

A PRIMER IN AIR MOVEMENTS

BASIC LOADS TO COMBINED AIR TERMINAL OPERATIONS
AND BEYOND

BY CAPTAIN TONY JOHNSON, CD



LOAD PLANNING AND THE INTERNET

Air mobility experts, air movers in particular, love statistics. Monthly freight handled, amount of passengers through, number of pallets built... the list goes on. Sometimes, in the course of gathering these stats, some rather large figures turn up. Five million pounds (lbs)¹ is one example. This is a big number and it gets even bigger when you consider it against the inherent limitations of an aircraft's payload. Now, imagine 10 times that number.

There are many ways the armchair air mover can forecast what airframes he or she needs to move 5 million lbs from, say, Trenton to Winnipeg. A casual glance at Wikipedia reveals that the maximum payload capacity of a CC177 (C17) Globemaster is roughly 170,000 lbs or 1/30th of the above figure.² Digging a bit deeper, one can find out that the stipulated maximum takeoff weight of a Hercules CC130 (C130) is 155,000 lbs.³ Using the above figures as a baseline, some quick math leads to the conclusion that it would require 30 C17s or 33 C130s to move 5 million lbs at any single moment in time. Throw the materiel on the planes and voila, the airlift planning stage is complete. This no doubt lends credibility to my aspirations of becoming a strategic planner.

Wait a minute. It seems obvious that a Globemaster is a bit bigger than a Hercules. How can they have such similar maximums? This is because the Wikipedia article does not take into account the fact that the casual reader does not even realize the differences between the two terms described, and furthermore, it ignores the principles of weight and balance and nationally implemented payload limitations. To make a more reasonable calculation, you also need to have a rough idea of the proper definitions, and many other factors need to be considered, such as compartment weight and height restrictions, which, in the case of the Hercules, are typically 10,000 lbs and 96 inches. Many more important calculations such as rigged versus load weight, compartmental differences, and the elimination of overhang also need to be considered.

Let us examine this a little further. First, let me explain a few terms. Maximum payload is not the trunk space in the back of a plane but rather a compounded figure based upon a series of relevant measurements that includes everything going on a dry airframe other than the aircraft itself. A more common term in figuring out the amount of freight that can go on an aircraft is the maximum allowable load. Simply put, this is the maximum total amount of weight, in addition to the normal operating weight of an aircraft, including crew plus fuel that can be successfully lifted off the ground. In the case of the C130J Hercules, the maximum allowable load is normally



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37,500 lbs. The resulting figure achieved by combining the maximum allowable load plus the normal operating weight is known as the maximum take-off weight and is the ultimate tolerable weight of an aircraft that is still technically capable of taking off. This includes the airframe, crew, passengers, fuel, baggage and cargo. Also, contrary to the advertised Wikipedia maximum takeoff weight (155,000 lbs), 164,000 lbs and 175,000 lbs are the maximum peacetime and wartime takeoff weights of the C130J.

Another limit already exceeded was that of intrinsic pallet restrictions. A traditional 108-inch by 88-inch aircraft pallet only holds a maximum of 10,000 lbs. Therefore, to exceed this amount we are not only destroying our airframes but we're wrecking a lot of pallets, and inevitably, this is going to get 1 Canadian Air Division staff very concerned. So let's start again; this time I'll be quick so we can get on with the intent of this article. Bottom line: don't use Wikipedia as a source of information for strategic or tactical load planning—never for cargo, never for passengers, never for range, never, ever.

GETTING LOADED

In order to more clearly exercise the 5-million lbs figure, I will consider the typical inherent equipment required to successfully contain the load on a plane and also what is in fact being loaded. To keep things simple, I'll use bottled water and 108-inch by 88-inch pallets. A full 330 millilitre (ml) bottle of water weighs exactly 1 lb and therefore we need to move 5 million bottles. There are 12 bottles of water in a case, measuring 10 inches long by 7 inches wide by 9 inches high, weighing 12 lbs and covering 70 square inches. Our pallet dimensions are advertised at 108 inches by 88 inches, but in actuality, they do not even measure up to their formal name. The actual measurements of the pallet are 104 inches x 84 inches and change. Using this number, it can be determined that the traditional aircraft pallet has a square surface of 8,736 inches. A few more small calculations and factoring

the ability to maintain the integrity of the case, it can be determined that 124 cases, or 1,488 bottles of water, can fit onto a single pallet layer.

For the remainder of this introductory lesson I will narrow the scope down to a single type of airframe, that of the C130J Hercules model. It is the newest aircraft in the Canadian Forces (CF) fleet and has already proven itself on operations, being deployed as part of the Tactical Airlift Unit in Kandahar. It has, in fact, 8 pallet positions and a very easy figure of 10,000 lbs to remember when trying to calculate load bearing capacity in the cargo compartment, except for positions 7 and 8, which are 8,500 and 5,000 lbs, respectively.

The next series of calculations is threefold, but by no means all inclusive. First is the height restriction. Using the 96-inch height restriction on a Hercules, we can determine that, initially, no more than 9 layers of our bottled water can fit inside the hold of the aircraft. Do the math and you come up with an absurd figure of 13,392 bottles of water per pallet. Given the previously mentioned term maximum allowable load, I hope some alarm bells just went off. The second calculation centres on compartment limits. This one pallet alone does not overload a Hercules, but it does, in fact, exceed compartment size and has the potential to wreck the airframe and pallet. Remember, a bottle of water weighs 1 lb and 13,000 bottles equals, well, 13,000 lbs. Eight pallets of water compared to the maximum amount of pallets a Hercules can hold would mean that we are now loading up a C130 with 108,000 lbs of H₂O. Yikes! This may not go over too well, particularly on the ramp where, yes, you can fit a pallet, but with the inherent tensile strength of hydraulics and airframes, only 5,000 lbs and nothing higher than 77 inches can be positioned here. The last of the three considerations is restraint. Once inside the aircraft, the load will need to be secured via netting and straps allocated to hold down the load and prevent it from

shifting throughout the time it is within the plane's confines.

Rebuild pallets as follows: load the cases four layers high (cases stacked on top of one another, evenly distributed and laid in an alternating pattern) so that we top out at just under 6000 lbs for each⁴ pallet and we'll only use 6 pallet positions so the last pallet position and ramp can be utilized to carry kit, maybe a couple of toboggans, and some food. Next, ensure the load is secured with netting and straps and we arrive at a grand total of 36,000 lbs plus crew and kit. And this is stretching it. Divide this into 5 million and you get 139, as opposed to our original number of 33. The conclusion is that it takes 139 individual flights to move 5 million lbs of bottled water from point A to point B at any time. Our problem didn't concern range at all, but you'll have roughly 32,000 lbs of fuel to get you wherever you need to go. We'll come back to the number 139 later on.

Here is some insight into the net payload delivered by "end ex." Five million bottles of water at 330 ml each equals 1.65 billion ml, or 1.65 million litres, enough water to fill a swimming pool two-thirds full if it were 50-metres long by 25-metres wide by 2-metres deep. In other words, two-thirds

of an Olympic-sized swimming pool full of water just cost a lot of time and money⁵ to move from point A to point B. On a sliding scale, this demonstrates peculiar insight into just how little payload an aircraft can actually carry. The same amount of water could be shipped overland by 75 truckloads and would barely put a dent into the hold of an ocean freighter. Water is heavy, but the inherent limitations and proper use of limited aircraft payload is another story altogether.

PRACTICAL DEMONSTRATION

Think again about 5 million pounds of freight and while you are at it, let us add 5,000 people to our problem and span the movement of this "freight" over a time frame of only two months. This is the amount of freight and passengers that was moved by CF aircraft from Canada to Haiti in roughly a two-month time frame in early 2010.⁶ This event was dubbed Operation HESTIA and although the number of flights was a lot smaller since the Air Force utilized strategic assets (C17s), it is still quite an accomplishment for an air force of Canada's size. These are staggering numbers when taking into account that concurrent to this operation, the Air Force was supporting Operation PODIUM, Operation ATHENA, and



CF Photo: Sgt Frank Hudec

numerous other domestic and foreign initiatives. This was a one-off operation that stretched Canadian airlift capacity to its maximum and demonstrated the skill, commitment, and leadership of CF personnel at all levels, particularly the traffic technicians working out of 2 Air Movements Squadron (2 Air Mov Sqn—celebrating a diamond anniversary this year). Keep in mind that the vast majority of freight delivered by air was not water but rather critical materiel in support of one of the largest humanitarian operations in North American history.

Now, forgive me if you thought the intent of writing this article was to provide insight into the magnificent C130J and how it may have been a superior alternative to the C17 during Operation HESTIA. I don't have a slide rule capable of comparing the two capabilities and will leave that to those whose job it is to war-game airlift scenarios. The preceding text was in fact designed to set up you, the reader, for what comes next, that of being a part of the Canadian air movements footprint in the headquarters element of Kandahar Airfield (COMKAF)⁷ in support of the North Atlantic Treaty Organization (NATO)-led International Security Assistance Force (ISAF) in Afghanistan. Caught your breath? In particular, now that we have some insight into some stand-alone aircraft and Canadian capabilities and limitations, it is time to focus on multinational operations ... with only a few digressions along the way.

COMBINED AIR TERMINAL OPERATIONS

Now let's take the 5-million lbs figure from our earlier experiment with Operation HESTIA and double it. Now double this result again and add another million for good measure. The resulting number is the amount of cargo that is processed by the Combined air terminal operations (CATO) at Kandahar Airfield (KAF) as a steady state in a single month. Twenty-one million pounds of freight, in addition to 20,000

passengers, is the norm for this NATO movements organization that is manned by 30 military and 80 contracted staff on a 24/7 basis, 365 days a year, supporting both military and commercial aircraft ranging from Dash 7s to AN-124 Antonovs to C17 Globemasters. Think of it as a multinational air movements squadron.

Do you remember the 139 flights it took to move 5 million lbs of water? With the massive amount of factors surrounding the various missions air forces are employed to carry out, CATO handles approximately 700 aircraft a month. It is a staggering number when you consider the unit also assists several national support elements (NSEs) on any given day and that some air crews, particularly those of Eastern Bloc descent, normally do not call in on their approach to KAF and as a result, CATO is left scrambling to support. For now, a brief summary of how airlifted materiel gets from A (outside KAF) to B (inside the wire) and some interesting facts specific to the restriction and maintenance of "good flow."

Now keep in mind this is the sustainment of a warfighting capability we are talking about. Massive movements of personnel, ammunition, food, fuel, water, and associated materials to a land-locked air base in a land-locked country surrounded by mountains, desert, inferior roads, and worst of all, an enemy with members who wouldn't think twice about blowing themselves up to stop a truck from delivering boxes of napkins or skids of Coca-Cola™ to KAF. Yes, the majority of movements into KAF on a daily basis are via road from staging bases and domestic hubs strewn throughout Asia and the Middle East. Also, as far as Air Movements is concerned, CATO isn't the only show in town. The United States Air Force (USAF), Royal Air Force, Marine Corps, and several other militaries and contractors have all set up shop in KAF and all together account for the same amount of air freight and passengers that CATO handles.

All incoming fixed-wing flights related to the ISAF mission in Afghanistan are coordinated between the Allied Movement Coordination Centre (AMCC) in Eindhoven, Holland, and the various management authorities of the airfields, including KAF.⁸ The AMCC's job is to collect shotgun blasts of flight requests from strategic staffs, air movement planners, civilian carriers, airfields, and other national authorities and to then collate and assign call signs and negotiate airfield slot timings based on move requests on a first-come, first-served basis. These are typically ironed out as early as 14 days in advance and as late as 24 hours prior to the estimated departure time of the flight. The resulting flight program is typically a living, breathing document, since changes in flights and flight cancellations and frequent payload amendments are the norm; in fact, most of CATO's planning is only ever done 24 hours in advance.

CATO, in itself, is presently capable of handling two strategic and two tactical

aircraft at any point in time. For example, a team of handlers can off load 36 pallets of food from a Supreme Boeing 747 out of Dubai, while another team simultaneously loads an AN-124 with sea cans for onward movement to a staging base somewhere in Europe. Concomitantly, a C130 intra-theatre passenger flight can be offloaded for reception, staging, and onward integration (RSOI) of persons as an AN-12 takes on a few tri-walls of spare parts destined for Bagram. Regardless of the size of the load, all of this can be handled simultaneously by CATO with the personnel and equipment in the present organization.

CATO is organized very much like a Canadian air movements squadron and rightly so. It is divided into several task-based sections all wholly dependent on one another in order to get the job done correctly and on time. It is currently led by the Chief CATO, a British squadron leader (Canadian major equivalent). The Canadian military element, made up of



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a mobile air movements team based out of Trenton is broken up and scattered throughout the organization, undertaking roles such as ramp team lead, deputy chief, duty air movements officer (DAMO), cargo coordinator and operations staff. Keeping in mind a three-shift rotation, it soon becomes apparent that the 21-million-lb figure is accomplished daily by approximately 35 persons at all levels working throughout any single point in time. Success requires open communications, good infrastructure, and available equipment.

The main sections of CATO are broken down into three parts: Passenger Services, Cargo Services and Ramp Handling. All three are supported by the headquarters element, which includes an operations and planning section, led by the Deputy Chief, CATO. Further to this, the Chief CATO is represented by 24/7 DAMOs who monitor on and offloads and aircrew adherence to slot times. As you can well imagine, and to further complicate matters, an

operationally intense airfield such as KAF has a large amount of concurrent activities on the ramp on an almost continuous basis.

The passenger section is the most likely choke point related to smooth CATO operations in its current form. This highly active environment can be compared to the Christmas flight season in Canada, times a factor of 10. Two terminals, one for inbound and one for outbound passengers, and manned by CATO and American personnel on a 24/7 basis, have all the ingredients for issues to arise. For instance, the outbound terminal will never be able to hold more than two strategic flights' worth of persons at any one time due to its inherent capacity. This, unfortunately, does happen from time to time. Also, international flights, for example, Canadian C17 home leave travel assistance (HLTA) runs need to have passengers screened differently than an ISAF commuter flight to Kabul. Regardless, CATO gets the job done well and without grievance by performing a perpetual cat



herding ballet with commercial airlines, AMCC, Tanker Airlift Control Center (TACC), and other strategic and tactical flights, including having to deal with everyone from disgruntled generals to manic politicians. This is also one of the most culturally diverse sections, employing military and civilian persons from over a half dozen nations, including Afghani citizens working as part of the Afghan Border Guard.

The cargo section sorts and prepares all freight and paperwork for pickup by NSEs or ramp sections for onward delivery to their respective clientele. It is manned by four persons and currently maintains a small presence as the NSEs and other users are normally very efficient as far as freight build-up is concerned.

The ramp section is the most visible, and, arguably, the busiest section in KAF's terminal operations. It is organized into nine teams with three on each shift and they perform a variety of functions. They also operate an assortment of aircraft handling equipment based upon the diverse aircraft configurations faced on a routine basis.

Their main function is to transfer freight to and from CATO transient freight yards and out to designated aircraft, utilizing various heavy equipment such as K-loaders, split loaders, and forklifts.

"Wow, that's nice, Tony," you may say. "This article really helps me out a lot. All these front-end loaders, tractors, and excavators driving around on an airfield to help throw boxes inside planes. By the way, what is a K-loader?" Don't even try to find it on Wikipedia. A lovely piece of kit, the K-loader is a wheeled aircraft freight handling vehicle whose sole purpose is to deliver palletized freight over short distances to and from ramp-enabled military patterned aircraft such as the C130 and C17. They come in various sizes and configurations, the most common of which found in Kandahar is the K-40, entailing the fact that it can move roughly 40,000 lbs of palletized materiel at a time. They kind of look like someone took the rollers you see in the Beer Store and mounted them on an Argo and then put the entire concoction under a press and set on "bake" for five hours. Split loaders, not to be confused with the above, are similar devices



CF Photo: Sgt Roxanne Clowe

as they also transfer freight to and from aircraft. The main difference here is that they have a functioning “elevator” of sorts, which allows handlers to transfer freight in the form of unit load devices (ULDs)⁹ and pallets to and from elevated decks of wide-body aircraft such as the airbus A-310 or Boeing 747 to ground-level equipment. I cannot describe it any better than that but must insist this equipment is crucial to proper cargo handling, and despite ill-timed mechanical breakdowns, this equipment is crucial to the smooth operational flow of air cargo.

Regardless, the ramp teams are tasked around the clock and typically handle (sometimes quite visibly) a cornucopia of freight and loads. They deal with such daily occurrences as garbage being dumped on the ramp out of the back of 737s as well as handling incoming freight apparently packed by the same crew that moved my household goods and effects last year from Winnipeg to Trenton. (Yes, I did receive ample compensation for that busted dining room chair.)

The operations and planning section is the nerve centre of CATO business activity. The persons tasked to this cell have a symbiotic relationship with the base operations centre (BOC), and in fact, they have personnel incorporated into this organization. All this effort so that flight arrivals, departures, delays, cancellations, parking, call ins (see above reference to former Eastern Bloc aircrews), and every other associated conceivable glitch related to prior permission requests (PPRs) is handled in a seemingly textbook manner. The persons working here are integrated into a fast paced operations environment, and they monitor and report on everything from AMCC slot timings to the safety concerns and immediate actions of all CATO personnel during indirect fire attacks on the airfield.

In a perfect world, CATO would be handling flights 24/7 and upping the monthly statistics by about 40 million lbs. However, in air movements, as in all logistical operations, many factors come into play, most of which seem to be perfectly designed to inhibit air flow.

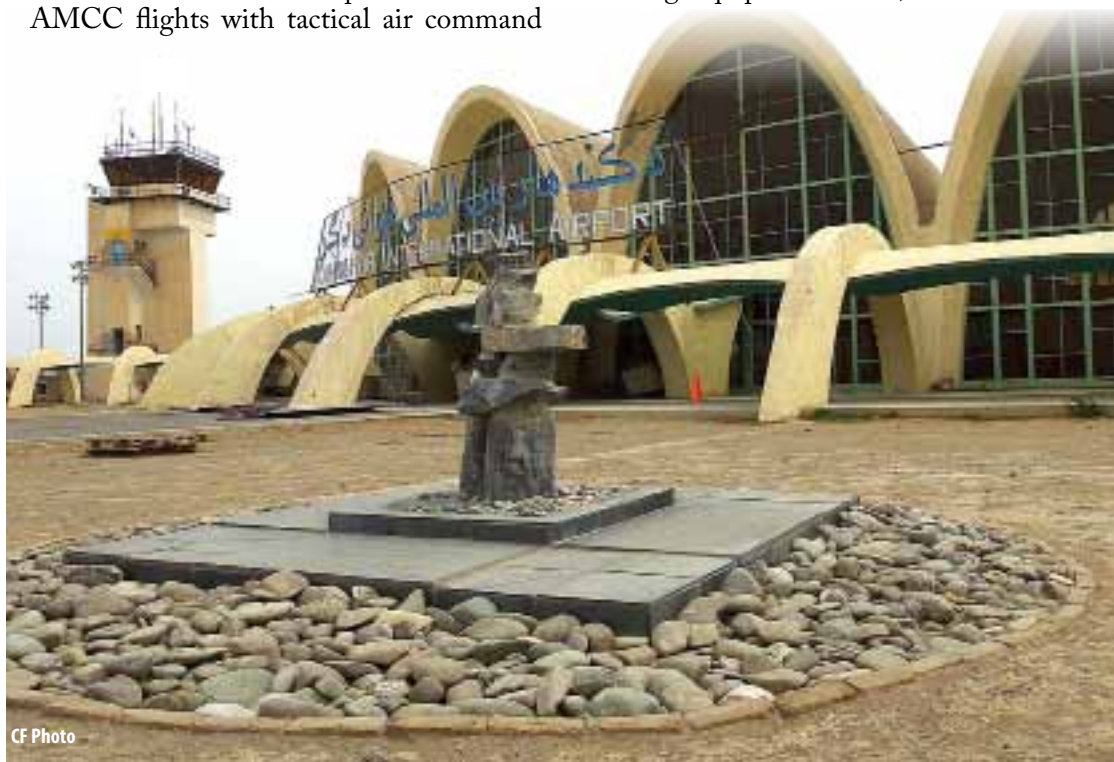


Kandahar Airfield in itself is a limiting factor, or a “choke point” in general terms. True, it is the busiest single-lane runway in the world, and true, it has gone through a vast modernization over the past eight years, but one must consider the fact that it is not solely dedicated to fixed-wing air mobility operations. No, that would be easy. It is actually a bit more complicated than that. Fixed-wing cargo flights, in fact, account for only a small percentage of all the monthly air traffic operations, over 35,000 of them, at KAF. Unmanned aerial vehicles (UAVs), helicopters, fighters, civilian charters (there is also an Afghan terminal using the same runway) and other operations make up the bulk of the traffic. There are not even enough letters in the alphabet to delineate one ramp from another at KAF. Let’s just say that over 25 active ramps surround the runway for the over 300 non-transient aircraft that are based here, and almost every minute of the day the sound of a jet, rotor, or turbo-prop engine roars past the CATO headquarters office. All the while, BOC personnel synchronize PPRs and attempt to harmonize AMCC flights with tactical air command

centre flights in line with national airlift authority intent.

Now for some surprisingly familiar territory: CATO has issues with maintaining the needed amount of serviceable aircraft handling equipment. Principally, there are too few pieces of kit on site to handle surges beyond the maximum on ground ratio of two strategic and two tactical aircraft. In addition, the original contract for air terminal logistical support was signed in 2006 when the operational tempo was significantly lower and primarily focused on Kilo ramp, adjacent to CATO’s main freight yard and hangar.

The increased tempo in day-to-day operations over the last few years has thus resulted in mass moves of freight from one side of the airfield to the other, a one-way route of over three kilometres. This is due to the expansion of cargo designated ramps on the opposite side of the runway. As those relatively familiar with aircraft handling equipment know, a K-loader is



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not effectively designed to travel long distances, even less so when bearing a load. It is designed to quickly shunt freight to and from an aircraft and the staging or receiving points. It does not take long to realize that due to operating these pieces of equipment outside the parameters of what they were designed for, essentially using them as flat-bed trucks, has put significant wear and tear on the current fleet. The three split loaders and four K-loaders are accordingly plagued with a multitude of maintenance issues.

The quandary of increased ramp capacity has led to increased air traffic. CATO's little two-and-two handling capacity did not bode well for all concerned, and as a result, competition reared its ugly head. We are in a fledgling egalitarian society after all. DHL, FedEx, Gryphon Airlines, National Air Cargo, and NATO NSEs have all recently entered the KAF Air Movements business, and, presenting effective business plans, have managed to abscond rapidly, stealing some crucial business away from CATO.

Yet, even when presented with an array of handicaps, competitors, and other issues, CATO remains a premier air movements organization, meeting or exceeding all tasks thrown in its direction. But despite the assortment of air traffic it has been tasked to accept, CATO has ostensibly slept through the influx of traffic flying into KAF. Not quite wholly the truth.

RENAISSANCE

The CATO mantra or mission statement is: "To serve as KAF's centralized coalition movements organization, providing efficient and effective passenger and freight handling services in support of the ISAF mission."

This mission has remained throughout the massive expansion at KAF and may have, in effect, resulted in CATO becoming a self-licking ice cream cone¹⁰ in that the mandate to support has driven the organization to meet an increase in tasked operations brought upon itself by its very

openness to accept business. Potentially so, but the resulting opportunities must mean that it has to be President's Choice Chocolate Crackle™, too good to resist.

On 1 April 2011, a new contract was to come into effect, transforming the organization into an air movements squadron extraordinaire and initiating a revitalization that would culminate in almost tripling the current aircraft handling capacity of CATO. Forget about the two strategic and two tactical aircraft scenario from above. The next step, to be attained by the end of 2011, will be to handle five strategic and four tactical aircraft at any given moment in time. The end result will be a freight handling capacity that well exceeds the earlier claim of 21 million lbs. This time, think double 20 million and add 10 million for good measure.

The amount of CATO ramp crews will be doubling, organizational charts are evolving, and plans are being made to absorb more business from the apparently endless queue of flying organizations residing on or transiting through the ramp at KAF. The NATO Maintenance and Supply Agency (NAMSA) has been directed to supervise the implementation of this contract and has fully committed all possible resources to ensure its success. For instance, forget about four K-loaders. Think more along the lines of ten. The contract has vehicle lifecycle management considerations, including increases in handling rates, accounting for almost any scenario, except for the next war, of course. This increase in operations is further alluded to via the fact that the USAF Air Transport Operations Centre (ATOC) is currently handling roughly the same amount of freight as CATO but is planning on scaling back their commitment to ISAF and passing on the bulk of their workload to CATO. To put this into perspective, 16,000 American soldiers are typical of a relief in place (RIP) operation processed by ATOC staff. All the more business for CATO to absorb.

SUM UP

Air movements is a particularly unique bird. Like all logistics operations in war, it is not a science, nor is it an art form but rather a complex arrangement of skill sets and capabilities that, when finely tuned, can result in the most magical of tasks being completed. Seemingly unimaginable amounts of freight and personnel can be transported with speed, versatility, and over vast distances in a short amount of time when required and organized by competent and dependable logisticians. Canadians have proven this time and again with the proven resilience of (tongue in cheek) strategic aircraft such as the C130 Hercules and through the undertaking of monumental airlift tasks such as Operation HESTIA with little or no notice. But this is not necessarily the best way to conduct business.

What can the Royal Canadian Air Force learn from CATO? Understand that CATO works and it works well beyond its intended scope. Like the Canadian military and many subset logistical organizations, it is often called upon to act outside its arcs and scrounge up solutions to outwardly impossible support tasks based upon an operational mission critical requirement. Learning from the past and realizing the importance of strengthening the logistical backbone of air mobility operations, NATO has injected a massive amount of equipment, manpower, and infrastructure into the organization; more so than is required by current operations, and, in fact, unbelievably, putting the cart behind the horse. Executing now upon the benefits of this foresight will ensure that the organization can be proactive in staging and training for future tasks as opposed to having to be reactive to the need.

Two important aspects of CATO definitely present a proof of concept as to how we can potentially improve the way we do business. First, they have combined the employment of military and contracted personnel together in a high tempo movements environment, and second, they have

invested in the proper tools, equipment and facilities necessary to get the job done.

The contractors, much like the reservists working at units all over Canada, provide motherhood guidance and wisdom to the experienced and rookies alike, and assist with routine procedures as well as cover for surge activities or when personnel are called to other tasks. At 2 Air Mov Sqn back in Canada, the CATO model is paralleled as the unit is called upon to provide 24/7 support on the aerodrome. Unlike CATO, however, it is also tasked to provide deployable mobile teams throughout the world with little or no notice. A reasonable solution would be to have a permanent fixed civilian workforce on the ground at 2 Air Move Sqn to augment the military presence.

Infrastructure and equipment, most importantly *modern* infrastructure and equipment, built to task facilities and vehicle (albeit abused) availability also ensure that the CATO mission will not fail. In Canada, it is evident that supporting equipment and infrastructure acquisitions sometimes come second to other priorities. Most of 2 Air Movements Squadron resides in a dilapidated, rundown array of hangars and temporary shelters not even originally designed for freight handling. Case in point, during Operation HESTIA, freight had to be “staged” in an area normally relegated to vehicle parking. The vehicles generally parked in this garage were consequently parked outside on the ramp, and as can be deduced, the operation ran into some mechanical issues related to environmental conditions. Forgive me if I get emotional here, but I have yet to see as beautiful a sight as two K-60s backed end-to-end and having freight pushed into the back of a C17 in one fell swoop. That represents a lot of water.

Fifty million lbs. As unreasonably high as that number seems, it is possible, given the right assets and a steady state air flow, that CATO in KAF will be ready to take on this number by 2012. Canadians are at

the pointy edge of the movements sword, navigating CATO through a resurgence in attractiveness as the organization transforms itself in line with the KAF's role as the largest NATO airbase in Afghanistan. The knowledge gained from our role here will no doubt aid with a renewed outlook at air movements operations from our CF domestic air hub in Trenton.

One final statistic: 50 million bottles of water stacked one on top of another equals 37,500,000 feet or 7100 miles. As the crow flies, that's the distance from Toronto to New York City and back 10 times or one trip from Toronto to Kandahar. Or 19,000 CN Towers laid end to end. Happy calculating. ■

Captain Tony Johnson was raised in Cornwall, Ontario, and is a logistics officer posted to 2 Air Movements Squadron in Trenton. He enjoys spending time with his wife Heather and getting stressed watching his two sons, Stuart and Thomas, play hockey. He likes hunting, fishing, drinking beer, and the Montreal Canadiens.

Abbreviations

air mov sqn	air movements squadron
AMCC	Allied Movement Coordination Centre
ATOC	air transport operations centre
BOC	base operations centre

CATO	Combined air terminal operations
CF	Canadian Forces
COMKAF	Commander Kandahar Airfield
DAMO	duty air movements officer
ISAF	International Security Assistance Force
lbs	pounds
ml	millilitres
NATO	North Atlantic Treaty Organization
NSE	national support element
PPR	prior permission request
USAF	United States Air Force

Notes

1. Air Movements uses the imperial system of measurements. Therefore, metric conversions have not been included in this article.
2. "Boeing C-17 Globemaster," Wikipedia, http://en.wikipedia.org/wiki/Boeing_C-17_Globemaster_III (accessed September 19, 2011).
3. "Lockheed C-130 Hercules," Wikipedia, <http://en.wikipedia.org/wiki/C-130> (accessed September 19, 2011)
4. The exact number is 5952, but who's counting?
5. $32,000 \times 139 = 4,448,000$. That is a rough estimate of fuel expended. \$5 million seems like a reasonable "at pump" price for F-34.
6. "Fact Sheet: Operation HESTIA and Joint Task Force Haiti," CEFCOM, <http://www.cefcom.forces.gc.ca/pa-ap/ops/fs-fr/hestia-eng.asp> (accessed September 19, 2011).
7. COMKAF is an acronym for the term Commander Kandahar Airfield, currently USAF Brigadier General Jeffrey B. Kendall, responsible for the operational efficiency and readiness of Kandahar Airfield.
8. "Home- AMCC ISAF Site", AMCC ISAF Site, <https://amccisaf.nc3a.nato.int/default.aspx> (accessed September 19, 2011).
9. A unit load device (ULD) is a container used to load freight and baggage on to an aircraft. They come in various shapes and sizes and simply put, reduce handling time by being pre-filled with smaller items prior to load or unload of aircraft. They also allow for segregation of freight by destination.
10. "Self-licking ice cream cone" describes a self-fulfilling prophecy.



CF Photo: Cpl Brandon O'Connell