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ANALYSING THE FUTURE TACTICAL HELICOPTER FORCE REQUIREMENTS BEYOND 2025

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AIM

1. The aim of this service paper is to analyse the future Tactical Aviation (Tac Avn) force requirements for the Canadian Armed Forces (CAF) beyond 2025. This will be done by looking at the capabilities of the aircraft currently forming the backbone of 1 Wing, Royal Canadian Air Force (RCAF) and their suitability to undertake those tasks mandated through the Canadian Defence Policy Paper – Strong, Secure, Engaged (SSE). The paper will also look at how operations in the Information Age may require a change in approach with respect to how Tac Avn will be used and whether the current force structure will be sufficient to operate in this Network Centric Warfare[1] arena. The analysis will highlight where significant gaps in the current force structure will need to be addressed in order for Tac Avn to continue to be at the forefront of Air-Land Integration (ALI). Finally, this paper will suggest some recommendations for Commander 1st Canadian Air Division when considering future Tac Avn employment options.

INTRODUCTION

2. The Tac Avn capability of the CAF has seen a significant period of change over the last 15 years with numerous operational deployments from counter insurgency (COIN) in Afghanistan to the most recent peacekeeping mission in West Africa, all involving operations in a Joint Interagency Multinational Public (JIMP) environment.

[1] Network-Centric Warfare (NCW) seeks to translate an information advantage, enabled in part by information technology, into a competitive advantage through the robust computer networking of well informed geographically dispersed forces.

The challenge now facing the RCAF is the institutionalization of important lessons learned from these missions in order to prepare for future Adaptive Dispersed Operations (ADO) as we enter the Information Age.

3. The inherent flexibility of Tac Avn has a profound effect on all 6 of the RCAF's operational functions (Command; Sense; Shield; Sustain; Act; and Generate)[2], and its successful employment both domestically and internationally espouses the fundamentals captured in Tac Avn doctrine[3]. This allows for growth in the Tac Avn community as well as enabling technological improvements in order to remain at the forefront of SSE mandates.

DISCUSSION

4. The following paragraphs will analyze current and future capability requirements by looking at the RCAF's operational functions:

5. COMMAND. Tac Avn contributes to the op function of Command by supporting the interoperability of digital Command and Control (C^2) with Canadian Army (CA) elements, other RCAF assets and coalition assets within a specific Area of Responsibility. Aviation resources are generally organized into capability-based Aviation Battalions (Avn Bns), which may or may not be a part of a larger Air Task Force. In the current context this means that a Joint Task Force (JTF) or deployed CA brigade will usually have OPCON over the Avn Bn for daily tasking and pre-planned operations.

[2] B-GA-400-000-FP-CF Aerospace Doctrine p 49 further defines the "Act" function as "Act-Move" and "Act-Shape"

[3] B-GA-440-000-AF-000 Tac Hel Ops and B-GA-441-001-FP-001 Tactical Level Aviation Doctrine

6. The Avn Bn will be a network enabled player in the Joint C^2 environment. "Properly implemented, network-enabled operations will involve a network of troops and supporting elements on the ground supported by joint sensor, fire support, and C^2 systems linked by voice and data to create a level of situational awareness (SA), battlefield mobility and fire support that will combine to overwhelm the adversary's understanding of the battlespace and his ability to react" [4]. The Avn Bn command and staff teams will be highly connected with the same tools being used by the core CA elements of the JTF and these tools will naturally be augmented by air specific applications. Used in concert, Tac Avn will enjoy a unique level of both friendly and enemy SA and will use this to assist both the tracking of current operations as well as to enable effective future mission planning.

7. SENSE. Tac Avn provides Sense to both Command and Act functions by conducting reconnaissance, surveillance and, to a certain extent target acquisition missions. Thus, it is vital that airborne systems are inextricably linked to ground C^2 systems so that rapid and reliable data can be transferred securely enabling timely decisions to be made by the ground commanders. Currently, the only way to get important and immediate information passed to the ground commander is by secure or insecure voice. The CH146 Griffon has an "Interoperable Griffon Reconnaissance Escort Surveillance System (INGRESS)"[5] capability, but this does not have a Full Motion Video

[4] B-GL-310-0014/AG-001 Land Operations 2021-Adaptive Dispersed Operations (p 23)

[5] A combination of weapon and Electro-Optic/Infra-Red (EO/IR) sensor suites enabling armed reconnaissance and tactical security missions

(FMV) downlink capacity at present; a "shoebox"[6] system has been trialled but was never implemented due to financial constraints, coupled with the possibility of it being wrapped into the Griffon Limited Life Extension (GLLE) project (more of which will be discussed later).

8. Future iterations of an armed reconnaissance helicopter will need to have the ability to actively stream 4k quality FMV securely to a Tactical Operations Centre (TOC) or an operative on the ground, whilst concurrently receiving target information from other sources (for example Unmanned Aerial Systems (UAS))[7]. This will enable the helicopter to rapidly switch from a Surveillance role to a Target Acquisition and Prosecution role with minimal delay. This will enhance information dominance and enable a competitive advantage, increasing the SA of geographically dispersed forces; one of the main tenets of NCW.

9. SHIELD. Tac Avn provides the Shield function by utilizing the CH146 in the escort role. Whether it be in the form of route reconnaissance or convoy escort, the helicopter can use its EO/IR camera to look out to a distance of 5km or more (depending on operating height) in order to identify and then potentially neutralize any threats which may be lying in wait for the ground force. It can also be used in concert with the CH147F Chinook to identify and clear the aircraft into a specified Landing Zone (LZ). Additionally, in a more traditional role, the CH146 can be used to augment ground

[6] The "shoebox" was a small unit that enabled a tactical communication down link (TCDL). It was to be inserted behind the pilot's seat of the CH146, with only minimal interference with the weapon systems being employed.

[7] Manned-unmanned teaming (MUM-T) operations combine the strengths of each platform to increase situational awareness, allowing the armed forces to conduct operations that include combat support and intelligence, surveillance, and reconnaissance (ISR) missions.

manoeuvre elements on SCREEN[8] and [limited] GUARD[9] tasks. This is important so that the ground commander can utilize his armoured reconnaissance assets in other areas, thus providing him with a more complete Common Operating Picture (COP). Again, the lack of a downlink capability severely restricts the free and accurate flow of information to the ground commander and this coupled with limited Beyond Line Of Sight (BLOS) communications and limited weapons systems reduce the current utility of the CH146 in these roles.

10. Both SCREEN and GUARD tasks could be completed more efficiently by armed UAS in future ADO environments and the preponderance of these assets of varying sizes would easily cover many aspects of the vertical dimension and would not necessarily be limited by the weather. Larger UAS would be able to provide a more persistent picture in clear weather, whereas, mini or micro UAS would be able to see sufficiently far ahead of the ground elements to be able to provide greater early warning of enemy locations / dispositions. However, the smaller systems do not generally have the persistence to provide effective cover for protracted periods and the lack of control of their use will continue to cause battlespace deconfliction issues and Flight Safety concerns for manned systems.

11. SUSTAIN. Tac Avn provides support to the Sustain operational function by providing logistical and administrative assistance to ground units across the span of the

[8] B-GA-442-001: The primary source of a SCREEN is to provide early warning to the main body through the communication of real-time combat information. This gives the protected force reaction time and manoeuvre space in order to orientate to meet the threat.

[9] Ibid: A GUARD force accomplishes all the tasks of a screening force but additionally, the guard force reconnoitres, attacks, defends, and delays as necessary to destroy enemy reconnaissance elements and disrupt the deployment of enemy first echelon forces.

battlespace. This can be in the form of movement of troops, kit and equipment from the Main Operating Base (MOB) to the Forward Operating Base (FOB) or secure movement where the threat to movement by land is considered too dangerous due to the proclivity of Improvised Explosive Devices (IEDs). Tac Avn can also be used as an aerial rebroadcasting asset, especially useful when ground forces are operating in a jungle or mountain environment. One of the more recent and very successful uses of Tac Avn has been with the inception of the Forward Aeromedical Evacuation (Fwd AE) capability utilized by the Avn Bn in Mali[10]. Critical casualty evacuation was performed by a team of doctors and medics protected by a team of infantry soldiers, with the cabin of the CH147F being set up like a mobile critical care unit.

12. There is no doubt that this capability will need to continue and potentially be built upon, with a greater level of care provision possibly giving rise to an extension of the current operating range[11]. This is entirely within the purview of the CH147F, but the current operating limitation is based solely on the lack of ability of the CH146 to be able to extend its combat range due to endurance and speed limitations. The CH147F can travel at speeds upto 170 knots, whereas the CH146 can only fly at a maximum of 120 knots. The secondary effect of this is that ground forces are unable to exert their influence on the local populace outside of a certain range, as they do not wish to attain casualties and not be in a position to be evacuated. Therefore, a more robust escort aircraft with an

[10] The Fwd AE team consisted of a CH147F escorted by 2 x CH146 working under the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA) mandate

[11] Current HSS doctrine states that a casualty needs to be receiving critical care no more than 2 hours after injury which is significantly longer than the more traditional "Golden Hour"

endurance similar to the CH147F would be required for this capability to have an operational effect at greater ranges.

13. ACT. Tac Avn provides support to the Act-Move function by enabling large and complex movements of troops and equipment into all areas of the battlespace. This is subtly different from the Sustain function described above insofar as it encompasses typical combat airlift missions[12]. The Act-Move function is almost entirely under the remit of the CH147F, but depending on the threat environment, will often include armed escort provided by the CH146. The Act-Shape function conversely, is almost exclusively undertaken by the CH146, and encompasses such tasks as direction and control of fire as well as elements of Forward Air Controlling using airborne FACs. Additionally, the CH146 can be used in a Close Combat Attack (CCA) role, which would provide a direct fire support for troops in contact or other area security tasks.

14. Act-Shape capabilities are currently restricted by the weapons platform of the CH146[13], which although give a combination of range and accuracy, only has the ability to neutralize unarmoured (soft) targets. There are currently projects being investigated that look at increasing the weapons payload of the CH146 so that it can attack a much wider range of targets, but the problem is one of limited All Up Weight. Weapons weight has to be balanced against fuel weight. Thus, if you want to carry more weapons, you will not be able to go as far or loiter in an area for a protracted period (in order to prosecute a target). The underlying problem is therefore one of power: more power will be generated

[12] Combat Airlift missions include (but are not limited to) Airmobile, Air Assault and Tactical Air Movement (e.g., para ops)
[13] Current authorized weapon fits include C-6, GAU-21 and M134

by improved engines, but these engines may need an improved transmission in order to generate more lift. The current GLLE project mentioned above is only looking at an updated avionics suite and does not account for a requirement to improve the engines and transmission so that the aircraft can operate more effectively in the harsh conditions of the equatorial regions. Therefore, if the CH146 is to last beyond 2025 and needs to continue to be an effective part of the Tac Avn Enterprise (TAE), then it must be capable of providing more power, going further faster, and have an improved weapons and targeting capability; this is not an insurmountable remit for a mid-life upgrade[14].

15. GENERATE. Tac Avn supports the Generate operational function by providing aerial mobility, reconnaissance and firepower support to land force training and high readiness force generation (FG). The current laydown of 1 Wg's forces focuses the majority of this training effort in the east of the country. Thus the Canadian Army Mechanized Brigades (CMBGs) in Ontario and Quebec are relatively well supported by both CH146 and CH147F, whereas the CMBG in the west of the country has to rely solely on support from the CH146 squadron based in Edmonton. The distance between CFB Petawawa (where the CH147F squadron is located) and the Edmonton based CMBG makes it unreasonable to support this brigade on a regular basis. Conversely, the co-location of the CH147F squadron with 2 CMBG in Petawawa means that this brigade gets plenty of support on the back of training sorties. The instant availability of both kit and equipment means that there are plenty of opportunities for combined FG that is

[14] https://www.gov.uk/government/news/upgraded-raf-puma-takes-to-the-skies The £260 million Puma Mk 2 upgrade means that the helicopters benefit from new engines which give them 35% more power and improved fuel efficiency to allow them to fly faster and twice as far as the Puma Mk1. They also have highly advanced digitised glass cockpits and upgraded liquid-crystal display instruments.

beneficial to aircrew and soldiers at the same time. This is also advantageous for the units within the Canadian Special Operations Regiment (CSOR) as it gives them exposure to the capabilities of the platform.

16. The future will almost certainly see the CH147F squadron remaining as a single unit. 450 Tactical Helicopter Squadron (THS) is the largest squadron in the RCAF, as it encompasses both the Fleet Technical Training Flight (FTTF) which trains all the CH147F technicians, as well as the Operational Training Flight (OTF) which trains all the aircrew[15]. Splitting the squadron up would cause difficulties both administratively and from a professional currency / competency point of view, as the simulator complex is also housed within the squadron building. Conversely, the balance of CH146 units around the country is entirely conducive to the valuable support and exposure that it gives to CA units. The main problems associated with the Generate function are inextricably linked to the question of Battlespace ownership. The rapid rise in the number of UAS of various sizes within most units of the CA and the control of their use within the training areas is causing flight safety concerns. It is imperative that a joint agreement is signed that creates specific rules and regulations for the use of UAS within the ranges so that positive deconfliction can be achieved that does not limit the activity of both manned and unmanned vehicles. The ideal solution would be to enact "positive control criteria" within these areas managed by qualified Air Battlespace Managers, but unfortunately,

[15] These sub-units are in addition to the normal elements of the Sqn with 3 x op flights, maint, log, admin, and ops functions.

this trade is undermanned and therefore unwilling to allow any of its specialists to be taken away from their primary locations.

CONCLUSION

17. There is a definite divergence in capability within the TAE that will continue to limit the tasks that Tac Avn can be called on to undertake. The CH147F is a world class helicopter that is the envy of many nations throughout the world; both Germany and Israel have expressed an interest in purchasing the Canadian variant as a replacement for their aging CH53 fleets. However, GLLE will only deliver an avionics upgrade whereas the CH146 would benefit greatly from an engine and transmission upgrade. The roles and responsibilities that are implied for the RCAF and Tac Avn in particular in SSE are still achievable, but with caveats that will not see the capability progress effectively post-2025. This, coupled with the innovation that is required as a result of a movement into a NCW environment means that there is a necessity for platforms that have the ability to transmit and receive information rapidly in order to react to an ever changing battlefield especially over a wide geographical area.

RECOMMENDATIONS

18. The following recommendations are offered:

a. Consideration be given to re-prioritizing the FMV downlink capability (Shoebox) for the CH146 fleet in the short term. This will ensure that the aircraft has the ability to improve its SENSE function as well as elements of the ACT-SHAPE function. This will have a direct effect on the SA of ground commanders

as well as improving overall SA within a Fwd AE package, especially if the CH147F can access the downlink video while airborne;

b. Investigation be conducted to improving the power available to the CH146 in the form of improved engines and transmission. The airframe structure will certainly last to 2035 and beyond, but the capabilities that are being delivered as part of GLLE will only go a certain way to improving the “flyability” of the aircraft and with proposals to employ additional weapon types, there will be a penalty on endurance that could prove costly;

c. Further investigation be conducted into the MUM-T concept between Tac Avn and UAS. The ability to share some of the tasks historically associated with Tac Avn only could free up the helicopters to support additional mission sets, enhancing capability in other areas of the battlespace.

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