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AIM

1. This service paper will address the question of using civilian contractor pilots in Royal Canadian Air Force (RCAF) Remotely Piloted Aircraft System (RPAS) squadrons. By examining legal and ethical aspects of the question, the paper will demonstrate that the RCAF can use civilians to supplement military pilot crewing of RPAS and should consider the option in the medium term. Such augmentation would relieve demand pressures on limited numbers of military pilots. The discussion considers the full spectrum of missions to be carried out by the RPAS capability, from the use of lethal force during an armed conflict to patrol of the Northwest Passage. This is to explore restraints that the RCAF should implement, like excluding civilian pilots from certain mission sets.

INTRODUCTION

2. Strong Secure Engage (SSE)'s initiative 91[1] is a surveillance and precision strike capability for the RPAS project and "marks a watershed moment in National Defence capability, strategy and policy."[2] The RPAS project delivering such capability should start its implementation phase in spring 2023 with aircraft deliveries by the end of 2025[3]. As a Class-III[4] RPAS certified to integrate any civilian airspace, the civilian regulators consider the Uncrewed Aerial Vehicle (UAV) as a normal aircraft but with a displaced cockpit. As such, the RCAF recently decided that fully qualified pilots would be the aircraft captains, as opposed to otherwise trained military operators[5]. The current project is a modest first step in demonstrating to the government and Canadians the benefits of this unique capability, which fills a gap in RCAF Intelligence, Surveillance and Reconnaissance (ISR) doctrine[6]. The relevance of the recommendation of this paper flows from the logic of the following three propositions. First, demand for RCAF RPAS capability will grow, especially for domestic taskings. Second, the availability of pilots and crew will continue to be a limiting factor to delivering the capability. Third, non-combat flying will constitute a substantial proportion of the flying schedule.

3. As mentioned in the Briefing Note on RPAS pilot occupation selection, military pilots are expensive to train but currently provide the lowest risk to RPAS project implementation. Endorsed by the Chief of the Air Staff, the note does explicitly open the door to exploring

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[1] Department of National Defence, *Strong Secure Engaged - Canada's Defence Policy* (Ottawa: DND Canada, 2017), 73.
[2] Matt Fraser, "Precision-Strike RPAS: A Watershed in Canadian Defence Capabilities" Canadian Forces College, 2019), 2.
[3] Department of National Defence, "Remotely Piloted Aircraft System Brief", Royal Canadian Air Force, January 27, 2022.
[4] NATO Taxonomy identifies class-III as having Minimum Take-Off Weight (MTOW) heavier than 600kg, able to operate Medium Altitude Long Endurance (MALE) or higher as per NATO, *Standards Related Document ATP 3.3.8.1.1 UAS Tactical Pocket Guide,* NATO Standardization Office, 2016, 10.
[5] Department of National Defence, *Briefing Note: RPAS Pilot Occupation Selection,* Royal Canadian Air Force, 2022.
[6] RPAS fulfils both airpower tenets and air ISR tenets as defined in Department of National Defence, *B-GA-400-000/FP-001 Royal Canadian Air Force Doctrine*, 2016 and Department of National Defence, *B-GA-401-002/FP-001 RCAF Doctrine: Intelligence, Surveillance and Reconnaissance*, 2017.

"further crewing options" in the medium term, underlining the organization's expectation that crew availability problem-solving will continue to be relevant[7] in the future.

DISCUSSION

4. The full list of mission sets is included in the Annex. Domestic mission sets include sovereignty patrol, North American Aerospace Defence (NORAD) Maritime and Aerospace warning and natural disaster response. International deployment mission sets consist of support to deployed commanders including kinetic effects, ISR and natural disaster aid. In a surveillance mission simulation build for demonstration purposes, RPAS aircraft relay each other tracking a suspicious ship transiting through the Northwest Arctic Passage for almost eight full days[8]. To keep one aircraft in the vicinity of the ship of interest for 188 straight hours, multiple aircraft have to relay each other. Approximately 155 hours are required just for transit from deployed operating bases. This is because of the multiple aircraft required and the great distances involved[9]. This reality illustrates the significant time demand for straightforward, non-tactical flying. For international employment scenarios, a significant amount of time could similarly be spent in transit depending on the distance from the Forward Operating Base (FOB) to the area of interest. Current projections for combat flying are biased towards past coalition scenarios that are not necessarily representative of future steady-state RCAF operations.

5. Ground-based crewing from a distant remote Ground Control Center (GCC) challenges two traditional assumptions that exist in aviation. First, the authority of the Aircraft Captain includes the responsibility to act in the event of an emergency to "preserve the safety of the aircraft, crew and passengers"[10]. For RPAS the responsibility for safety of flight is to third parties in the air or on the ground beyond preserving the safety of the aircraft. Indeed, "national authorities [. . .] shall have due regard for the safety of civil aviation [and] the safety of third parties and properties on the ground."[11] The current National Defence Flying Orders account for separate responsibilities between safety of flight and responsibility for mission and crew. They define the Air Vehicle Operator (AVO) as

> the person responsible for the control and monitoring of a [Uncrewed Aircraft System] UAS in flight. For the purposes of these orders an AVO in command of a UAS, unless otherwise specified, has all the rights and responsibilities of an Aircraft Captain of a conventional aircraft[12].

Similarly, the Air Vehicle Commander (AVC) is "The person charged with command of an UAS in flight. The AVC also exercises command of all crew and personnel in the UAS control station during UAS operations". Second, the GCC challenges the following assumption. Unlike traditional aircraft, RPAS cockpits offer the opportunity for increased numbers of crew handovers, limited only by the amount of qualified personnel assigned to the unit. Multiple crews

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[7] Department of National Defence, *Briefing Note: RPAS Pilot Occupation Selection*.
[8] *RPAS_Arctic_Ops_DND2* video, Director Aerospace Requirement, 2023.
[9] Total airborne time is the sum of both figures.
[10] Department of National Defence, *B-GA-100-001/AA-000 National Defence Flying Orders Book 1 of 2 Flight Rules*, Change 13, 2022, 6.
[11] NATO Allied Air Traffic Management Publication, *Draft Allied Aeromedical Publication AAMedP-51: NATO RPAS Airspace Integration,* NATO Standardization Office, 17.
[12] Department of National Defence, *B-GA-100-001/AA-000 National Defence Flying Orders Book 1 of 2 Flight Rules*, 108.

are a necessity given the long mission durations. The opportunity for pilot swaps between military pilot and civilian pilots (and vice versa) during the same mission are therefore conceivable as being routine, and even a small amount of civilian pilot augmentation could provide relief for military pilots.

6. Public debate often emerges around the following questions: "Do RPAS lower the threshold for the use of force?", "Do RPAS encourage a video game mentality?", and What is the "impact on mental health of operators?" These debates, along with "demands for greater transparency"[13] are to be expected. The United Kingdom directly addressed public skepticism related to the U.K. armed forces RPAS capability in a briefing paper to the U.K Parliament.[14] Being clear and open with the public is necessary. Precision strike and use of force represent perhaps the most controversial aspect of the full extent of the RCAF RPAS capability. The following discussion assumes that use of force is legal, ethical and accountable under military command authority and responsibility.

7. In 2013, the Harvard University Humanitarian Policy and Conflict Research (HPCR) produced its Manual on International Law Applicable to Air and Missile Warfare[15]. It serves as a guide to treaty laws complemented with up-to-date international customary law based on *opinio juris*. The following findings are consistent with the HPCR Manual:

a. In international humanitarian law, only military aircraft can engage in attack[16]. The accepted definition of military aircraft evolved over time and includes two requirements of interest here. First, the commander with mission level decision authority needs to be a member of the armed forces. Second, the aircraft needs to be "controlled, manned or preprogrammed by a crew subject to regular armed forces discipline"[17]. In our case, RCAF responsibility must prevail through a clear chain of command. A civilian pilot, responsible for safety of flight and control as aircraft captain, is responsible to the military commander of the mission. Specifically, an Air Combat System Operator (ACSO) could combine the existing Mission Intelligence Coordinator (MIC) role with RPAS Crew Commander (RPCC) duties. This is reflected in the B-GA-100 division of roles. The AVO is the civilian pilot and the AVC is the military commander of the flight in this case.

b. A civilian pilot would not have unlimited liability but would be submitted to Code of Service Discipline and military Command and Control[18].

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[13] Louisa Brooke-Holland, *Overview of Military Drones used by the UK Armed Forces* (London: House of Commons Library, 2015), 43.
[14] Brooke-Holland, *Overview of Military Drones used by the UK Armed Forces*.
[15] Harvard School of Public Health. Program on Humanitarian Policy and Conflict Research, *HPCR Manual on International Law Applicable to Air and Missile Warfare* (Cambridge: Cambridge University Press, 2013).
[16] "Military aircraft are alone entitled to exercise belligerent rights." *Hague Rules of Air Warfare*, February 1923, Art 13 [HRAW].
[17] The other two requirements are the need to be "operated by the armed forces of a State" and "bearing the military markings of that State." Harvard School of Public Health. Program on Humanitarian Policy and Conflict Research, *HPCR Manual on International Law Applicable to Air and Missile Warfare*, 37.
[18] *Revised Statutes of Canada (RSC), 1985, c. N-5 National Defence Act*, Art 60 (1) (f) and (j).

c. Assuming civilian pilots are Canadians serving with a Canadian military unit, they are not a mercenary[19].

d. A civilian is a non-combatant, but should the pilot participate in RPAS combat missions, their role would meet the criteria for "direct participation in hostilities". Therefore, such a pilot would "become a legitimate object of attack" while participating and lose the protection conferred by their status as a civilian.[20] International law clearly evolved without foresight on the ability to remote-control weapon systems from half a world away. In the GCC within Canada, the civilian pilot would not be exposed to direct attack.

e. International humanitarian law covers civilians in military aircraft as follows: "civilian members of military aircraft crews" should be granted Prisoner Of War (POW) status should they fall into "the power of the enemy".[21] Again, away from the battlefield, the civilian pilot would not be exposed to the possibility of capture by the enemy in the traditional sense. However, in the unlikely scenario that their role is somehow attributable by a foreign power, their possible part-time occupation flying internationally for civilian airlines could expose them to unwanted attention abroad.

f. Finally, from a domestic legal perspective, the case of "military investigations involving civilians" is covered in the Aeronautics Act[22].

8. Chapter three of the "2001 Canadian manual on Joint Doctrine on the Law of Armed Conflict at the Operational and Tactical" is entitled "Combatant Status"[23]. The document addresses the issue in detail in the context of determining which enemy can be targeted by friendly forces. Indeed, this is critical for commanders to issue clear rules of engagement (ROE) for personnel under their command to follow. The Canadian manual qualifies "civilians who take a direct part in hostilities [as] unlawful combatants". However, none of the references cited in support of this statement prohibit civilian combatants in the way other actions are prohibited, like

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[19] *Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol 1)*, [APl], https://www.ohchr.org/en/instruments-mechanisms/instruments/protocol-additional-geneva-conventions-12-august-1949-and, Art 47 (2).

[20] International Conference (The Hague), *Hague Convention (IV) Respecting the Laws and Customs of War on Land and Its Annex: Regulations Concerning the Laws and Customs of War on Land*, 18 October 1907, [HIVR] Art 2; [APl] Art 51 (3); and *Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II)*, [APII], https://www.ohchr.org/sites/default/files/Documents/ProfessionalInterest/protocol2.pdf, Art 13 (3).

[21] *Geneva Convention relative to the Treatment of Prisoners of War*, [GCIII], https://www.ohchr.org/en/instruments-mechanisms/instruments/geneva-convention-relative-treatment-prisoners-war, Art 4 (A) (4). This is also incorporated in Canadian law: *RSC, 1985, c. G-3 Geneva Conventions Act*, as Art 13 (4) provides "shipwrecked" immunity to "persons who accompany the armed forces without actually being members thereof, such as civilian members of military aircraft crews [. . .] provided that they have received authorization from the armed forces which they accompany". However, "*there is disagreement among experts whether persons who are entitled to prisoner-of-war status by virtue of Article 4A(4) would lose their entitlement to that status if they were to participate directly in hostilities.*" in International Committee of the Red Cross, "IHL Treaties - Geneva Convention (III) on Prisoners of War, 1949 - Commentary of 2020 | Article 4," accessed March 1, 2023, https://ihl-databases.icrc.org/en/ihl-treaties/gciii-1949/article-4/commentary/2020?activeTab=undefined#index_Toc42431487.

[22] Part II of *RSC, 1985, c. A-2 Aeronautics Act*, Art 10.

[23] Department of National Defence, *B-GJ-005-104/FP-021 Joint Doctrine Manual Canadian Manual on Joint Doctrine on the Law of Armed Conflict at the Operational and Tactical Level*, Ottawa: DND Canada, 2001), 35.

perfidy for instance[24]. Rather, international law simply states such civilians temporarily lose their immunity from attack, thus becoming legitimate targets[25]. Nevertheless, employing lethal force in combat imposes a moral burden on the combatant. From an ethical point of view, this burden should not be carried by a civilian. The question then becomes: what is considered direct participation in hostilities? The HPCR manual presents a comprehensive list of examples. These include "operating or controlling weapon systems or weapons in air or missile combat operations, including remote control of UAVs and [Uncrewed Combat Air Vehicles] UCAVs," and "employing military communications networks and facilities to support specific air or missile combat operations." An unarmed RPAS serving as a datalink relay platform or "participating in target acquisition" in support of a combat situation is considered to be engaged in hostilities[26]. Even unarmed, supporting a combatant commander in the context of an armed conflict would constitute direct participation in hostilities. Thus, to determine if using civilian pilots is ethical or not, what matters is really the role of the mission the military aircraft is tasked for, not the aircraft classification as a military weapon system.

9. From this discussion stems the following proposed mission restrictions on civilian pilot augmentation. A civilian pilot could only fly domestic and international disaster relief missions, domestic sovereignty patrols, generic domestic training and the transits that enable all of these[27]. A threshold question is the transit of an armed aircraft on its way to a domestic training range. A conservative approach would be to reserve this mission to military pilots, but the question remains valid.

10. What follows is a non-exhaustive list of practical considerations for the RCAF.

a. To implement civilian pilot augmentation of RPAS would require changing the RPAS Concept of Operation (CONOPS) to accommodate at least the two important requirements already described. The first is to accommodate a civilian aircraft captain under a military crew commander. The second is a clear definition of restraints to employment of the civilian pilots, like the one proposed in the preceding paragraph. To supplement the CONOPS, Judge Advocate General (JAG) assisted direction on the question of civilian pilot authorization could be standardized for each tasking order.

b. The CONOPS change would make the task of training and scheduling crews more complex because of the restrictions. At the same time, having a bigger human resource (HR) pool provides more flexibility overall which is the main justification for the effort to augment military pilots. There would be an increasing demand for resources for currency training which would provide an incentive to limit the number of civilians

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[24] The articles cited are the same three as note 20. Perfidy is prohibited as per APl Art 37 (1).

[25] "Civilians shall enjoy the protection afforded by this Part, unless and for such time as they take a direct part in hostilities" APII, Art 13 (3).

[26] Harvard School of Public Health, Program on Humanitarian Policy and Conflict Research, *HPCR Manual on International Law Applicable to Air and Missile Warfare*, 138.

[27] "The preparation and training of aircrews [. . .] with a view to the execution of a predetermined air or missile combat operation constitutes a measure preparatory to a specific hostile act and, therefore, amounts to direct participation in hostilities." According to the HPCR, civilian contractors engaged in *generic* combat training are not considered to take direct part in hostilities, in Harvard School of Public Health, Program on Humanitarian Policy and Conflict Research, *HPCR Manual on International Law Applicable to Air and Missile Warfare*, 140.

contracted. Finally, possible mental health issues for civilian pilots are mitigated by the non-combat nature of the proposed allowed mission sets.

c. From a business perspective, the organization would need to devote the resources to carefully develop a first-of-its-kind contract. For the institution, being able to share some of the crewing burden via contracts provides flexibility in managing financial resources. Labor law expertise is required for this initiative.

d. In terms of pilot requirements, the United States government established a precedent for civilian pilots on a similar platform for similar missions. The U.S. Customs and Border Protection flies unarmed surveillance missions with the MQ-9B with civilian pilots[28]. The requirements are equivalent to Airline Transport Pilot License (ATPL) requirements of 1,500 hours of flight experience and more. Applicants would be motivated by the convenience of making wages proportional to their level of experience without the burden of travel. For instance, ex-military pilots could fit this profile.

CONCLUSION

11. The RCAF is building the RPAS project to bring a unique and new capability that fits its doctrine. The 2023 RCAF Strategy document calls for organizational innovation[29]. Indeed, design thinking should challenge legacy assumptions when it can resolve limiting factors like crewing. The purpose of the paper was to demonstrate the feasibility of augmenting RCAF RPAS units with civilian pilots. It is inaccurate to state that using civilian pilots for RPAS would be against the Law of Armed Conflict and thus it would be a mistake to dismiss the idea based on that logic. Because of the benefits of augmenting human resources for crewing, a deliberate consideration should be made for the inclusion of civilian pilots. In the future, pilot duties will be gradually relieved with more autonomy, and the questions discussed here about military responsibility over aircraft control and mission command will remain relevant.

RECOMMENDATION

12. The RCAF should formally investigate the use of civilian pilots to augment RCAF RPAS units in the medium term, or sooner if military pilot shortages become a limiting factor to enabling this new capability. To prepare for this, military officers like ACSOs should be trained in RPCC and MIC duties.

Annex: RCAF RPAS Mission Sets.

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[28] UAS MQ-9 Predator B Fact Sheet, U.S. Customs and Border Protection, accessed February 24, 2023, https://www.cbp.gov/sites/default/files/assets/documents/2019-Feb/air-marine-fact-sheet-uas-predator-b-2015.pdf. Air Interdiction Agent (Pilot) – Flight Assessment, U.S. Customs and Border Protection, accessed February 24, 2023, https://www.cbp.gov/careers/car/aia-flight-assessment and, Department of National Defence, "Initial RPAS Pilot Position Selection Brief", Director Air Force Requirement, October 2020, slide 7 notes.

[29] Department of National Defence, *Royal Canadian Air Force Strategy: Agile, Integrated, Inclusive*, 2023, 17.

Annex – RCAF RPAS Mission Sets[30]

Domestic Missions	**NORAD Missions**	**Deployed Missions**
• Canadian sovereignty and patrol	• Aerospace Warning	• Assistance during and after natural disasters
• Fisheries and pollution patrol	• Aerospace Control	• Intelligence, Surveillance and Reconnaissance
• Surveillance for large events (e.g. Olympics)	• Maritime Warning (2006)	• Maritime Patrols
• Aid to Civil Power during and after natural disasters		• Direct support to deployed commanders including kinetic effects

[30] Department of National Defence, "Remotely Piloted Aircraft System Brief" .

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U.S. Customs and Border Protection. "UAS MQ-9 Predator B Fact Sheet." Accessed February 24, 2023. https://www.cbp.gov/sites/default/files/assets/documents/2019-Feb/air-marine-fact-sheet-uas-predator-b-2015.pdf