

## Archived Content

Information identified as archived on the Web is for reference, research or record-keeping purposes. It has not been altered or updated after the date of archiving. Web pages that are archived on the Web are not subject to the Government of Canada Web Standards.

As per the [Communications Policy of the Government of Canada](#), you can request alternate formats on the "[Contact Us](#)" page.

## Information archivée dans le Web

Information archivée dans le Web à des fins de consultation, de recherche ou de tenue de documents. Cette dernière n'a aucunement été modifiée ni mise à jour depuis sa date de mise en archive. Les pages archivées dans le Web ne sont pas assujetties aux normes qui s'appliquent aux sites Web du gouvernement du Canada.

Conformément à la [Politique de communication du gouvernement du Canada](#), vous pouvez demander de recevoir cette information dans tout autre format de rechange à la page « [Contactez-nous](#) ».

CANADIAN FORCES COLLEGE / COLLÈGE DES FORCES CANADIENNES  
CSC 29 / CCEM 29

EXERCISE NEW HORIZONS

**MISJUDGED CAPABILITY: MEDIUM LIFT AVIATION FOR THE CANADIAN  
ARMY**

By Major R. S. Lott

*This paper was written by a student attending the Canadian Forces College in fulfilment of one of the requirements of the Course of Studies. The paper is a scholastic document, and thus contains facts and opinions which the author alone considered appropriate and correct for the subject. It does not necessarily reflect the policy or the opinion of any agency, including the Government of Canada and the Canadian Department of National Defence. This paper may not be released, quoted or copied except with the express permission of the Canadian Department of National Defence.*

*La présente étude a été rédigée par un stagiaire du Collège des Forces canadiennes pour satisfaire à l'une des exigences du cours. L'étude est un document qui se rapporte au cours et contient donc des faits et des opinions que seul l'auteur considère appropriés et convenables au sujet. Elle ne reflète pas nécessairement la politique ou l'opinion d'un organisme quelconque, y compris le gouvernement du Canada et le ministère de la Défense nationale du Canada. Il est défendu de diffuser, de citer ou de reproduire cette étude sans la permission expresse du ministère de la Défense nationale.*

## ABSTRACT

Since the end of the Cold War, defence forces world-wide have been forced to review their operational efficiencies, cost effectiveness, and future visions. As a result the Canadian Forces (CF) leadership reduced its inventory by cutting its medium transport helicopter (MTH) fleet. The Canadian Army was obliged to rely upon the less capable aviation Utility Tactical Transport Helicopter (UTTH) fleet, the Griffon in future operations. This paper demonstrates that Canada's Army of Tomorrow requires medium lift aviation resources in order to meet Canada's future defence needs.

CF aviation indicates the Griffon fleet is numerically insufficient and incapable of accomplishing many of its assigned core tasks. Future battlespace threats and changing operational environments emphasize the requirement for MTH capability in conjunction with the present UTTH, to provide a dedicated, versatile, rapidly mobile capability, when and where they are needed within the future battlespace. The paper concludes by recommending the CF consider establishing an eight aircraft MTH squadron, at the army level, in support of its brigades.

“If we are to ensure that the Army can continue to meet the nation’s needs, the work to transform our Army to meet the challenges ahead must begin now.”<sup>1</sup>

Lieutenant-General M.K. Jeffery  
Chief Land Staff  
2002

In late 1990, the Canadian government placed budgetary pressure on the Canadian Forces (CF) to cut operating costs. To meet this pressure the CF leadership decided to make reductions; aviation would be one of the areas targeted. On 1 April 1991, the CF leadership abruptly moth-balled its medium transport helicopter (MTH) fleet, the CH-47 (Chinook). Subsequently the CH-47 was sold and the Canadian Army was then obliged to rely upon a less capable aviation fleet. The CH-135 (Twin Huey), and then its replacement, the CH-146 (Griffon) Utility Tactical Transport Helicopter (UTTH), were required to fulfill not only its tactical tasks but also the void left by the demise of the MTHs. On one hand, the 1994 Defence White Paper stated that the Canadian Forces was to be comprised of a multi-purpose combat-capable force,<sup>2</sup> able to operate with the modern forces of our allies.<sup>3</sup> On the other hand, the loss of the MTH fleet has certainly caused a gap in the Canadian Army’s ability to fulfill its directed White Paper commitment. The Canadian UTTH fleet is now overstrained, and in many areas restricted in accomplishing its core tasks. CF and Army strategic guidance<sup>4</sup> state that future military tactical land aviation will be based on the provision of tactical reconnaissance, aerial firepower and mobility. All of these tasks fall within the stated core capabilities of the UTTH fleet. Furthermore, both UTTH and

---

<sup>1</sup> LGen M. K. Jeffery, Lieutenant General. Army Strategy: Commanders Message. 2002, p 1.

<sup>2</sup> Multi-purpose combat-capable forces are defined as forces capable of effective employment in a wide variety of situations, but not as universally capable as general purpose would imply. Canada, Department of National Defence. A Strategic Capability Plan for the CF (Final Draft). Ottawa: Department of National Defence, 2000, p.11.

<sup>3</sup> Canada, Department of National Defence. Highlights of the 1994 Defence White Paper. Ottawa: Department of National Defence, 1994, p 3.

<sup>4</sup> This guidance includes *Shaping the Future of Canadian Defence: A Strategy for 2020* (Strategy 2020), ‘Strategic Operations and Resource Direction 2003’ (SOR 2003), and ‘Land Force Strategic Direction and Guidance’ (LFSDG 2001).

MTH fall within the tactical aviation description, as they are air resources that continuously support land forces.<sup>5</sup>

The Canadian Army's leadership stated that aviation resources in support of the Army of Today and the Army of Tomorrow<sup>6</sup> are within the capabilities of the Griffon.<sup>7</sup> This paper will demonstrate that Canada's Army of Tomorrow requires medium lift aviation resources in order to meet Canada's future defence needs.<sup>8</sup> This paper opens by defining the CF definition of medium transport helicopters, followed by a brief historical perspective of the effectiveness of medium lift aviation in military operations. Next it will describe the present day aviation capabilities, including deficiencies. Further, an analysis of the tomorrow's battlespace<sup>9</sup> will describe a CF capability requirement for medium lift helicopters in the future. Finally, this paper will conclude with a comparison of present Canadian Army lift capability, present some shortfalls of the MTH, and provide a recommendation. This paper will only concentrate on the requirement for the capability, not encumbered by defence budget considerations. For any discussions, the CH-47 Chinook will be used as a basis of a legitimate medium lift capability, as it is currently used by other military forces in this role.

---

<sup>5</sup> Canada, Department of National Defence. Tactical Helicopter Operations (B-GA-440-001/FP-001). Ottawa: Department of National Defence, 2000, p 1-1.

<sup>6</sup> Army of Tomorrow is the mid-term portion of the three-horizon army force development concept. The three horizons are the Army of Today (the Army that currently exists), the Army of Tomorrow (encompasses the 5-10 year planning horizon), and the Army of the Future (11-25 years). The Army of Tomorrow is the focus of force development work that is coordinated by the design of two structural models. The first model being the intentions for the next ten years, and guides longer-term activities such as experimentation and equipment acquisition prior to actual procurement decisions. The second model is the Interim Model that constitutes a concrete description of what the Army will look like in about five years. This Interim model is developed in sufficient detail to guide the necessary changes to the Army of Today and provide a useful starting point for capability gap analysis that influence the long-term Army of the Tomorrow plan. Canada, Department of Defence, Advancing with Purpose: The Army Strategy. Ottawa: Department of National Defence, 2002, p 8.

<sup>7</sup> 1 Wing Headquarters. Tactical Aviation Aerial Firepower: The Armed Griffon Concept. Ottawa: Department of Defence, 2002, p 1-1.

<sup>8</sup> Canadian Forces aviation resources are under operational command of 1 Canadian Air Division, with operational control devolved to 1 Wing Headquarters who provide direction to its tactical aviation units in support of the land forces.

<sup>9</sup> Battlespace refers the physical volume including the moral dimension that expands and contracts in relation to the ability to acquire and engage the enemy. Directorate Land Strategic Concepts (DLSC), 2003.

The CF, like most other NATO allies categorize their aircraft according to the aircraft's all up weight (airframe, fuel and payload). The categories are light, medium and heavy. Medium helicopters are primarily used for the carriage of combat troops, equipment, logistics and casualty evacuation. The maximum all up weight of a medium lift helicopter is between 17,000 to 22,000 lbs.<sup>10</sup>

To illustrate that the MTH has matured into a significant battlefield vehicle capable of undertaking numerous essential roles, a brief historical overview will be discussed. The MTH emerged during the Korean War within the US military environment. Although at the time it was seen as a fairly delicate machine, the MTH proved invaluable in troop movement, sustainment and casualty evacuation throughout the battlespace. A product of new technologies and newer battlefield environments, within twenty years the MTH developed into a highly robust aircraft reputed for its versatility and flexibility in several harsh environments. Operations by British forces in Aden, the Suez, and Cyprus emphasized the importance of MTH, again confirming its mobility, responsiveness, and flexibility as an essential capability on the battlefield.<sup>11</sup> United States forces in Vietnam used the MTH predominantly for troop transport and logistic tasks. In this inhospitable and geographically harsh environment the MTH afforded the Americans the flexibility necessary to dominate much of the battlespace. Years later, during the Falklands campaign, MTH provided essential support to British forces in the form of ship to ship/shore military re-supply, ground logistic support and troop, artillery and ammunition movement. Without this capability, the British would have been hard pressed to sustain the war-winning effort.<sup>12</sup> All the above examples support the requirement for medium lift aviation. The

---

<sup>10</sup> Canada, Department of National Defence. Tactical Level Aviation Doctrine B-GA-441-001/FP-001. Ottawa: Department of National Defence, 2000, p B-8.

<sup>11</sup> Blackbird. The Value of their Mobility. British Army Review, 1980, p 8.

<sup>12</sup> Wolley. The RAF's Helicopter Forces. RUSI Journal, Spring, 1989, pp 27-31.

United States, Russia, British and France have no doubts as to the value of medium lift helicopters and regard them as an essential part of the combat arms team.<sup>13</sup> Over the past 30 years the capability of the MTH has developed dramatically. It is now of immense value in assisting during Operations Other Than War (OOTW)<sup>14</sup> and in all phases of warfare. Now that the past has been reviewed, present day medium lift capability will be analysed.

Canada's Army presently consists of three identical brigade groups with few army level troops. It was designed with a depth of multi-purpose combat-capability and subscribes to a pre-1991 Cold War doctrine of open terrain manoeuvre warfare. The requirement to move significant numbers of combat troops, heavy / bulky loads of equipment and supplies, and to quickly remove casualties is deemed a necessity for today's Canadian Army. Although the requirement was substantiated in the 1994 Defence White Paper, the Canadian Army still does not have the capability within its present aviation fleet. The ability to accomplish these tasks is therefore solely dependant upon ground transportable forces.

Within the CF, tactical aviation resources are under command of 1 Canadian Air Division, with the majority of airframes assigned to support the Army. Within the Army's present structure, tactical aviation capability consists of a single aviation fleet of 83 Griffons. These UTTH are distributed throughout the three regular force brigade groups, each having one squadron of 24 helicopters assigned. The remainder are utilized at tactical aviation schools, combat support units, and reserve detachments for training purposes. This number will be

---

<sup>13</sup> J. Waddy. The Great British Helicopter Muddle. Defence Helicopter World, April, 1988, pp 30-34.

<sup>14</sup> Operations Other Than War (OOTW) include domestic operations, service assisted and protected evacuations, disaster relief, peace support operations (PSO) and humanitarian operations. OOTH may precede and/or follow war, or occur simultaneously with war fighting in the same theatre. Canada, Department of National Defence. Conduct of Land Operations – Operational Level Doctrine for the Canadian Army (B-GL-300-001/FP-000). Ottawa: Department of National Defence, 1998, pp 115-118.

reduced to 16 within each brigade group in the near future. Army leadership set specific operational priorities or aviation support to the army in the areas of, reconnaissance, aerial firepower and mobility.<sup>15</sup> These three tasks represent only a small portion of the operational tasks identified by 1 Wing Headquarters<sup>16</sup> which Canadian military aviation should be capable of accomplishing (Table 1). Unfortunately the present UTTH fleet is only capable of achieving less than one third of their required operational tasks.

<b>TACTICAL HELICOPTER CAPABILITIES / TASKING MATRIX</b>			
<b>COMBAT</b>	<b>COMBAT SUPPORT</b>	<b>COMBAT SERVICE SUPPORT</b>	<b>OPERATIONS OTHER THAN WAR</b>
Reconnaissance and surveillance	Command and Liaison	Logistical Movement	Humanitarian Assistance
Direction and Control of Fire	Tactical Movement	Aeromedical Evacuation	Aid to Civil Power
Anti-armour Attack Operations	Casualty Evacuation (Casevac)		Peace Support
Security	Combat Search and Rescue (CSAR)		Counter-Drug Operations
Air Mobile Operations			Counter-Terrorism
Special Operations			
Legend (Level of capabilities are depicted by the following shades)			
Full Capability ⇒			
Limited Capability ⇒			
No Capability ⇒			

Table 1 - Tactical Mission Capability Gaps – CH-146 following ERSTA<sup>17</sup> and Weapon ‘add on’<sup>18</sup>

<sup>15</sup> Canada, Department of National Defence. Tactical Level Aviation Doctrine B-GA-441-001/FP-001. Ottawa: Department of National Defence, 1997, pp 1-2.

<sup>16</sup> 1 Wing Headquarters is responsible for providing operational direction and management to the Tactical Helicopter resources within the CF in support of land force operations. This headquarters also develops strategic doctrine for rotary wing tactical aviation within the CF.

<sup>17</sup> To operate effectively commanders require information about the enemy and the environment. This information assists them in making decisions regarding such things as manoeuvring of troops and the provision of fire support or targeting. Reconnaissance (recce) is the primary means of providing this information. Electro-optical Reconnaissance Target and Acquisition (ERSTA) is a system that is added onto helicopters to assist in enhancing the recce to provide this required information to commanders. ERSTA consists of a sensor package which provides high resolution imagery for detecting, recognizing and identifying targets, and an airborne control station that is capable of real /near-time transmission of the sensor package imagery. Canada, Department of National Defence. Advancing with Purpose: The Army Strategy. Ottawa: Department of National Defence, 2002, p 8.

<sup>18</sup> Col J. M. Duval. Presentation: Tactical Aviation Doctrine. Toronto: Command and Staff College Course 29, 20 March 2002, slide 22.



To further complicate the problem of limited aviation support, the Chief Land Staff's (CLS) third task, mobility will be further reduced. Each brigade group has a light infantry battalion integral to its organisation. Canadian Army doctrine, reinforced by recent ground operations (OPERATION APOLLO), states that the minimum lift requirement for air mobile operations is to move a reinforced company of 150 soldiers.<sup>19</sup> Any fewer soldiers would severely limit the required firepower at the destination. This would jeopardize the chance of a second lift taking place safely in support of the initial lift. The capability to move a minimum of a reinforced company in a single lift is not possible with the present UTTH resources. With the planned reduction to 16 UTTH within each brigade group, coupled with the limited space within each aircraft (six combat loaded troops) only a portion of the required reinforced company can move simultaneously.

The inadequate troop movement capability of the Griffon will be further reduced in the next few years. With the inclusion of either the Electro-optical Reconnaissance, Target and Acquisition (ERSTA) for reconnaissance missions, or the 'add on' weapons packages for aerial firepower the internal cargo space will be significantly condensed. Twenty-five ERSTA systems will be acquired and will be attached to the Griffon airframe. These systems take up valuable internal space and add to the all up weight. The possibility of utilizing the same aircraft for troop, logistic or medevac movement is further minimized. Aerial firepower can be accomplished by utilizing an 'add on' capability to many if not all the remaining Griffon fleet; again limiting internal space for troops (from 6 to 3 combat soldiers), and medevac litters. Reconfiguration of the airframe between missions/tasks would not be feasible or timely, and would significantly reduce the effectiveness of the UTTH resources.

---

<sup>19</sup> Canada, Department of National Defence. The Army Post Operation Report: OPERATION APOLLO. Kingston: Army Lessons Learned Centre, 2002, pp 4-9.

Canadian brigade groups currently employ the LG1 howitzer as the primary indirect fire support weapon in support of the light infantry battalions. To provide the necessary dedicated fire support it is assumed that the requirement to move the artillery should be similar to the light infantry battalion's mode of transportation (wheeled or aviation). Unfortunately, the Griffon is incapable of moving an LG1, its detachment and basic load of ammunition due to the helicopter's limited lift capability. Canadian tactical level aviation doctrine has identified this weakness and states that the movement of LG1 in a coalition scenario will be accomplished through the use of coalition helicopters.<sup>20</sup> This is a major shortfall, as the normally dedicated indirect fire support would then be dependant upon another nation's resource, possibly prioritized in support of their own forces. Without dedicated indirect fire support the safety of Canadian soldiers may be jeopardized.

The UTTH has several limitations and significant capability shortfalls (depicted in Table 1). To address these shortfalls, other options should be introduced. One of these options, which will address a number of the shortfalls, and assist in accomplishing the aviation operational requirements, falls within the capabilities of the MTH. Some of the shortfalls, easily accomplished by the MTH due to its size and lift capability, would include Combat Service Support tasks (Logistical Movement, Aeromedical Evacuation), Combat Airlift (Airmobile operations, tactical movement tasks), and several OOTW.

The requirement to accomplish further tactical aviation operational tasks is evident of today. MTH is capable of accomplishing some of the UTTH shortfalls. The acquisition of a fleet of eight MTHs would give the Army the capability to carry out required operational tasks in

---

<sup>20</sup> Canada, Department of National Defence. Tactical Level Aviation Doctrine B-GA-441-001/FP-001. Ottawa: Department of National Defence, 1997, pp 6-2 to 6-5.

conjunction with current UTTH resources.<sup>21</sup> MTH would give the Army the flexibility required to accomplish tasks simultaneously or separately, with minimal disruption and or reconfiguration to an already overburdened UTTH fleet. Eight airframes would ensure the availability of a minimum of six airframes in support of operations (capable of concurrently transporting a reinforced light infantry company), and two for training/undergoing daily/scheduled maintenance. Operating costs and the maintenance support package required for MTH systems may be greater than that required for UTTH systems, however, these may be co-located and dual tasked. More importantly, operationally, the employment of both MTH and UTTH assets supporting combat operations provides the best mission flexibility and efficiency.

The Canadian Air Force owns tactical rotary aviation within the CF, with operational control devolved to 1 Wing Headquarters who provide direction to its tactical aviation units in support of the land forces. This being said, it is important to understand that medium lift aviation is embedded within, and is an essential part of land forces in other nations. The following examples portray where large numbers of MTH are located, signifying their importance to the nations indicated. Within the United States XVIII Airborne Corps, the German Army within their Luftlande Brigades, the Belgians within their newly reformed capability of Para Commandoes, and the British within their 16<sup>th</sup> Air Assault Brigade and 24 Airmobile Brigade. MTH is considered by these same nations as another arm of the combat arms team (army aviation), indispensable to the modern commander when applying airpower to the battlefield.

By relying upon one single type of airframe (Griffon), with its limited capability and numerous tasks, the army is significantly reduced in air portability. This capability gap would be

---

<sup>21</sup> An interview with the Head of Canadian Forces Army Doctrine - Manoeuvre (Aviation) indicated that a minimum of eight MTHs would suffice the present CF capability requirement. The minimum would include two

addressed by employing up to eight MTHs (one squadron embedded at army level<sup>22</sup>), increasing air portability to an acceptable level of moving a reinforced company to almost anywhere on the battlefield.<sup>23</sup> As an additional note, British military forces currently employ the CH-47 during Peace Support Operations (PSO),<sup>24</sup> in support of non-governmental agencies, search and rescue and firefighting tasks. The Canadian Army could also benefit by utilizing MTH resources for these identical collateral tasks, therefore adding to the value of the capability.

Present day aviation capability is lacking in the areas of rapid troop and equipment movement, guaranteed logistics sustainment, and casevac. Without improvement in these areas there will be significant restrictions to the Army's effectiveness in the future. The UTTH deficiencies are too important to be ignored. If the CF is required to be rapidly deployable, interoperable, modernized, and sustainable it is therefore important to recognize the army's deficiencies and act on improving them.<sup>25</sup> The lack of MTH in today's military environment is obvious. The future is more of a concern, as its battlespace will require a higher requirement to move troops and provide essential support.

Prior to discussing the Army of Tomorrow, the future battlespace will be addressed in order to indicate its capability requirement. NATO allies envisage that the future battlespace environment will take the form of asymmetric conflict with nations fighting unconventional armed bodies, not necessarily classed as soldiers. Canadian Forces Directorate of Land Strategic

---

MTHs for training purposes. Further additions to the fleet would only enhance the capability.

<sup>22</sup> The 'army level' is defined as the organizational structure above Corps level.

<sup>23</sup> An interview with the Head of Canadian Forces Army Doctrine - Manoeuvre (Aviation) indicated that a minimum of eight MTHs would suffice the present CF capability requirement.

<sup>24</sup> Peace Support Operations (PSO) are multi-functional operations conducted impartially in support of a United Nations/Organization for Security and Cooperation in Europe mandate involving military forces, diplomatic and Humanitarian agencies. PSO are designed to achieve conditions specified in the mandate. PSO include peacekeeping and peace enforcement (Chapter VII) as well as conflict prevention, peacemaking, peace building and humanitarian operations. Canada, Department of National Defence. Conduct of Land Operations – Operational Level Doctrine for the Canadian Army (B-GL-300-001/FP-000). Ottawa: Department of National Defence, 1998, p 136.

Concepts (DLSC) predicts the future battlespace as moving from its present linear battlespace<sup>26</sup> and developing into a non-linear,<sup>27</sup> multi-dimensional<sup>28</sup> battlespace within the next decade. Furthermore, urban warfare will become the prevailing environment of conflict within the next ten years. The battlespace could consist of multi dimensional 'bubbles' of conflict dispersed throughout the battlefield where forces up to independent brigade groups may operate autonomously. These 'bubbles' will vary significantly, depending upon the mission and terrain, but will be separated, making the support of each a critical factor in ensuring victory. As a result, Canadian Army leadership has directed that the future army will be prepared to fight future battles on complex terrain (urban, jungle, mountainous) with the capability of operating on open terrain. In this context, success on the battlefield will depend upon the responsiveness of the formation involved. The capabilities of these formations are only as good as their equipment and organization.<sup>29</sup> It is therefore assumed that the future army must have tactical agility, enabling it the ability to successfully move about this new battlespace is paramount to success.

NATO forces and the CF clearly see the change in the future battlespace. Both have embarked on new ways of thinking, and developing forces and capabilities that can adapt quickly to new challenges and unexpected circumstances.<sup>30</sup> The Army, like so many of its NATO allies,

---

<sup>25</sup> LGen M. K. Jeffery. Briefing: Advancing with Purpose: The Army Strategy. Ottawa: Directors of the Canadian Army Staff, 30 April 2002, slide 24.

<sup>26</sup> Linear battlespace refers to units/formations that are contiguous in terms of space (i.e. set up next to one another and sharing common boundaries etc). The notion of literally butting up to one another in terms of geographic responsibilities. Directorate Land Strategic Concepts (DLSC), 2003.

<sup>27</sup> Non-linear battlespace refers to non-contiguous units that are not physically touching areas of responsibility. An example would be during the Vietnam War when US units deployed by helicopter and not adjacent to other units, but into independent dispersed localities. Resulting in non-linear vice linear battle space. Directorate Land Strategic Concepts (DLSC), 2003.

<sup>28</sup> Multi-dimensional battlespace contains, in physical terms, refers to the five aspects of the Sub-surface continuum, contains physical domains (levels) of Space, Air, Near Surface, Surface and Sub-surface. Electro-magnetic integrates all physical domains. Directorate Land Strategic Concepts (DLSC), 2003.

<sup>29</sup> Canada, Department of National Defence. Land Force Command B-GL-300-003/FP-000. Ottawa: Department of National Defence, 1997, p 25.

<sup>30</sup> United States Joint Forces. Joint Operations War Fighting (JOW) Manual: Thoughts on the Operational Art of Future Joint War Fighting. Washington: US Joint Forces Command, 2002, p 24.

has begun to embrace the need to transform by undergoing major reorganization and restructuring in order to deal with this future environment. For the CF, this transformation started in early 2002 and will continue through to 2012 and is defined as the Army of Tomorrow. This ten year period is a planning tool designed and built to exist within the five to ten year timeframe. It concentrates on the development of a new Army representing the army's intentions into the future and guides long-term equipment acquisition.<sup>31</sup>

The army structure envisioned in the Army of Tomorrow will differ significantly from its present day structure. In order to reach the Army of Tomorrow's ten year end state, there is a requirement to pass through the five year 'Interim Model' (2007). This Interim Model allows for progressive steps from the present day three identical regular force brigade groups, into three more specialized brigades of the future. The new force will concentrate on the future non-linear battlefield, focusing on operating in complex terrain with the ability to operate in open terrain.<sup>32</sup> One of these new brigades is the Main Contingency Force (MCF) brigade, based upon mechanized forces with tanks and medium range artillery. The two remaining brigades will be predominantly light in nature, consisting of a reconnaissance regiment, two mechanized infantry battalions, one light infantry battalion, a regiment of light artillery/mortars and applicable combat support and combat service support units. These two light brigades accompanied by their required indirect fire support will be the focal point for utilizing Canada's MTH capability.

Light infantry battalions supported by the light artillery regiments are tasked with developing capabilities for special operations optimized for mobility and firepower in operations

---

<sup>31</sup> Canada, Department of National Defence. Future Army Development Plan. Ottawa: 30 April 1998, pp 1-2.

<sup>32</sup> MGen M. K. Jeffery. Briefing: Advancing with Purpose: The Army Strategy. Ottawa: Directors of the Canadian Army Staff, 30 April 2002, Slide 38.

especially in complex terrain.<sup>33</sup> Clearly this is an emphasis for mobility. Complex terrain is an area of operations with minimum road networks, such as in the Falkland Islands or the mountainous regions of Afghanistan and may include natural and man-made obstacles, such as those found in the desert, jungle or heavily urbanized environments. In short, complex terrain certainly restricts movement by conventional wheeled means. The only other method to transport the required cargo is through the air. The MTH is fully capable of providing this resource. As with operations in complex or open terrain, the selection and apportionment of aircraft types will be primarily based on the operational requirements and not the environment. However, as demonstrated throughout recent airmobile operations during OPERATION APOLLO, although UTTH aircraft<sup>34</sup> performed in accordance with performance planning parameters, due to extreme altitudes its limitations clearly came to the forefront. Aviation capabilities traditionally associated with MTH lift operations became necessary in order to conduct missions under these environmental conditions. In-theatre forces were unable to use the limited UTTH capability, while the MTH capability ensured effective and efficient aviation combat operations.<sup>35</sup>

Within the urban environment, current Canadian doctrine emphasizes the requirement to move laterally above the ground, using aviation assets for insertion onto rooftops, as ground entrances are likely locations for booby traps. Further, this method allows attackers to force enemy out to the street where they are vulnerable, rather than facing a desperate action. Mass

---

<sup>33</sup> MGen M. K. Jeffery. Briefing: Advancing with Purpose: The Army Strategy. Ottawa: Directors of the Canadian Army Staff, 30 April 2002, Slides 37-40.

<sup>34</sup> United States forces provided the essential MTH lift to the Canadian Battlegroup during the entire OPERATION APOLLO.

<sup>35</sup> Canada, Department of National Defence. The Army Post Operation Report: OPERATION APOLLO. Kingston: Army Lessons Learned Centre, 2002, pp 1-14.

casualty evacuation (CASEVAC) is also more expedient using MTH from rooftops.<sup>36</sup> One CH-47 can move a 56-soldier force rapidly to any destination required.

MTH have, traditionally and are currently used to transport troops and logistics well behind the Forward Edge of Battle Area (FEBA). These important tasks will remain, while others will evolve. Examples of this evolution took place during recent conflicts such as the 1991 Gulf War or OPERATION APOLLO (ground battle). At some point in OPERATION IRAQI FREEDOM (recent US offensive action against Iraq) the unique ability to provide mobility as assault aviation came to life. The rapid movement of combat troops and equipment when and where they are required allows for deep strikes over wide distances and, in the case of Afghanistan, difficult terrain not normally accessible by other means of transportation. These tasks would include but not be limited to mobility tasks in support of assaults, reinforcement of critical areas, sealing of penetrations, and carriage of critical defensive supplies.

Indirect fire will continue to be a concern in the future battlespace. Light artillery units within each brigade group will provide the bulk of indirect fire support to the light infantry. A requirement for medium lift aviation capability is also necessary as it is essential that the artillery be within certain minimum ranges in order to provide effective fire support. By using the same method of transportation as the light infantry, the flexibility of MTH is again demonstrated as the artillery and light infantry can travel within range of each other throughout their missions.

The requirement to sustain the Army of Tomorrow will be no less of a challenge than today. Speed and mobility make MTHs an asset for transporting the required, large amounts of sustainment throughout the brigade area of operations. These supplies range from artillery pieces and ammunition to bulk fuel, from construction/field stores to medical and technical

---

<sup>36</sup> Canada, Department of National Defence. Dispatches: Training for Urban Operations Vol 9, No 2. Kingston: Army Lessons Learned Centre, May 2002, pp 14-25.



stores. On the future distributed asymmetric battlespace,<sup>37</sup> maintaining secure ground lines of communications will not be practical or desirable, therefore aerial sustainment will be required in greater degree. The more widely dispersed combat operations are, the more heavily dependent they will rely on direct and dedicated aerial sustainment to accelerate replenishment and avoid vulnerable ground lines of communications. On the asymmetric battlefield, the sustainment system must be capable of supporting across greater distances and must be able to refocus the weight of the sustainment effort smoothly and rapidly from one discontinuous line of operations to another.

Medium lift aviation is becoming more essential on the future distributed, non-contiguous, asymmetric battlefield. Emerging United States Army concepts state the requirement for vertical take-off and landing capability in order to fully execute their mounted anti-access, operational manoeuvre, and vertical envelopment concepts.<sup>38</sup> Medium aviation lift assets, with greater payload, range, and speed provide the capability to move equipment and/or troops at a better rate, with fewer sorties, in less time than other aviation or ground assets.

Other nations presently restructuring their land components are looking at their resources in the same manner as the Canadian Army. British studies have determined the importance of MTH in their recent reduction of force levels. Canadian strategic direction states that a new strategy will emphasize flexibility, mobility and reach, with emphasis on higher technology with smaller forces that cover larger areas more rapidly.<sup>39</sup> MTH provides this flexibility, mobility and reach. The requirement for medium lift aviation capability in the future battlespace is even

---

<sup>37</sup> Asymmetric battlefield refers to the notion of the type of threat that exists in the battlespace as opposed to any specific geographic area. The threat being armed bodies that are not necessarily armed forces, directed by social entities that are not necessarily states, and fought by people who are not necessarily soldiers. Being distributed refers to the dispersion between actions with the asymmetric threat throughout the battlespace. Directorate Land Strategic Concepts (DLSC), 2003.

<sup>38</sup> Various manned platforms that provide specific functions in support of the operational concept, supported by other manned and unmanned systems.

greater than present day if the direction at which Canadian Army doctrine is moving is an indication.

A short comparison between the current army ground lift resources, present aviation capabilities and capabilities of the MTH is depicted in Table 2. This table focuses on two common logistic tasks; those of re-supply and troop movement, indicating the versatility of MTH over the other two resources. Presently, Griffon and Heavy Logistic Vehicle Wheeled (HLVW) currently in use within the army are incapable of fully supporting the commanders who are limited to relying upon them as the sole sources of lift. This capability deficiency arises when required to transport critical, time sensitive logistical supplies (defensive stores, ammunition) to units engaged with enemy forces, or when delivering personnel reinforcements to build up depleting forces in essential battlefield locations. Delivery must be as close to guaranteed as possible, it must be timely, and organized in order to be effective. The Griffon and HLVW are hampered by various current restrictive capabilities and therefore both logistic supplies and reinforcements cannot be guaranteed. The evidence provided indicates that MTH are more dependable than the current ground capability in several ways.

---

<sup>39</sup> Elliott, The Times. London, 28 January 1990.

Capability	Heavy Logistic Vehicle Wheeled (HLVW)	UTTH CH-146 (Griffon) without ERSTA or weapon 'add-on'	MTH CH-47(D) (Chinook)
Max Lift Capability	Total: 19,000 lbs.	Slung: 1,500 lbs or Internal: 900 lbs Total: 2,000 lbs	Slung: 12,000 lbs Internal: 26,000 lbs (3) Total: 26,000 lbs
Speed	90 kms/hr (route dependant)	120 kts	170 kts
Range	Loaded 550 kms	Loaded 350 kms	Loaded Radius approximately 300 kms Endurance 2.5 – 4 hours
Combat Equipped Troops (1)	22 pax (based on the Troop Carrying Variant)	6 pax	54 pax
Stretcher	N/A	3 – 6 (2)	24
Primary Uses	- Cargo - Artillery Ammunition	- Aerial firepower - Reconnaissance (ERSTA) - Limited mobility	- Cargo - Transport of FARP (500 gallons of fuel) - Artillery lift (4)
Numbers held by CF	Approximately 1000 distributed throughout the CF	83	0
Notes	(1) Combat soldier, based on weight of 250 lbs (fighting order and rucksack included). (2) Only utilised in mass evacuations. (3) Most likely will bulk out prior to meeting this weight. (4) LG1 Light Gun, basic load and 10 man detachment		

Table 2 - Capabilities Comparison (Ground and Aviation)

The use of HLVW to transport large amounts of cargo is manpower intensive. Firstly, HLVWs are fully dependent upon safe routes that are cleared of both natural obstacles (river washouts, mudslides) and man-made obstacles (abatis, minefields) before movement occurs. Route clearance is an engineer and time intensive task that takes place throughout all stages of the movement. It is essential as it ensures the safety of the transported cargo. Unfortunately the employment of already over-tasked engineers may have adverse effects, as they must be taken away from other, possibly more important tasks. Secondly, the possibility of encountering armed groups and/or established ambushes may also hinder the timely deliverance of cargo. Without providing armed security, a convoy may be attacked, resulting in the destruction/loss of the cargo, or worse, endangering the safety of the transported troops. Armed security forces and vehicles are a necessity for escorting and providing the safety to this type of logistical

movement. HLVW may not be the most viable solution since the security of their movement is manpower intensive in comparison to MTH carrying out the same tasks. MTH does not require the same level of route clearance and are not hampered by ground obstacles. If attacked by land forces MTH is flexible enough that it can change direction in order to avoid possible attack as long as it keeps within its assigned air corridor.<sup>40</sup> Although it requires significantly less security, other aviation resources may be tasked to provide armed escort; however, this task would not be manpower intensive.

Another consideration is that HLVWs are restricted to carrying their entire payload on the back of the vehicle. This normally bulks out before reaching its maximum load limit. MTH is capable of carrying its entire payload either internally, externally (slung underneath), or both, making it a more versatile capability than the HLVW option.

Griffon's capability in conducting assigned operational tasks such as tactical transport, air mobile operations, repositioning of combat troops on the battlefield, combat re-supply, movement of logistics, and casualty / aeromedical evacuation is very limited. This is due to the small number of available airframes (83), their flight range, inadequate internal space capacity, and restricted payload ability. It is only more capable than the HLVW in the area of timeliness due to lesser route and security issues, but is restricted in its payload weight. The MTH is more versatile than the Griffon as its total payload weight is greater and it can accomplish all of the above operational tasks.

With the exception of the internal carrying of a Forward Air Refuelling Point fuel bladder, MTH does not require significant materiel handling equipment. External loading allows

---

<sup>40</sup> An Air Corridor is a safe route through the airspace for use by friendly aircraft. It is established for the purpose of preventing friendly aircraft from being fired upon by friendly forces. The area is designated by timings, grid references of a centre point, width on either side of this line, and a minimum /maximum altitude in feet. Canada,

for the transport of bulkier, outsized loads, generally reducing on-load and off-load times as equipment is pre-rigged for pick-up. It permits for the rapid delivery and placement of loads, while reducing aircraft exposure times in any landing zone. MTH can fly over or under controlled/restricted airspace enabling the delivery of loads to remote and difficult to reach areas that are sometimes too small or unsuitable to accommodate HLWV or other types of aircraft. The versatility of the MTH is so much greater than ground transport as MTH are not dependant upon cleared routes and escorting protection parties. MTH capability provides army commanders with the ability to rapidly move combat forces, supplies and equipment virtually anywhere within their area of operation unhindered.<sup>41</sup> Tactical insertion, tactical transport, airmobile operations, repositioning of combat troops on the battlefield, combat re-supply, movement of equipment and supplies, and CASEVAC/aeromedical evacuation are all examples of MTH operations. The Griffon is limited in its ability to accomplish these same tasks. Without the MTH capability, commanders of tomorrow will be forced to rely exclusively upon ground transportation, or the more restrictive Griffon to accomplish assigned tasks.

In order to avoid appearing biased and thereby undermine the validity of this paper, several limitations and deficiencies of the MTH should be stated. Helicopters, like all military equipment will never be completely invulnerable. MTHs present a fairly significant target even though they can be armed for self-defence with heavy machine guns and flares. Then again, there is nothing on the battlefield that cannot be attacked successfully. MTH protection can be

---

Department of National Defence. Land Force: Field Artillery Doctrine B-GL-371-001/FP-001. Ottawa: Department of National Defence, 1999, p 38.

<sup>41</sup> Canada, Department of National Defence. Tactical Level Aviation Doctrine B-GA-441-001/FP-001. Ottawa: Department of National Defence, 1997, pp 6-1 to 6-4.

gained indirectly by speedy manoeuvre and by operating at lower altitudes, thus minimizing detection and therefore improving survivability.

Forces deploying by helicopters lack a source of ground support vehicles (HUMV/Land Rover, motor cycles, ATV etc.) on arrival at their destination. This restriction can be detrimental to their mission as it limits tactical effectiveness. These vehicles would be used as mobile weapons platforms, troop mobility and logistic transport for ammunition and other essential items. MTH has the required lift capability to transport support vehicles for of airmobile troops which in turn adds to the effectiveness of the deployed troops. United States and British Forces demonstrated this during OPERATION IRAQI FREEDOM when small, lightly armed vehicles were delivered with airmobile forces.

Another restriction is the MTH heavy requirement for logistical support. Similar to mechanized forces, and other aviation resources, the MTH requires a considerable amount of this type of support. Maintenance cycles and spares are factored into capability requirements (number of airframes within a MTH squadron). Although weather restricts aviation during severe conditions such as fog, or blizzards, this is being overcome and less restrictive as technology improves the airframe, navigation and avionics systems. Severe weather also restricts many other ground and air transport. As there is no requirement to restrict MTH to vulnerable airfields real-estate (basing) is not an issue. MTHs are robust enough to be placed in forward field locations collocated with UTTH in order to support land forces. This will also reduce the requirement for separate airfield security forces. Although the MTH has some limitations, the impressive capability outweighs these deficiencies, making it an asset to any future type of operations. These same points have been considered by several significant world military powers (United States, Britain, Russia and France) that have concluded that the

strengths of the MTH outweigh its limitations. The state of these nation's medium lift aviation forces certainly demonstrates the importance of MTH capability.<sup>42</sup>

In conclusion, the Canadian Army strategy aims to meet future challenges. It is evident that a requirement, as stated in strategic guidance, exists to improve existing medium lift aviation capability gap within the Canadian Army. This paper began by defining the MTH, followed by historical examples in which the MTH capability proved indispensable for mobility and support roles. The present day Canadian aviation was then analysed, noting that the present UTTH aviation fleet (Griffon) is numerically insufficient and incapable of accomplishing several of its assigned core tasks. The requirement to attain the MTH capability within the present Army structure was identified as significant as it provided a more versatile airframe that would, in conjunction with the present UTTH, be capable of accomplishing more of the assigned core aviation tasks and possibly other collateral tasks.

The future battlespace was described, stating new anticipated threats and changing operational environments (non-linear, complex) that emphasized the requirement for MTH capability within the evolving Canadian Army restructure. MTH's most valuable contribution to the Army of Tomorrow would be dedicated versatility, rapid mobility of combat equipped troops, vehicles, weapons systems, and logistics when and where they are needed on the battlefield with little difficulty.

A comparison established that the MTH was more versatile than the HLVW or the Griffon in areas such as lift capability. MTH was also significantly less costly in the issue of security and route clearance than the HLVW.

---

<sup>42</sup> H.T. Elliot, The British Battlefield Helicopter. Toronto: Canadian Forces Command Staff College, 1990, pp 9-14.

It is recommended that a MTH capability be acquired and placed within this army level structure as it is the responsibility of army level troops to provide the necessary resources to brigades to assist them in accomplishing their mission. This would give the Army the flexibility required to employ the MTH asset wherever, and whenever required (in support new army structure, during PSO, or in support of external agencies). A MTH squadron, with a minimum of eight airframes, would give the Army a viable solution to ensure the required mobility and flexibility required on the future battlespace. The contributions that a MTH squadron brings to the Canadian Army certainly outweigh its deficiencies and limitations.

By reacquiring this 'now lost' capability, the Army would significantly improve the efficiency gap identified within both Defence and Army Strategies. The Army's planning requires new thinking about the capabilities needed within the multi-purpose combat-capable force of the future. MTH would be an indispensable element of the modern battlefield on which Canadian soldiers operate. Further, MTH could possibly provide additional capability to the Canadian government and non-governmental agencies in times of natural disaster within our national boundaries. In order to be effective within the prescribed Army of Tomorrow, a medium lift aviation capability is required. The Canadian Army requires medium lift aviation resources in order to meet Canada's future defence needs.



## Bibliography

### Books

Polmar, Norman. Military Helicopters of the World. Annapolis, Maryland: Naval Institute Press, 1981.

### Articles

Allen, Patrick. "At the Drop of a Hat: Rapid Reaction Concept." Defence Helicopter. August – September, 2000: pp 8-12.

Barry, B.W. "Future Airmobile Forces." RUSI Journal. Autumn, 1988: pp. 33-40.

Blackbird, R. "The Value of Their Mobility." British Army Review. 1980: p 8.

Brogna, Capt Anthony. "Multi-track: Posturing the Aviation Force to Meet the Challenges of the Next Century." US Army Aviation Digest. No 1-87-4, December, 1987: pp 10-13.

Donaldson, Peter. "Long Lived Lifter." Defence Helicopter. June – July, 1998: pp 6-12.

Hussain, F. "The Future of the Military Helicopter." RUSI Journal. September, 1985: pp.14-18.

Inge, LGen Sir Peter. "Development in the Land Battle." RUSI Journal. Winter, 1989: pp 11-15.

O'Conner, BGen Gordon. "Developing a Total Force." Canadian Defence Quarterly. Volume 18, No 2, Autumn, 1988: pp 9-16.

Ripley, Tim. "Making things Happen: Support Helicopter Force." Defence Helicopter. April – May, 2000: pp 35-39.

von Senger und Etterlin, Gen Dr F.M. "New Operational Dimensions." RUSI Journal. June, 1983: pp 11-15.

Waddy, J. "The Great British Helicopter Muddle." Defence Helicopter. April, 1988: pp 29-34.

Wolley, G.A. "The RAF's Helicopter Forces." RUSI Journal. Spring, 1989: pp 27-31.

### Unpublished Papers

Elliott, H.T. Squadron Leader. The British Battlefield Helicopter: Potential Unrealized. Canadian Forces Command and Staff College, 1990.

Vincent, Robert H. Helicopter Fleet rationalization and support to the land battle. Canadian Forces Command and Staff College, 1991.

## **Seminar Reports**

- Canada, Directorate of Land Strategic Concepts. Future Army Capabilities (DLSC Report 01/01). Kingston: January, 2001.
- Canada, Directorate of Land Strategic Concepts. Future Army Experiment: Operations in the Expanded Battlespace. Kingston: August, 2001.
- Royal United Services Institute for Defence Studies. The Role of the Helicopter in the Land Battle: Seminar Report 9 Nov 1971. London: January, 1972.

## **Government Publications/Documents**

- Canada, Department of National Defence. Advancing with Purpose: The Army Strategy. Ottawa: Department of National Defence, 2002.
- Canada, Department of National Defence. A Strategic Capability Plan for the Canadian Forces (Final Draft). Ottawa: Department of National Defence, 2000.
- Canada, Department of National Defence. Canada's Army (B-GL-300-000/FP-000). Ottawa: Department of National Defence, 1998.
- Canada, Department of National Defence. Conduct of Land Operations – Operational Level Doctrine for the Canadian Army (B-GL-300-001/FP-000). Ottawa: Department of National Defence, 1998.
- Canada, Department of National Defence. Dispatches: Training for Urban Operations (Vol2, No 2). Kingston: Army Lessons Learned Centre, 2002.
- Canada, Department of National Defence. Future Army Development Plan. Ottawa: Department of National Defence, 1998.
- Canada, Department of National Defence. Highlights of the 1994 Defence White Paper. Ottawa: Department of National Defence, 1994.
- Canada, Department of National Defence. Land Force Tactical Doctrine (B-GL-300-002/FP-000). Ottawa: Department of National Defence, 1997.
- Canada, Department of National Defence. Land Force Command (B-GL-300-003/FP-000). Ottawa: Department of National Defence, 1997.
- Canada, Department of National Defence. Land Force Sustainment (B-GL-300-004/FP-001). Ottawa: Department of National Defence, 1999.
- Canada, Department of National Defence. Land Force Field Artillery Doctrine (B-GL-371-001/FP-001). Ottawa: Department of National Defence, 1999.

Canada, Department of National Defence. System Study 1996-2005, Synopsis of Part One and Part Two. Ottawa: Department of Defence, 1991.

Canada, Department of National Defence. System Study 1996-2005, The Corps Model, Part Two, Combat Function Study on Aviation (Draft). Ottawa: Department of Defence, 1991.

Canada, Department of National Defence. Tactical Aviation Aerial Firepower: The Armed Griffon Concept. Ottawa: Department of Defence, 2002.

Canada, Department of National Defence. Tactical Helicopter Operations (B-GA-440-001/FP-001). Ottawa: Department of National Defence, 2000.

Canada, Department of National Defence. Tactical Level Aviation Doctrine (B-GA-441-001/FP-001). Ottawa: Department of National Defence, 2000.

Canada, Department of National Defence. The Army Post Operation Report: OPERATION APOLLO. Kingston: Army Lessons Learned Centre, 2002.

NATO, Use of Helicopters in Land Operations (ATP – 49(C), 2000.

United Kingdom. The Falklands Campaign: The Lessons. London: Her Majesty's Stationary Office, 1982.

United States Joint Forces, Joint Operations War Fighting (JOW) Manual: Thoughts on the Operational Art of Future Joint War Fighting. Washington: US Joint Forces Command, 2002.

## **Internet Sites**

[http://www.airforce.forces.ca/1\\_wing/about\\_us/general\\_e.cm](http://www.airforce.forces.ca/1_wing/about_us/general_e.cm) -  
1 Wing – General Information

<http://www.army.forces.ca/strategy/English/stratcommander.asp> -  
Army Strategy: Commander's Message

<http://www.army.forces.ca/strategy/English/interimoverview.asp> -  
Interim Model: Model Overview

<http://www.rafodiham.co.uk/history/htm> -  
Station History part 3 – No's 7 and 18 Squadrons

## **Interviews**

McLeish, LCol S. Interview: MTH Aviation: Canadian Directorate Army Doctrine 4-4 (Aviation) / 1 Wing A7 Doctrine, Kingston, 14 March 2003.

## **Presentations**

Duval, Col J. M. Presentation: Tactical Aviation Doctrine. Toronto: Command and Staff College Course 29, 20 March 2002.

Jeffery, MGen M. K. Briefing: Advancing with Purpose: The Army Strategy, Ottawa: Directors of the Canadian Army Staff, 30 April 2002.