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DIVIDING THE CH146 INTO SUB-FLEETS

Major Sarah Lemay

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By Major Sarah Lemay
Par le major Sarah Lemay

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DIVIDING THE CH146 INTO SUB-FLEETS

AIM

1. The aim of this service paper is to demonstrate that dividing the CH146 Griffon Helicopter into sub-fleets will optimize its employability until 2035. Currently, the CH146 is being used in three distinct roles both domestically and internationally. These roles include Tactical Aviation (Tac Avn), Search and Rescue (SAR), and Special Operations (SO) and each challenge the basic airframe's operational effectiveness in their own way. Truly sub-divided fleets will focus the operational envelope to better support each role.

INTRODUCTION

2. The most recent defence policy Strong Secure Engaged, released in 2017, is the way the Canadian Government plans to invest in the Canadian Armed Forces (CAF) until 2037. The investment plan does not include the replacement of the CH146 griffon helicopter in any of the three roles for which it is used today.¹ Therefore, the Director General Aerospace Equipment Program Management (DGAPEM) as the Technical Airworthiness Authority (TAA) for the Minister of National Defence² must ensure there is a plan in place to support the technical requirements for the CH146 Griffon until it is replaced. In order to accomplish this, a significant financial and time investment is required.

¹ Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: National Defence, 2017).

² National Defence and the Canadian Armed Forces, "Technical Airworthiness Authority Overview," last modified 15 March 2018, <http://www.forces.gc.ca/en/business-regulations-technical-airworthiness/index.page>.

3. Planning for the long-term supportability of the CH146 fleet has been acknowledged for several years under the Griffon Limited Life Extension (GLLE) project.³ Given the complexity of modern aerospace systems and the cost of modifications, consideration of cost versus benefits will be required in order to optimize the financial envelope provided. It will not be feasible to carry out all the desired modifications for all airframe users. Choices will need to be made. Since the CH146 will still be required to operate in the three roles mentioned above, the RCAF must leverage the GLLE and consider generating unique sub-fleets to maximize the operational capacities of the CH146 in a given role. This service paper will discuss how the CH146 evolved, the operational limitations of one single fleet and a basic costing analysis.

DISCUSSION

4. In service since 1995, the CH146 Griffon is a Utility Tactical Transport Helicopter (UTTH)⁴ with a maximum fuel load of 2,100lbs and allowable weight of about 11,900lbs.⁵ This fleet was purchased to operate in the tactical aviation and the combat support environment. The special operations and search and rescue roles were added to the fleet over time. For the purposes of this service paper, the combat support role will be considered within the SAR role as they operate within a similar environment. As such, there are three role dependent paint schemes making them easily identifiable. Since being in service, the aircraft have been modified multiple times to support an ever-changing operational environment. Modifications were mainly generated by operational capability gaps, new avionic systems to avoid obsolescence or

³ Government of Canada, "Griffon Limited Life Extension," last modified 30 May 2018, <http://dgpapp.forces.gc.ca/en/defence-capabilities-blueprint/project-details.asp?id=1228>.

⁴ Royal Canadian Air Force, "CH-146 Griffon," last modified 29 June 2017, <http://www.rcaf-arc.forces.gc.ca/en/aircraft-current/ch-146.page>.

⁵ "RCAF - 1 Wing Tactical Aviation," YouTube Video, 8:23, posted by "RCAF VIDEO de l'ARC," 19 April 2018, <https://www.youtube.com/watch?v=f7qbKloYtec>

structural integrity requirements. Embodied modifications have progressively increased the aircraft basic weight thus limiting internal load flexibility.

5. In order to appropriately characterise the CH146, it will be assumed that the key limiting factor of this aircraft is the maximum allowable weight. Therefore; to evaluate the effectiveness of the fleet in each role consideration of the different priorities and characteristics of air power is required.

a. In a SAR role, it is essential to be highly visible, reach the search area as quickly as possible and remain on station as long as possible within a permissive environment. It is also important to carry all required medical and life support equipment to treat recovered persons.⁶

b. In the SO role, operational effectiveness is measured by the ability to manoeuvre as an unidentifiable force, to have speed of operation and the ability to project power in all types of environments with a small team.⁷ Operational adaptability is essential as they need to be effective in permissive and non-permissive environments. They must also be as flexible as their users.

c. In a Tac Avn role, versatility and flexibility is key, for example, the ability to change aircraft configuration from rappel to door gunning quickly in order to adapt to

⁶ Department of National Defence, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine* (Trenton, ON: Canadian Aerospace Warfare Center, 2015), 5-6.

⁷ Department of National Defence, DAOD 8001-0, *Canadian Special Operations Forces Command – Information and Asset Security* (Ottawa: National defence, 2015).

army operations. This role has a wide range of operational mandates; close air support, convoy over watch, troop transport, rappel, command and liaison, etc.⁸

6. With the breath of operational considerations, it is difficult to provide a single fleet that will be versatile and flexible enough to support them all well. Therefore, each role will be required to compromise if sub-fleets are not created. The competing prioritisation is felt by each community since all aircraft must embody every modification. Projects require larger financial investment and take more time to install and develop. If each community was permitted their own modifications (tailored to purpose), community level test and evaluation flights could more easily handle projects within their area of expertise without the need to access stakeholders/SMEs outside their specific functions.

7. The CH146 now regularly have Griffon weapon system requirement meetings in order to discuss the competing projects. With over 140 projects for this aircraft it is challenging to allocate the finite amount of financial and personnel resources.⁹ In some cases, if the modification is only needed by one sub-fleet, the financial investment would be significantly lower and more effectively distributed to other projects. For example, the CH146 modification to fit the new Armoured Crash Attenuation Crew Seats (ACACS) was recently released. Given the role of SAR, they do not use armoured seats, therefore would not require this modification. In this case, the manpower dedicated to carrying out the modification of the seat rails will be wasted. This is a prime example of where sub-fleets should be considered.

⁸ "RCAF - 1 Wing Tactical Aviation," YouTube Video, 8:23, posted by "RCAF VIDEO de l'ARC," 19 April 2018, <https://www.youtube.com/watch?v=f7qbKloYtec>

⁹ Capt Eric Spencer, D/AEO CH-146, e-mail conversation with author, 10 October 2018.

8. The average basic weight of the ten CH146 helicopters held by 430 Tactical Helicopter Squadron (THS) is just over 7,400lbs.¹⁰ The basic weight does not include any mission kit, nose ballast or fuel; therefore, operators have a maximum of 4,500lbs that can be added for operations. All three communities are constrained by the aircraft weight limitations, the Tac Avn and SO communities often operated in extremely hot and high environments which limit the aircraft operational flexibility. Nevertheless, the hostile operating environment risk will often take precedence over the ability or desire to reduce the weight of the survivability equipment. On the other hand, weight limitations have a large impact on the SAR community as it can be directly related to saving lives. In the standard configuration the SAR load is 600lbs. This includes 75lbs for SAR Box, 225lbs of kit, 100lbs for the stokes litter, 100lbs for winter kit, and 100lbs for the life raft. This limits their fuel load to 1,500lbs and average range to 250NM.¹¹ Every pound saved from the basic aircraft weight is additional fuel to increase the range and time on station.

9. Within the Tac Avn and SO roles the aircraft have sustained significant denting over time compromising the structural integrity of the aircraft. Potential causes of the damage have been mainly attributed to the rough operating environment. In order to mitigate the damage, protective panels for the aircraft door posts, baggage compartments and floor boards were developed. Throughout the development of these panels, multiple concerns were identified by the SAR users due to the additional weight. Therefore, significant consideration for material types, weight and ease of installation generated multiple delays in the delivery and increased financial costing of this project. Demonstrating the difficulty of balancing each competing priority.

¹⁰ Average basic weight extracted from 430 THS technical aircraft record set, consulted 09 October 2018.

¹¹ Maj Christian Labbe, SAMEO 424 (S&R) Sqn, e-mail conversation with author, 10 October 2018.

10. On the other hand, during SAR operation, the aircraft is required to engage in over water hover operations for hoisting more frequently than Tac Avn. This type of activities requires precise and stable flying. In order to help with this type of flying the SAR community requested a modification of the Radar Altimeter (RADALT) and a forward axis auto pilot system. In 2015, the RADALT modification was released. Following the satisfaction of the SAR community, the Tac Avn aircraft received the modification. Significant concerns were raised in an unsatisfactory condition report questioning the safety of the new system. During Night Vision Goggle (NVG) operations “the intensity and the constant presence of the RADALT light is a concern because they are in close proximity to the over torque, RPM and master caution light. This could result in these critical lights to blend in with the RADALT lights”.¹² This indicates how differently each community operates within their environment and how complex it is to balance the requirements.

11. It could be argued that the generation of sub-fleet decreases the CAF operational flexibility, being unable to interchange each CH146 from one role to the next. This might have been true when they all were the same paint scheme. Thus, now, there are three distinct approved paint schemes limiting the operational flexibility. The yellow of the SAR aircraft cannot be used in a tactical environment, but the yellow is ideal to increase the visibility during a search operation. The re-painting of a CH146 is a significant maintenance task. Therefore, changing an aircraft from one community to the other cannot be done without a financial and resource cost.

12. Furthermore, each role does not use all available mission kits. The SAR community has the night sun and hoist almost always installed, as opposed to the Tac Avn who mostly use the

¹² Department of National Defence, Unsatisfactory Condition Report Database, Accessed 09 October 2018, ref number 2570/2017/0006, last modified, 24 November 2017.

MX-15, door guns and countermeasures. Even if each tail number is fit for each of these kits, the long-term impact of not using the wiring is not considered. For example, while preparing the aircraft for OPERATION IMPACT in 2016, significant electrical snags were found with aircraft that had never had the countermeasures installed. Therefore, even if sub-fleets are not present the interchangeability is limited.

13. The technical variations provided in the examples above are small in scope and do not permanently limit the potential to modify an aircraft in the future, however, limiting the modification to only one community could have a positive impact on the operational capabilities of the aircraft. The cost and time to change the paint scheme and the required technical changes to the role of that given aircraft could be embodied during the same maintenance inspection. In 2015, following the evaluation of the DND/CAF contribution to the National Search and Rescue Program¹³, the RCAF was requested to conduct an evaluation of optimisation of the CH146 in the Search and Rescue operations. The Briefing Note (BN) produced only evaluated options to extend the range of the aircraft within the capacity of the CH146 as a single multirole fleet, by either the installation of an auxiliary fuel tank or a decrease in crew size.¹⁴ The option of decreasing the basic weight of the aircraft was not evaluated.

14. Another potential cost of sub-fleet would be training, both for aircrew and maintenance crews. The current basic technical course for technicians does not include all CH146 potential mission kits and some specific mission kits have specific training considerations.¹⁵ Therefore, as the basic technical specifications of the aircraft will remain the same, this will not considerably

¹³ Canada. Department of National Defence. 1258-216 (CRS) Evaluation of the DND/CAF Contribution to the National Search and Rescue Program. Chief Review Service, 2015, viii.

¹⁴ B Elliott, *BN addressing CRS report on SAR*. (1 Canadian Air Division: file 3385-1 (SSO SAR), 20160422).

¹⁵ Royal Canadian Air Force, *CH146 Fleet Employment Training Plan*. (1 Canadian Air Division, 2015) 18-21.

change the current training structure. There is currently a requirement to review the Fleet Employment Training Plan (FETP) for the CH146, thus it is a good time to provide the required input to influence the new FETP. As for aircrew, all CH146 pilots have the same Tactical First Officer course (TAFO). Therefore, provided that the difference between sub-fleets are for role specific operations, it should only effect post TAFO training, currently already specific to each community.

15. The Canadian Government recently announced that the CH149 Cormorant helicopter will be implementing a mid-life upgrade. As a result, the CH149 will be returning to the Trenton operational area as the primary and only search and rescue helicopter in that area.¹⁶ This may limit the requirement for the long-term implementation of the SAR role for the CH146, but not its combat support role. Therefore, this should not limit the requirement to further analyse sub-fleets.

CONCLUSION

16. In conclusion, this service paper has attempted to prove the requirement to further analyse the potential of dividing the CH146 Griffon Helicopter into sub-fleets. Notably, each community operates the CH146 in a very different way and regularly uses different equipment. ACACS, the protection panels and the RADALT modifications are just examples where these competing priorities are difficult to balance. These examples are a sample of the issues and complexities of optimising the operational envelope of this weight limited aircraft. Since the aircraft are already divided into three different paint schemes, they are already identifiably different and need significant investment to interchange. If the scope of technical differences

¹⁶ Government of Canada, "CH-149 Cormorant Mid-Life Upgrade," Last modified 30 May 2018, <http://dgpapp.forces.gc.ca/en/defence-capabilities-blueprint/project-details.asp?id=1227>.

between each sub-fleet remains limited, it will optimise the operational capabilities of the airframe in order to support each role well. This will ensure that the benefits out-weigh the cost.

17. As the CAF undergoes significant changes in the coming decades, there is no plan to replace this airframe in any of its roles until 2035. Therefore, the investment planned with the GLLE and the analysis into the efficiency of the technician training demonstrates that the right time to influence the outcome is now. Whether the CAF divests the SAR role in Trenton to the CH149 Cormorant, the CH146 will remain active as a secondary SAR aircraft within the combat support role which will continue to compete for different modifications than the Tac Avn and SO communities. It is also likely that as the SO community continues to specialise in their operational domain, their requirements for the CH146 will become increasingly more specific in a complex and classified environment. Therefore, in order to maintain the flexibility of air power it is crucial to ensure the flexibility of the operational effectiveness of the CH146 Griffon Helicopter until at least 2035.

RECOMMENDATION

18. A more detailed analysis and costing for sub-fleets should be carried out in conjunction with the Griffon Limited Life Extension project to optimize the financial investment into the CH146 Fleet.

19. Further analysis to optimise the training requirements of the sub-fleets in order to appropriately influence the FETP.

Intended recipient: DGAEPM

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