has functional authority over the following key areas: procurement of goods and services, materiel management, and materiel-related support. The ADM(Mat) is the departmental program authority for materiel and is accountable to the Deputy Minister for the full life cycle of materiel, including management of the MA&S process. The products of this process (ships, aircraft, trucks, ammunition, food, clothing, and supplies) contribute to Canada's defence capability, both at home and abroad. Defence procurement is an instrument to help the CF ensure that it is strategically relevant, operationally responsive, tactically decisive, and capable of operating within a dynamic and evolving security spectrum.

There are three full-scope service delivery divisions within the Materiel Group, each with its own area of specialization, covering the three environments (Equipment Program Management for Maritime, Land, and Air), and five special focus divisions to manage major project delivery, complex procurement services, materiel systems and the supply chain, and industry and international programs. The three divisions that have a more direct impact on Air Force sustainment are the following:

- a. **Aerospace Engineering Program Management (AEPM) Division.** The AEPM Division, which is responsible to ADM(Mat) and responsive to the Chief of the Air Staff (CAS) for Air Force support, provides specialized engineering and logistics services for all CF aircraft weapon systems. In addition to managing high-level materiel acquisition and support activities, it also supports front-line aircraft maintenance units on a daily basis. This support includes activities such as technical advice, flight test and evaluation, developing and approving repair schemes, issuing special inspections, modifying maintenance programmes and schedules, short-notice procurement of high-priority items, relocation of major aerospace components, and

granting of extensions to scheduled maintenance to satisfy operational requirements. Although commanders retain authority for key decisions concerning aircraft utilization, there is ongoing communication between the AEPM Division and aircraft maintenance unit staffs concerning routine technical matters and to provide local commanders with expert advice. Under ADM(Mat), the Aerospace Engineering Test Establishment (AETE) is the exclusive development/engineering flight test agency for the CF.

- (1) **AETE.** This ADM(Mat) establishment conducts a wide variety of flight and ground testing involving every aircraft type in the military inventory. It is also responsible for the technical evaluation of new systems to be installed on all CF aircraft. Its testing capabilities include aviation life support equipment, night vision systems, and electromagnetic compatibility.
- b. **Land Equipment Program Management (LEPM) Division.** Also responsible to the ADM(Mat), but responsive to the Chief of the Land Staff (CLS), the LEPM Division is a **major supplier of strategic support to the CF**, and a provider of an array of services relating to land weapon systems, and is also the departmental authority for ammunition, including ammunition used by the Air Force. In coordination with CANOSCOM, it provides GS Land Equipment Maintenance Services in support of operational commanders and all CF joint area of operations (AO). Under the LEPM Division, two units provide support to operations: Quality Engineering Test Establishment (QETE), and 202 Workshop Depot.
 - (1) **QETE.** This establishment provides expertise regarding electromagnetic interference testing, fuels and POL products, and thus provides an essential service to the Air Force. If fuel contamination is suspected, QETE often gets involved in high-priority testing. QETE also provides expertise for aircraft crash investigations, and is responsive to the Director Flight Safety (DFS) in that regard.
 - (2) **202 Workshop Depot.** This depot provides modification and update services, maintenance, and preparation of land weapon systems assigned to operations. Although the activities of 202 Workshop Depot are primarily focused on land equipment, it may also support Air Force equipment such as modernizing vehicles with new communication suites, armament, and armour prior to a deployment.

c. **Materiel Systems and Supply Chain Division (MSSC Div).**

This division is responsible to ADM(Mat). It delivers key MA&S services and associated strategic programs, and it provides the frameworks and oversight to deliver relevant, responsive, and reliable materiel support to the CF and DND. This is achieved by delivering key materiel supporting services and strategic programs in support of operations, by providing strategic-level materiel functional authority direction to the CF and DND, and by planning and managing the strategic development of materiel business requirements and related systems. The MSSC Div is broken down into the following four directorates:

- (1) **Director Materiel Policy and Procedures (DMPP).** It provides strategic MA&S policy and direction to enable effective delivery of materiel to support CF operations;
- (2) **Director Materiel Systems, Plans and Requirements (DMSPR) / J4 MA&S Coordinator.** It defines the strategic vision for future DND/CF MA&S & J4 requirements and capabilities, and it plans and manages their development;
- (3) **Director Quality Assurance (DQA).** It provides assurance that the CF and DND receive quality materiel and services to support their operations at home and abroad; and
- (4) **Director Supply Chain Operations (DSCO).** It provides MA&S programs and services in support of DND/CF operations such as publications management, inventory codification, fuels management, and disposal services.

Canadian Operational Support Command (CANOSCOM).

CANOSCOM delivers operational support to national and international CF missions and serves as the link between strategic support provided from Canada and the environment-specific support provided to a CF task force. It achieves this provision of support by integrating support capabilities provided by force generators into task-tailored JTFSE. CANOSCOM also generates materiel from national stocks and force generates for and executes through the Canadian Forces Joint Support Group (CFJSG), the tasks in support of the CF operational commanders and CF joint AO. These include support to theatre activation, mission closure teams, intermediate staging bases/teams (ISBs/ISTs), third location decompression, and various assistance visits. To achieve this mandate, CANOSCOM is responsible for the following specialist agencies that provide, either directly or indirectly, support to all military operations:

- a. **Canadian Materiel Support Group (CMSG).** The CMSG is the CANOSCOM formation that manages the national warehousing, distribution systems, and transportation network for materiel and ammunition. It plans and executes the delivery of materiel and assigned logistics services such as ammunition, supply, and transportation network operations, and also executes reachback for the provision of national materiel and transportation services. As such, it is responsible for 7 Canadian Forces Supply Depot (CFSD) Edmonton, 25 CFSD Montreal, and four CF ammunition depots located at Bedford, Dundurn, Rocky Point, and Angus.
- b. **Canadian Forces Joint Signal Regiment (CFJSR).** The CFJSR provides signals support to the Canadian Forces Joint Headquarters (CF JHQ), and communications and information systems support to CF operations. Its tasks include establishing and maintaining radio, telephone and satellite communication networks, installing and upgrading computer systems and software applications for deployed operations, and heavy cabling, including fibre optic communications networks for CF installations in Canada and around the world.
- c. **Operational Support Engineering Group (OS Engr Gp).** Also responsible for 1 Engineering Support Unit, the OS Engr Gp provides operational-level military engineering support. Its main responsibility is to deliver non-kinetic military engineering effects in support of CF operations. The OS Engr Gp provides CS and GS to deployed forces by conducting mobility, counter-mobility, survivability, and general engineer support tasks. The delivery of engineering support for CEFCEM and Canada COM is conducted in coordination with dedicated staffs in their respective coordination centres. CANOSCOM also participates in the force generation of deployable JTFSE engineer support units as required.
- d. **CF Health Services Group (CF H Svcs Gp).** The CF H Svcs Gp generates health service capabilities in support of all CF activities. It is worth noting that CANOSCOM does not have operational command (OPCOM) over CF H Svcs Gp but rather operational control (OPCON) when such services are provided to an operation. This group provides or arranges for health support services to CF personnel deployed on operations and to other groups such as OGDs, coalition partners, and civilians as directed

through the strategic joint staff. It retains full responsibility for all aspects of force generation (i.e., personnel, materiel/equipment resources, and individual and collective training).

- e. **Operational Support Military Police Group (OS MP Gp).** The OS MP Gp provides support to deployed forces by conducting police, security, and specialist operational tasks; this includes law enforcement, criminal intelligence gathering, civilian police force training, personnel and materiel security, and detention operations. The CANOSCOM Provost Marshal plans and coordinates, in consultation with CEFCON and Canada COM Provost Marshals, operational support to deployed forces including to entities such as ISBs and reception, staging, onward movement, and integration (RSOI) sites.
- f. **Canadian Forces Joint Support Group (CFJSG).** The CFJSG is a high-readiness, rapidly deployable formation that provides and coordinates operational-level support to CF international and domestic operations. The CFJSG offers multiple support options, both military and commercially contracted. The CFJSG's mission is to force generate and integrate CF operational support personnel into a trained and cohesive JTFSE that is task-tailored to support assigned missions. It is currently structured to support non-combatant evacuation, Disaster Assistance Response Team, theatre activation, mission closure, and integrated lines of communications (ILOC) operations. The CFJSG also has the capability of raising a Joint Task Force Support Group (JTFSG), the purpose of which is to serve as the in-theatre link between national support provided from Canada and the support integral to deployed tactical Navy, Army, and Air Force units. The CFJSG is currently comprised of the Joint Support Group Headquarters (JSG HQ), 3 Canadian Support Unit (CSU), 4 Canadian Forces Movement Control Unit (CFMCU), and Canadian Forces Postal Unit (CFPU). The CFJSG HQ's mission is to provide a command and control capability for the CFJSG and its assigned units in order to provide support to deployed domestic, continental, and expeditionary operations. The combination of these units under the functional control of the CFJSG HQ framework provides the CF with a highly responsive, mission-oriented organization capable of supporting the projection of combat power. To fulfill such a mandate, the CFJSG is responsible for the following three national-level units:

- (1) **3 CSU.** The main mission of 3 CSU is to plan, deliver, execute, and provide operational supply support to CF operations. Its core functions consist of mounting supply commodities, participating in theatre activation and deactivation, providing support to deployed missions, receiving and reconstituting materials from returning forces, and maintaining supply document control for all operations. It is also responsible for the CF relocatable temporary camp (RTC), and is the custodian for the CEFCOM automated data processing equipment and CANOSCOM sea container reserves.
- (2) **4 CFMCU.** The main mission of 4 CFMCU is to plan, coordinate, and execute the provision of deployable movement control to the CF. Its main task is to provide strategic movement control for CF personnel and material through Canadian and foreign seaports and airports.
- (3) **CFPU.** The main mission of CFPU is to provide postal services to CF personnel and units.

AIR FORCE AGENCIES

From an Air Force perspective, there are other specialist agencies that will likely be involved in sustaining aerospace operations. Some of these organizations are designed to be expeditionary, and their equipment and personnel are maintained at a readiness level that enables them to rapidly deploy in support of any CF operation. Elements of these units could be attached to an AEW, and then integrated within the OSF or MSF, depending on the nature of the services provided. Main capabilities and responsibilities of these units are described below:

- a. **Aerospace and Telecommunications Engineering Support Squadron (ATESS).** ATESS provides specialized aerospace and telecommunications engineering, training, and production services in support of worldwide Air Force operations. ATESS is a one-stop shop capable of taking a project from the idea stage through the drawing, prototyping, testing, and production phases. In addition to aircraft structures, avionics, and nondestructive testing, it provides storage facilities for retired aircraft fleets, and repairs and overhauls airfield equipment. ATESS also installs airfield equipment at bases across Canada, provides expert advice on airfield equipment, maintains and designs airfield software systems, and trains personnel in various aerospace areas.

- b. **12 Radar Squadron and 42 Radar Squadron.** These 1 Cdn Air Div high-readiness units provide ground control intercept, and command and control using specialized radars. Their primary role is to provide aerospace control and surveillance in support of joint and/or combined operations and exercises. At their MOBs, these squadrons provide support to CF18 training at 3 Wing Bagotville and 4 Wing Cold Lake.
- c. **86 Airfield Systems and Utilities Flight (ASU Flt).** A flight with 8 Wing Construction Engineering (CE), the primary role of 86 ASU Flt is to provide second- and third-line maintenance to deployed CE mechanical equipment. This includes the sets of mobile aircraft arrestor systems (MAASs), including certification, complex systems for power generation and distribution, fuel storage and distribution, water purification and storage, as well as waste water collection and treatment. The operation and maintenance of these systems is an MSF role, as is the provision of labour required for initial set-up. However, 86 ASU Flt may be called forward by the deployed MSF to assist should the maintenance be beyond the capability of the DOB personnel.
- d. **8 Air Communications and Control Squadron (ACCS).** The primary role of 8 ACCS is to provide air transportable navigation aids, tactical communications, landing aids facilities, and air traffic control in support of air operations. Its roles include the provision of network-enabled controlled airfield in support of air operations, and the provision of high readiness air traffic services and communication and information services in support of air and joint operations. 8 ACCS is equipped with a variety of state-of-the-art deployable equipment including airfield lighting kits, precision approach radars, and control towers. Upon being called to participate in an AEW, 8 ACCS would coordinate with the CFJSR the level of communication services required for the operation.
- e. **2 Air Movements Squadron (Air Mov Sqn).** 2 Air Mov Sqn provides personnel to support domestic and international air mobility operations. This sqn is responsible for processing all airlift traffic, including passengers, freight, baggage and mail. It is also responsible for the rigging of tactical air transport loads in support of aerial delivery operations. 2 Air Mov Sqn maintains a significant operational expeditionary airlift capability in the form of 10-person mobile air movement section (MAMS) teams to

sustain air logistic support operations around the world, especially for the deployment and redeployment phases of an operation. It is worth noting that, although 2 Air Mov Sqn does provide a specialist Sustain function, from a doctrinal perspective it is embedded in the Move function.

- f. **4 Construction Engineering Squadron (CE Sqn).** Under the direction of 1 Cdn Air Div, formally known as 4 Airfield Engineering Sqn, 4 CE Sqn's capabilities will match the Air Force's current and future engineering requirements. This sqn is a leader for deployed construction engineering operations, providing expert advice, relevant accredited training, deployable mission-ready specialist support, and comprehensive field-testing and evaluation. As the Air Force centre of excellence in deployed construction engineering, its mission is as a multi-faceted operational training squadron that provides unique force development and force generation capabilities for the Air Force and CF deployed operations. A key aspect of this sqn is to conduct trials and evaluation and validation of airfield engineering equipment, procedures, and personnel. It also provides collective and individual training for EOD and improvised explosive device disposal (IEDD), ADR, and force protection (FP).
- g. **14 Construction Engineering Sqn.** 14 CE Sqn is a total force sqn that supports aerospace operations by recruiting, training, and deploying Reserve CEs, primarily in the areas of infrastructure support and airfield work.



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CHAPTER 3



SUSTAINING AEROSPACE OPERATIONS



INTRODUCTION

The preceding chapters provided a broad overview of sustainment and its components, principles that govern it, characteristics and factors to bear in mind when planning for it, and a list of organizations that support the Air Force in providing it. This chapter focuses on how sustainment is actually carried out—both at MOBs and DOBs. As thorough planning is essential to the success of any operation, this chapter also discusses the basic elements of sustainment planning.

On a daily basis, most Air Force sustainment resources are devoted to supporting MOB-based operations and the many force generation activities that take place at Air Force wings. A large percentage of Air Force personnel are employed in mission support, operations support, and aircraft maintenance organizations, and these support organizations themselves must be sustained. Although operations conducted from MOBs are vital to the defence of Canada, it is important that the Air Force also be capable of projecting aerospace power around the world. This means that aerospace operations also need to be sustained in deployed destinations where many of the resources normally found at an MOB are not available.

Transitioning from sustaining MOB operations to deployed operations can be difficult if readiness has not been a high priority. If the principles and characteristics of sustainment are heeded, however, MOB support organizations and activities will be structured and conducted in such a way that forces can be deployed without unduly affecting MOB operations or imposing stress on support personnel. Ideally, Air Force organizations will transition seamlessly between MOB and deployed operations, and support personnel will possess the skill and mindset needed to effectively perform their job under any circumstance—at home or away.

SUSTAINING MAIN OPERATING BASES

MOBs are fixed Canadian operating locations with significant permanent infrastructure from which the Air Force derives its capacity to generate and sustain the full spectrum of aerospace capabilities it is expected to deliver. The majority of Air Force operational capabilities can be found at one of seven MOB: Greenwood, Shearwater, Bagotville, Trenton, Winnipeg, Cold Lake, and Comox. The organizational structures that occupy these MOBs are referred to as wings. MOBs have two primary purposes. First, they support and facilitate the peacetime functions of raising, training, and sustaining the capacity of the Air Force for operations. Second, they continue to concurrently support ongoing operations, which may be conducted in either peacetime or wartime, such as air mobility, sovereignty

patrols, surveillance, reconnaissance, search and rescue, support to civil authorities, and humanitarian assistance, at the required tempo. Ultimately, the Air Force's ability to generate and effectively apply aerospace power across the full range of military operations relies on assured and continued access to secure air bases that are in the right locations, have adequate base infrastructure and utilities, are populated with the right mix of essential personnel, and are capable of providing all needed services. From these secure bases, aerospace power can be projected to distant destinations throughout the world.

MOBs are operated 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 to support MOB operations, while also ensuring that skill sets are maintained, and that the necessary number of personnel is available to conduct effective expeditionary operations and to sustain FOLs



CF Photo

as and when required. As the Air Force must often concurrently support MOB- and DOB-based operations, strategies need to be developed and implemented to optimize the use of the four components of sustainment and to ensure a smooth transition to deployed operations. The requirement to deploy military personnel can put a significant strain on MOB support capabilities and a wing may need to increase its reliance on contractors and temporary civilian personnel while concurrently sustaining a DOB.

There is a fundamental difference between sustaining domestic and continental operations, and sustaining international operations. Domestic and continental operations can be projected and sustained much more effectively than international operations by developing strategies to leverage significant capabilities extant in a mature national economy and infrastructure so as to attain sustainment effects far beyond integral CF / Air Force / DND capabilities. This allows the CF / Air Force / DND to exploit interior lines of communication (LOC) to rapidly deploy its assets



to a DOB and generate aircraft sorties. This is particularly important when supporting operations in the Arctic where distances and weather are extreme, populations are scattered, and transportation and other infrastructure is sparse. Because similar transportation and infrastructure deficiencies are often encountered on expeditionary ventures, international operations will require the implementation of strategies to augment integral CF / Air Force / DND force projection and sustainment capabilities through more expansive multinational collaborative arrangements, deployed contractor support, and HNS.

SUSTAINING DEPLOYED OPERATING BASES

Referring to an aerospace operation conducted within Canada as expeditionary is a relatively new idea and can cause confusion, specifically if the operation is being conducted from an MOB. For example, when 4 Wing Cold Lake deploys CF18s to CFB Comox to satisfy NORAD (North American Aerospace Defence Command) alert requirements, 4 Wing is conducting an expeditionary operation—even though it is being conducted from another MOB.

Expeditionary aerospace support can be defined as the ability of Canada's Air Force to support the conduct of operations effectively at home and abroad. Its ability to do so depends on its capability to rapidly deploy assets to a wide range of destinations—nationally and internationally. It must also be able to activate, operate, support, and sustain either a DOB or FOL.¹ This necessitates having the doctrine, personnel, infrastructure, equipment, training, and mindset to be able to conduct aerospace operations at destinations other than home base, and in environments that may present various levels of threat and hazards. Expeditionary support is not a revolutionary concept; rather, it represents an organization and a mindset that helps to focus Air Force support assets into a structured and ready force enabling the CF to remain responsive to the demands of the government of Canada.

The Air Force uses the term "expeditionary" to describe any aerospace 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, Canada's aerospace expeditionary forces can be described as task-tailored aerospace assets, deployed for the accomplishment of a specific objective, and able to operate and sustain themselves from other than their MOB. For larger Air Force deployments, an organization known as an AEW may be stood up. An AEW is comprised of a command element (comd elm), an OSF, an MSF, and one or more air detachments (air dets).

The operations and mission support elements needed to mount and sustain expeditionary aerospace operations are drawn mostly from permanent

¹ See footnote 1, page 19.

MOB organizations. The preparedness of the Air Force to deploy is maintained by the OSF/MSF readiness cycle. In addition to their MOB jobs, OSF/MSF 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, or fitness for military duty, combined with the speed, reach, and flexibility of airlift, give the Air Force a unique ability to project aerospace power where and when required.

SUSTAINMENT PLANNING

INTRODUCTION

Planning is foundational to the successful application of aerospace power, and sustainment planning is an essential part of operational planning. Sustainment planners must be familiar with a variety of methods for estimating requirements for personnel, materiel, infrastructure, and services required by and to sustain aerospace operations. They also must be aware of lessons learned from previous operations and be well versed in the application of five main sustainment factors to ensure that resources are effectively provided where and when required. This demands a comprehensive understanding of the nature of the aerospace operation being supported, as well as an appreciation that some aspects of aerospace operations are rarely predictable or repeatable, and that the organizations and processes used to support them must adjust accordingly, often with great haste.

SUSTAINMENT FACTORS

Planning factors are key considerations that necessarily influence the planning process. Military planners have, over the course of many years, identified five key factors that generally apply when planning the sustainment requirements for a military operation. These factors are destination, demand, distance, duration, and risk. Properly accounted for, they will enable planners to determine the number of personnel, quantity of materiel, type of infrastructure, and variety of services required to achieve assigned objectives with minimum risk. These factors apply when planning for ongoing daily MOB operations, when planning an expeditionary deployment of aerospace forces to a DOB or FOL, and when planning for increases in operational tempo and/or severe environmental conditions. They should be formally addressed in major planning activities using the Canadian Forces Operational Planning Process (CFOPP), and should also be taken into account, albeit in a less formal manner, in even minor planning activities.

Destination. The destination from which operations will be conducted determines the environment in which sustainment activities are carried out. It is essential that military planners have knowledge of the destination and surrounding area, including available infrastructure, the level of support to be provided by local contractors, the HN and coalition partners, climate, and local culture. Regardless of whether the destination is a well-established military facility, such as a Canadian MOB, or an austere base on foreign soil where facilities and support services from the HN are very limited, there are always unknown quantities, and if at all possible, a reconnaissance visit should occur before detailed planning begins so that sustainment needs can be more accurately assessed. From this assessment, a determination can be made as to the length and difficulty in maintaining the LOC. Additionally, the amount of resources required from the MOB and other supporting agencies, as well as the level of effort needed to establish a theatre distribution network, influences the sustainment level of effort. Some of the critical variables that must be examined as part of destination include:

The environment needs to be taken into account in terms of 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.

a. **Infrastructure.** Infrastructure encompasses many different types of facilities and capabilities such as naval ports and airports. Critical factors for aerospace operations include the aviation fuel storage and distribution system, runways and ramps, ammunition storage and EOD areas, water sources, and medical facilities.

b. **HNS and Coalition Partners.** For international operations, and where the Air Force is operating as part of a coalition, HNS and the support that can be provided by coalition partners must be taken into account. As described in the preceding chapter, the range and reliability of HNS available in terms of personnel, equipment, services, and other resources may allow the Air Force to reduce its sustainment footprint. Careful consideration must be made by the planners to identify, evaluate, and determine HN sources of supplies and services to be used during the operation, while taking into account the respective reliability and compatibility of such resources.

c. **Climate and Terrain.** Climate and physical geographical characteristics of the destination will likely impact the performance and safety of personnel and functioning of the equipment. These sub-factors may affect resource consumption rates and aircraft operations, as well as the sustainment footprint.

Demand. Demand, as it relates to sustainment, can be defined both by the quantity of materiel (or commodity) needed to support the operation and the corresponding cycle or rate of consumption. Typically, the demand for supplies or commodities is divided into three categories: surge, steady-state, and cyclical. 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 aerospace power. Steady-state demand reflects the continuous usage of commodities such as rations and potable water, which can be accurately predicted. Cyclical demand represents changes in consumption due to changing weather or operational posture. Fuel and ammunition are examples of cyclical-demand commodities. Although the preventive maintenance concept applied to aircraft make 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 aerospace 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 other sustainment factors—destination, distance, and duration—and the type of aerospace platform being employed. The operational tempo may vary from sustaining a single airplane conducting one flight per day in a peacetime operation to a large Air Force contingent, with multiple aircraft types conducting aerospace operations around the clock. Therefore, the requirement for personnel, materiel, infrastructure, and services will vary significantly, and it needs to be scaled appropriately to optimize the sustainment footprint.

Distance. As described for the destination factor, the distance both to and within the theatre of operations will determine the length and capacity of the LOC, and dictate transit times and the need to establish ISBs.² For deployed military operations, an ISB located within or close to the theatre of operations may be required to ensure an efficient and sufficient flow of resources to and from the 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 or not to forward base other resources such as test equipment and specialized tools. Although portable automated test equipment that can be forward located may be available for a certain aircraft type, other considerations such as the capability of the MOB to support local operations also have to be taken into account.

² In the current Canadian context, the strategic LOC (to theatre), including ISBs, is a CANOSCOM responsibility. Also, intra-theatre transportation is a JTFSE responsibility.

Finally, it must be noted that there are several destination, demand, and distance considerations when selecting between land, sea, and air 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 disembarkation (APOD) / seaport of disembarkation (SPOD) to the DOB; and
- c. sea transportation is of lower cost when conducting a strategic move and is primarily used for lower priority cargo.

AIR TRANSPORTATION

There are several destination, demand, and distance considerations when selecting between surface and air transportation. First, transport aircraft (e.g., CC177, CC130) possess a global capability to deliver loads over great distances, and combined with speed, provide the ability to rapidly project aerospace power on a global basis. Although 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 sustain a presence in order to contain a rapidly developing crisis.

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 sustainment. 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 at the MOB. Although a number of aircraft with supporting elements may be deployed for several months, activities at the MOB must continue. The tempo of MOB activities may be reduced, but flying operations to support assigned domestic and international objectives, as well as force generation, must continue. Consequently, the Air Force must maintain a suitable sustainment capability to support such operations. Major MOB activities such as aircraft maintenance schedules (i.e., 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 the use of reservists, casual employees, and contractors as “backfill” for deployed personnel.

Risk. The risks to the Sustain function 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 stocks and protection will be necessary. Hostile activities can impede movement, destroy logistic stockpiles, and close airports and seaports or affect their throughput capabilities. As the operation unfolds, the level of risk may change and the sustainment plan will need to be adjusted to reflect the new situation. Sustainment planners must be flexible and innovative in developing solutions to counter the risks to the operation and do their part to enable a commander to stay within the decision cycle of the enemy. In addition to threats posed by an individual, organization,



CF Photo: MCpl Craig Wiggins

or nation, the deployed force may face other threats emanating from the operating environment. These threats, being passive in nature but still potentially harmful, are better defined as operational hazards. They include, among other things, weather and extreme environmental conditions, mines and unexploded ordnance, infectious diseases, dangerous animals/reptiles/insects/plants, geography, civil disobedience, and criminal activities.

The aerospace 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 aerospace weapons, especially in a deployed context, can add additional risk to the operation. Aerospace operations are frequently tied to fixed installations providing runways, maintenance, and fuel facilities, increasing risk by limiting the range of operating locations. To minimize this risk to the greatest extent practical, the DND/CF Airworthiness Programme includes sophisticated risk management processes so that commanders can make well-advised decisions concerning operational risk.

PHASES OF AN AEROSPACE OPERATION

Chapter 2 discussed sustainment levels—strategic, operational, and tactical. This section will focus largely on the operational level and the sustainment activities associated with mounting and conducting operations. As described in B-GJ-005-500/FP-000 *Canadian Forces Operational Planning Process*, a joint operation normally consists of the following five phases: warning, preparation, deployment, employment, and redeployment.³ Aerospace operations, whether or not they are part of a larger joint operation, follow the same phases. Planning, which is initiated in the warning phase and continues in the preparation phase, is of particular importance since a failure to properly anticipate and plan for sustainment requirements could quickly lead to failure. The remainder of this section will discuss sustainment planning as it relates to operations.

THE PLANNING PROCESS

Aerospace operations planning is based on operational procedure, which is the logical sequenced approach to the conduct of military activity, and the CFOPP, which is a coordinated process to determine the best method of accomplishing assigned operational tasks or 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.

In broad terms, the CFOPP can be divided into five parts (or segments): initiation, orientation, COA development, plan development, and plan review. The first three parts are also known as the estimate process. In its full form, the CFOPP is a sophisticated and highly structured strategic planning tool that is intended for execution by an experienced staff supported with ample resources. It incorporates advanced features such as specific role assignments, detailed situational analysis, multi-factorial option identification, analysis and evaluation, and records of decision. The CFOPP is not limited to only large-scale planning activities, and modified forms of it can be used for planning at all levels.

Operations planning may be initiated at varying levels in response to either political or military events (including significant changes to an ongoing operation), and the initiating authority will provide high-level guidance in the form of an initiating directive and warning order. The resulting

³ The B-GJ-005-300/FP-001, *CFJP 3.0 Operations*, also identifies seven stages of an operation: planning, preparation, build-up, execution, termination, reconstitution, and analysis, 2-1.

initial assessment should begin to consider sustainment requirements, as the availability or lack of sustainment resources may significantly limit the range of options available to a commander.

Following the initial assessment, the planning staff must be oriented towards the requirements of the new or revised operation. Aerospace support planning must be an integral part of the overall planning process, starting by identifying and analysing the precise nature of the operation and scoping out, in broad terms, the sustainment necessary to achieve the stated objectives. Staff representatives for each support area or discipline will then develop a comprehensive sustainment requirements “inventory” consisting of the personnel, infrastructure, materiel, 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.

For materiel requirements, planners must estimate as accurately as possible the associated quantities, locations, and delivery times to the consolidation area, loading sequences, and usability condition. 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 aerospace operation—if it is not needed to support the operation, it should not be there. The range of 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 selected, the specialist staffs will develop ways and means for satisfying them.

Due to the interactivity and interdependency among sustainment activities and disciplines, the planning process must be highly integrated, and every effort must be made to avoid the natural tendency to work in isolation. Everyone must work from a common set of assumptions and strive to optimize the overall support capability rather than trying to make their area function well at the expense of others. If a plan for one support area is developed using information that is not available to all planners, problems may arise in the interfaces with operational units and other support areas, and it will be more difficult to satisfy the principle of economy. If sustainment planning is fully integrated, there is a much greater probability that support solutions will optimize the support footprint and will be marked by cooperative, mutual effort to succeed. Synergy is achieved when the capabilities of the entire support effort exceed the sum of the capabilities of its individual parts.

CONTINGENCY PLANNING

Contingency plans (CONPLANS) are predetermined operation plans (OPLANs) based on probable scenarios (e.g., a certain circumstance may trigger the implementation of a plan to deploy a certain number of fighter aircraft). Operations are defined in terms of duration, types, and numbers of aircraft, intensity, prevailing conditions, and other parameters. Requirements for response times are stipulated in terms of initial movement of personnel and equipment, on-site operational capabilities (initial operating capability and full operating capability), and other objective measures of readiness and capability. CONPLANS include subordinate support plans based on the scenario and related planning factors.

Contingency support organizations are preformed aerospace support organizations that can be tasked to sustain specific aerospace operations. Personnel and resources are normally employed in one organizational construct at a wing or unit, but if necessary, they can reform into another



CF Photo: Cpl John Bradley

unit to provide sustainment for specific operations, either at their MOB or at a deployed destination. Contingency organizations are particularly effective where an operation extends for long periods, and sustainment is best achieved through the rotation of personnel in fixed formations through a managed readiness cycle.

MASTER IMPLEMENTATION PLANS

For new aerospace operations of a more continuous nature (such as the introduction of a new fleet of aircraft on a wing), a master implementation plan (MIP) will be developed that includes detailed support annexes covering all required support areas. In time, local procedures will be introduced to provide support practitioners with the direction and guidance necessary to do the job. Over time, the local procedures may be modified in accordance with changing circumstances, but these modifications should not be introduced haphazardly or without a wide-angle view of their impact on other support areas. Sustainment principles such as primacy of operations, simplicity, and cooperation should always be kept in mind and change control should be in place.

SUSTAINMENT AND THE OPERATIONAL PHASES

Sustainment for operations encompasses the functions of planning, establishing in-theatre infrastructure and facilities, deploying forces, providing ongoing support in a wide range of areas during the operation, and redeploying forces. Operational sustainment is of particular interest to operational commanders as it aims to create the operational environment required to generate the greatest operational freedom.



US Photo: Amn Javier Cruz

WARNING

The warning phase is the operational phase in which 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. It is during this phase that the commander's intent and vision are communicated so that planning activity can commence. Sustainment planners need to anticipate and carefully assess

potential sustainment requirements, and should also start liaising with all organizations, both within and external to the Air Force, so that other staffs can also begin preparations and command and control (C2) arrangements can be clarified. Considerable lead time may be needed to address some sustainment 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 steps in the CFOPP will be followed and the operational plan finalized. Sustainment requirements may be addressed in a subordinate support plan, or in annexes to the main plan. Work must begin to address a myriad of sustainment details so that the deployment milestones are met in an orderly manner that respects the principles of sustainment. 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 the putting in place of contracts and other support arrangements to ensure a steady replacement of consumables. If possible, a comprehensive reconnaissance visit to the intended deployment location, with appropriate representation from subject matter experts, should be carried out early on in the preparation phase.

DEPLOYMENT

In the context of aerospace operations, deployment normally is synonymous with the activation of an airbase at a deployed location. When executing the deployment plan, activities may include some or all of the following:

- a. movement of the force and materiel in accordance with the previously determined priorities;
- b. establishment of the DOB and associated facilities, infrastructure, and other services which will enable the deployed forces to operate (e.g., beddown activities);
- c. RSOI;
- d. implementation of HNS and other contracting arrangements; and
- e. establishment of reachback mechanisms for support of aerospace operations.

EMPLOYMENT

When the first elements of the force are in place and initial operating capability has been achieved, operations will normally commence. Proper planning will ensure that all of the required sustainment components are in place to provide the required support. 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, infrastructure, materiel services) are continually monitored to ensure that the commander's objectives are met, and mission success is achieved.

REDEPLOYMENT

Redeployment is the process of preparing 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 steps of the redeployment activities are:

- a. determination of the redeployment sequence;
- b. close-out of the DOB and hand-over to the replacement force or HN;
- c. reintegration; and
- d. distribution and application of observed lessons.

RECONSTITUTION

Reconstitution encompasses those activities needed to restore the desired level of combat effectiveness to Air Force units, personnel, and materiel following a major operation. 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 operations normally start at the conclusion of a campaign or operation when personnel are reintegrated and materiel is repatriated.

For joint and combined operations, some reconstitution activities will likely be coordinated by CANOSCOM. Generally, the initial reconstitution begins in the theatre of operations under direction of a theatre close-down team. This team will perform a stock verification and report to CEFCOM

or Canada COM. More specifically, the movement from the theatre, the verification and determination of the condition of the materiel and equipment, and the return of stocks to units will normally involve the CFJSG, CMSG, life cycle managers, and MOB staffs.

MOBs play a significant role in reconstitution, and they must be equipped and ready to provide a multitude of services to Air Force units and personnel redeploying from operations. Health and personnel support services may include honours and awards, physical and mental health care, and provision of assistance for reintegration into MOB activities and home routines. MOBs must also be capable of replenishing depleted commodities and repairing or replacing equipment in preparation for the future operations. Depending on the condition of the returning aircraft and support equipment, considerable time and a significant level of effort may be required to reconstitute its 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 MOB and 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 restore a healthy stagger;
- to 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; and
- to administrative staffs it can mean reintegration of personnel and the provision of pay, leave, and health services.

SUMMARY

Sustainment is often thought of in terms of deployed operations, but especially for the Air Force, a proper balance must be found in supporting both MOBs and DOBs. Planning is essential to the success of any operation, and sustainment planners need to have foresight, understand the characteristics of sustainment, and wisely apply the principles of sustainment. There are essential sustainment activities associated with each of the five phases of an operation, and consideration must also be given to reconstitution so that operational capability can be restored as soon as possible following an operation.



CF Photo: Cpl John Bradley

GLOSSARY

Where this publication is the source of a definition, no source is indicated. The definitions contained in this glossary deriving from the *Defence Terminology Bank*, found online at <http://terminology.mil.ca/term-eng.asp>, are indicated utilizing the abbreviation DTB.

aerospace operation

An activity, or series of activities, related to the planning and application of aerospace power to achieve assigned objectives. (DTB Record 37248)

aerospace power

The element of military power that is applied within or from the air and space environments to achieve effects above, on and below the surface of the Earth. (DTB Record 34078)

aerospace support

The provision of personnel, infrastructure, materiel, and services to enable aerospace and other military operations. (DTB Record 37282)

air expeditionary wing (AEW)

A deployed aerospace force comprising at its core a command element, one or more air detachments, an operations support flight, and a mission support flight, that employs aerospace power and conducts aerospace operations.

Note: An AEW comprises, at its core, a command element, one or more air detachments, an operations support flight and a mission support flight. (DTB Record 34903)

airlift

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

airport of disembarkation (APOD)

The airport in the operational theatre at which the aircraft carrying personnel and materiel are off-loaded. (DTB Record 7757)

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)

augmentees

Regular or Reserve force members assigned to an operation to augment a unit in theatre that is formed primarily from an established Canadian Forces unit. (DTB Record 24252)

austere base

A base that has limited infrastructure and facilities.

Note 1: As a minimum, an austere-base will include a sufficient runway and a water point; however, ramps will require some expansion.

Note 2: At an austere-base radar and approach aids (including airfield lighting) are typically insufficient. Furthermore, access to commercial power is normally unavailable or unreliable. (DTB Record 34902))

close support

The support given to the supported component command to meet its unique requirements in order to deal with tasks of immediate concern to its commander's operations.

Note: This support is normally provided within a day and requires a high degree of responsiveness and mobility. (DTB Record 34905)

commander's intent

The expressed purpose, method and desired end state of an operation. It assures unity of purpose throughout a command. (DTB Record 32716)

deployed operating base (DOB)

An expeditionary base that supports the employment and sustainment of deployed forces. (DTB Record 30809)

(Note: A DOB could be an FOB and/or FOL.)

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)

(Note: Associated characteristics consist of, but are not limited to: will-power, courage, commitment, tenacity and stamina. These characteristics complement the military ethos and professional knowledge of the application of military power across the spectrum of conflict nationally and internationally.)

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)

Designated airfields at which dedicated facilities are maintained to support periodic tactical fighter operations. (DTB Record 6316)

(Note: An FOL could be a commercial facility.)

infrastructure

A term generally applicable to all fixed and permanent installations, fabrications, or facilities for the support and control of military forces. (DTB Record 4534)

integral support

The support of an immediate and organic nature required to fulfill a unit's primary function. (DTB Record 34909)

main operating base (MOB)

A well-found base responsible for supporting the generation, employment and sustainment of permanently assigned air, land and/or maritime forces.

materiel

All public property, other than real property, immovables and money, provided for the Canadian Forces or for any other purpose under this Act, and includes any vessel, vehicle, aircraft, animal, missile, ammunition, clothing, stores, provisions, or equipment required. (DTB Record 864)

mission support flight (MSF)

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

Note: The MSF provides both close support and integral support. (DTB Record 34912)

mission support squadron (MSS)

An Air Force wing unit that supports expeditionary aerospace operations by force generating trained, equipped, and ready-to-deploy elements of mission support personnel in a mission support flight or smaller force packages. (DTB Record 34913)

operations support

Within an aerospace force, the provision of assistance that directly supports aerospace 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 aerospace management and control). Operations support may include aircraft maintenance coordination. (DTB Record 34914)

operations support flight (OSF)

The task-tailored component of an air expeditionary wing that provides the wing's operations support. (DTB Record 34915)

operations support squadron (OSS)

An Air Force wing unit that supports expeditionary aerospace operations by force generating trained, equipped, and ready-to-deploy elements of operations support personnel in an operations support flight or smaller force packages. (DTB Record 34916)

reachback

A concept whereby a deployed force receives support from organizations external to the theatre of responsibility. (DTB Record 27435)

reintegration

The process by which Canadian Forces personnel return from a deployment to everyday roles and activities at personal, domestic, and organizational levels.

Note: For individual personnel, reintegration may include psychosocial aspects such as personal, family, work, cultural or community assimilation. (DTB Record 34918)

Sustain

The operational function that regenerates and maintains capabilities in support of operations. (DTB Record 26171)

sustainability

The ability of a force to maintain the necessary level of military power for the duration required to achieve assigned objectives. (DTB Record 5474)

sustainment

The provision, maintenance and administration of personnel, materiel, health services and infrastructure to maintain the combat power of a military force. The ability of a nation or a force to maintain effective military power to achieve desired effects. (DTB Record 34949)

total force

A force composed of members of both the Regular and of the Reserve Force who are serving together in the same units or other elements, in such numbers as are directed by the Chief of the Defence Staff, with each member of each such unit or other element retaining his or her distinctive terms and conditions of service. (DTB Record 24674)

well-found base

A base that has a highly developed infrastructure.

Note: 1. A well-found base includes a sufficient and well-maintained runway and ramp, all required approach aids including a radar for day and night operations and, if required, arrestor gear.

2. A bare base has the least equipment and facilities, an austere base is somewhat better equipped and a well-found base is fully equipped. (DTB Record 34919)

LIST OF ABBREVIATIONS

ACCS	Air Communications and Control Squadron
ADM(Mat)	Assistant Deputy Minister (Material)
ADR	airfield damage repair
AEPM	Aerospace Engineering Program Management
AETE	Aerospace Engineering Test Establishment
AEW	air expeditionary wing
air det	air detachment
Air Mov Sqn	Air Movement Squadron
AO	area of operations
ASU Flt	Airfield Systems and Utilities Flight
ATESS	Aerospace and Telecommunications Engineering Support Squadron
Canada COM	Canada Command
CANCAP	Canadian Contractor Augmentation Program
CANOSCOM	Canadian Operational Support Command
CANSOFCOM	Canadian Special Operations Forces Command
Cdn Air Div	Canadian Air Division
CE	construction engineering
CEFCOM	Canadian Expeditionary Force Command
CE Sqn	Construction Engineering Squadron
CF	Canadian Forces
CFAWC	Canadian Forces Aerospace Warfare Centre
CF H Svcs Gp	Canadian Forces Health Services Group
CFJSG	Canadian Forces Joint Support Group
CFJSR	Canadian Forces Joint Signals Regiment
CFMCU	Canadian Forces Movement Control Unit
CFOPP	Canadian Forces Operational Planning Process
CFPU	Canadian Forces Postal Unit
CFSD	Canadian Forces supply depot
CMSG	Canadian Materiel Support Group

COA	course of action
CONPLAN	contingency plan
CS	close support
CSU	Canadian Support Unit
DND	Department of National Defence
DOB	deployed operating base
EOD	explosive ordnance disposal
FOB	forward operating base
FOL	forward operating location
GS	general support
HN	host nation
HNS	host-nation support
HQ	headquarters
ISB	intermediate staging base
JSG HQ	joint support group headquarters
JTFSE	joint task force support element
LEPM	land equipment program management
LOC	lines of communication
MA&S	Materiel Acquisition and Support
MOB	main operating base
MSF	mission support flight
MSS	mission support squadron
MSSC	Materiel Systems and Supply Chain

NDHQ	National Defence Headquarters
OGD	other government department
OS Engr Gp	Operational Support Engineering Group
OS MP Gp	Operational Support Military Police Group
OSF	operations support flight
POL	petroleum, oils, and lubricants
QETE	Quality Engineering Test Establishment
RSOI	reception, staging, onward movement and integration
sqn	squadron

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