National Defence Défense nationale

Canadian Forces College

Collège des Forces Canadiennes

MANNED PERSISTENT SURVEILLANCE AND STRIKE CAPABILITIES FOR THE RCAF

Maj A.R.W. Jordan

JCSP 42

Service Paper

PCEMI 42

Étude militaire

Disclaimer

Opinions expressed remain those of the author and do not represent Department of National Defence or Canadian Forces policy. This paper may not be used without written permission.

Avertissement

Les opinons exprimées n'engagent que leurs auteurs et ne reflètent aucunement des politiques du Ministère de la Défense nationale ou des Forces canadiennes. Ce papier ne peut être reproduit sans autorisation écrite.

Canada

CANADIAN FORCES COLLEGE – COLLÈGE DES FORCES CANADIENNES
JCSP 42 – PCEMI 42
2015 – 2016

JCSP SERVICE PAPER – PCEMI ÉTUDE MILITAIRE

MANNED PERSISTENT SURVEILLANCE AND STRIKE CAPABILITIES FOR THE RCAF

Maj A.R.W. Jordan

Word Count: 2203

Compte de mots: 2203

MANNED PERSISTENT SURVEILLANCE AND STRIKE CAPABILITIES FOR THE RCAF

AIM

1. Since the terrorist attacks on the United States on 11 Sept 2001, Canada and the Canadian Armed Forces have been increasingly involved in non-traditional combat operations, commonly known as asymmetric warfare. Through Canadian and allied experiences in Afghanistan, as well as other theaters of operation, persistent Intelligence, Surveillance and Reconnaissance (ISR) has been a significant force multiplier, and its value cannot be understated. The ability to conduct precision strike coupled with the constant stare over the battlespace multiplies the benefit of persistent ISR. This service paper will investigate as well as make a recommendation of the advantages and force multiplier effect of enhancing the RCAFs capabilities by adding a precision strike capability to one or more existing high endurance platforms.

INTRODUCTION

2. Based on the collective allied experiences in Afghanistan, Iraq, Libya and the current operation in the Syrian theatre of operations, the proliferation of (ISR) platforms have grown to be indispensable force multipliers. Some of these platforms, such as the MQ-9 Reaper UAV, or the CF-188 Hornet, with the sniper pod have the ability to both sense and strike. Other platforms such as the Block 3 CP-140M Aurora have a robust sense capability, but are not strike capable in the overland mission set. In cases where ISR has identified targets of interest or been present where friendly forces are in need of close air support (CAS); and the ISR aircraft is not armed, an additional strike capable platform must be called in to complete the mission. The time between detection, the decision to strike and the strike itself is known as the sensor to shooter

loop.[1] Any technical, operational of command loop means to shorten this loop has advantages to the war fighter on the ground. The media has portrayed the use of armed UAVs in a negative light, and the use of the Hornet in Kuwait is currently politically contentious.

3. Based on current Canadian Forces Doctrine, the Canada First Defence Strategy (CFDS) as well as the tenets and characteristics of airpower, this service paper will outline the rational for expanding the capabilities of the RCAF's ability to conduct ISR-Strike missions. Additionally this paper will also make recommendations, based on existing national and allied capabilities, on how the RCAF can adapt existing platforms to carry out ISR-Strike missions in expeditionary operations.

DISCUSSION

4. Although somewhat dated by the recent change in government, the initial basis for the any Defence related activity should be the CFDS. The CFDS outlines the requirements for the Canadian Forces to operate in a "major international operation for an extended period" utilizing multi-role and combat-capable" military assets.[2] While there is no further definition of what an extended period is, in the current deployment construct of the Canadian Forces, anything that requires forces beyond an initial six month deployment could be considered extended. The ten years in Afghanistan, Op LIBECIO in Libya as well as the ongoing deployment to Kuwait could therefore be considered major operations.

5. The second aspect of the CFDS that should be strongly considered is the concept of multi-role combat capable aircraft. As stated by USAF General Deptula in a 2009 interview, "almost every force application aircraft flying in Southwest Asia today has a targeting pod on it

[1] Defense Update: International Online Defense Magazine, "Urban C4I: Accelerating the Kill Chain, Closing the Sensor-to-Shooter Cycle," last accessed 04 Feb 2016, http://defense-update.com/features/du-1-06/urban-c4i-7.htm.

[2] Government of Canada, "Canada First Defence Strategy", accessed 04 Feb 2016 http://www.forces.gc.ca/en/about/canada-first-defence-strategy-summary.page.

that is used more for ISR than targeting."[3] With a very large number of sensors in the battlespace, it makes sense to employ the combat capable aircraft to their fullest extent. If the sensor can also be the shooter, it can reduce the number of steps as well as temporal delays in the sensor to shooter chain.

6. While the Canadian Forces did not deploy its only aircraft capable of land attack to Afghanistan, CF-188 Hornets were deployed to Kosovo in 1999, Libya in 2011 and have been in Kuwait since the fall of 2014. All four theatres have also seen the deployment of other RCAF assets, such as the CP-140 Aurora in both maritime and overland surveillance, the CC-130E/H/HT in tactical airlift as well as air to air refueling (AAR) roles, and the new CC-130J aircraft in the tactical transport role in Afghanistan, Libya and Kuwait. Considering the characteristics of airpower, the Aurora as well as the Hercules, in all variants, have certain advantages over the Hornet. Both platform types have sufficiently large fuel capacities providing them with the ability to stay aloft for significantly longer periods of time which enhances the airpower application of persistence.[4]

7. The desire for a capability providing both persistent ISR as well as performing the strike role when required is nothing new for the RCAF. Early in the new millennium, a project called Joint Unmanned Targeting and Acquisition System (JUSTAS), was initiated. This project, had the end state of acquiring unmanned aerial systems (UAS) that would fill capability gaps in both domestic surveillance operations as well as expeditionary deployments where ISR as well as strike capabilities may be required.[5] Given the success and reliance that our American allies

---

[3] LGen Deptula, "Air Combat Platforms and ISR", *Defence Today*, March 2009, 43. accessed 04 Feb 2016, http://www.ausairpower.net/SP/DT-Deptula-March-2009.pdf.

[4] Department of National Defence, B-GA-400-000/FP-000, Canadian Forces Aerospace Doctrine (Ottawa: DND Canada, 2009), 26.

[5] Chris Thatcher, "RCAF seeks new costing data for long-range UAS system", *Skies*, 21 January 2016. accessed 04 Feb 2016, http://skiesmag.com/news/article/RCAFseeksnewcostingdataforlongrangeUASsystem.

have placed on unmanned systems in both the pure ISR role, as well as the ISR strike role it would seem logical for Canada to follow suit. Ongoing questions regarding the regulation of UAS airworthiness as well as access to domestic as well as international airspace have further confounded efforts to further project JUSTAS to reality.[6]

8. One reality is that JUSTAS is many years away from being a useful capability for the RCAF. At present there is not even a request for proposal for industry to submit bids to deliver a large UAV capability to the RCAF.[7] Another reality is that the strike portion of the OP Impact mission could be carried out by other aircraft. The Aurora aircraft has seen its mission evolve from its service introduction from that of an anti-submarine warfare (ASW) platform to a very capable overland ISR platform. Its exotic suite of sensors and radios make it a state of the art command and control platform. Additionally the Aurora crews are trained and proficient in weapons delivery, making them the only fixed wing platform other than the Hornet than can directly employ lethal force.

9. As capable as the Hornet is, it is limited in its ability to remain over the battlespace for extended periods of time. Without AAR support on-station time can be extremely low depending on the transit distance to and from the main operating base. With a long endurance aircraft like the Aurora, already in-theatre providing ISR support, exercising flexibility and versatility in arming the Aurora would be a significant force multiplier. With both budgetary and personnel constraints in mind, there are means by which the core tenets of airpower can be capitalized in order to better serve the war fighter.

---

[6] David Pugliese, "DND concludes that it does not need permission to fly drones in domestic airspace, despite 'greater challenges'", *National Post*, 17 August 2013. accessed 04 Feb 2016, http://news.nationalpost.com/news/canada/dnd-concludes-it-does-not-need-permission-to-fly-drones-in-domestic-airspace-despite-greater-challenges.

[7] Thatcher, *RCAF seeks new costing data for long-range UAS system*…, .

10. As the Canadian Forces do not have an ISR-Strike aircraft, other than the Hornet, the RCAF must consider the operational flexibility of converting one or more existing aircraft to supplementing the strike capability of the Hornet. Aircraft in the current inventory that lend themselves well to such modification are both the Hercules and the Aurora. The United States Marine Corps, has successfully modified several Hercules aircraft to perform high endurance ISR strike. As well there are several United State Navy (USN) variants of the P-3 Orion, the baseline aircraft for the Aurora, armed with a litany of weapons for offensive strike.

11. Originally acquired during the Cold War, the Aurora has undergone a number of modifications and upgrades in order to extend its service life as well as to keep its capabilities in step with technological advances. In addition to its ASW role, the modernized Aurora is capable of functioning as a command, control, communication, computer, intelligence, surveillance and reconnaissance (C4ISR) platform for domestic and international operations. Additionally it is capable of overland ISR and strike coordination[8]. Already capable of dropping weapons for ASW attack, the addition land attack weapons would enhance the flexibility and versatility of the Aircraft to its penultimate state.

12. The Aurora aircraft lends itself well to incremental upgrades and weaponization. Its internal bomb bay, already configured to hold up to 8 torpedoes is also capable of holding the GBU10-12-16 series of bombs in the 500 to 2000 pound category. These weapons are precision guided strike weapons that are already in the inventory and employed by the Hornet. In addition to the internal weapons bay, there are provisions on the aircraft for up to ten wing mounted weapons pylons. These pylons are capable of carrying unguided land attack rockets, missiles

[8] Wright Eruebi, "Canada's modernized CP-140 Aurora has 'James Bond' properties", *Royal Canadian Air Force News*, 20 May 2014, last accessed 5 Feb 2016, http://www.rcaf-arc.forces.gc.ca/en/article-template-standard.page?doc=canada-s-modernized-cp-140-aurora-has-james-bond-properties/hvexurrt.

such as the Harpoon, Maverick and Hellfire as well as low collateral damage precision strike guided bombs such as the SCALPE and the Griffin small diameter bomb.[9]

13. The USMC has demonstrated that the Hercules can be adapted to the ISR strike role as well. Under project *Harvest Hawk* a number of USMC Hercules, previously configured for AAR have undergone conversion to add a roll-on, roll-off, ISR strike capability, while still retaining its AAR function. As of 2012, twelve USMC KC-130J Hercules had been converted to the Harvest Hawk configuration. The left hand AAR pod was removed and replaced with a weapons mount for either four AGM-114 Hellfire missiles or 16 DAGR laser guided rockets. The left hand external fuel tank was modified to hold an ISR turret in the rear section, and a mount was instated on the ramp to hold and fire ten Griffin missiles.[10] By retaining the right hand AAR pod, the aircraft is still able to conduct AAR mission while loitering over a target of interest and continuing to exploit it for intelligence.

14. This initial modification had some limitations. With the Griffin launcher mounted on the cargo ramp, the aircraft must depressurize and slow-down in order to open the ramp to launch the missiles. Additionally with the ISR turret in the left hand external tank, the aircraft becomes an obstruction to targets on the right. To overcome these deficiencies, a retro-fit para door, known as the Derringer Door has been developed that will allow for the firing of the Griffin missiles through the door, with the aircraft on speed and still pressurized. A follow-on improvement project will see the ISR turret moved from the external tank to the nose to eliminate the aircraft masking issue.[11] The ability to convert a tactical transport or tanker asset

---

[9] Department of National Defence, D2-290/2011E-PDF, *Project Laminar Strike: Canada's Air Force: Post Op Athena* (Ottawa: DND Canada, 2011), 47.

[10] Defense Industry Daily, LLC, "Harvest Hawk Aims to Arm USMCS KC130J Aerial Tankers", last accessed 06 Feb 2016, http://www.defenseindustrydaily.com/harvest-hawk-aims-to-arm-usmcs-kc-130j-aerial-tankers-05409/

[11] Strategy Page, "Air Weapons: Upgrading Harvest Hawk", last accessed 06 Feb 2016, https://www.strategypage.com/htmw/htairw/20150108.aspx.

into an ISR strike aircraft in hours is a significant force multiplier as it allows one aircraft to carry out several missions in the long duration sortie. This can have the additional benefit of a reduced overall footprint of deployed forces.

15. At present, neither the Aurora, nor the Hercules aircraft fleets have the capability or training to employ overland weapons effects. It should be possible to leverage the engineering support from the USMC Harvest Hawk program as well as the various weapons programs that the United States Navy has embarked on to employ weapons from the P-3 Orion aircraft. Another very important aspect will be the training of the aircraft technicians as well as the aircrews to load and employ these new weapons. The Aurora crews would be at an advantage as they already train to employ torpedoes in the ASW role. The Aurora crews however do not have any defensive systems to defeat missiles, nor do they currently have defensive maneuvering tactics. Crews operating both the J model Hercules as well as the venerable HT version in the AAR role are equipped with a defensive suite of chaff and flares and they are trained in defensive maneuvers. At present they are not trained in weapons delivery.

CONCLUSION

16. The modifications conducted on the USMC Hercules AAR fleet have demonstrated that the Air Force functions of Command, Act, Sense and Shield can be greatly enhanced with the addition of roll-on, roll-off weapons and sensor systems. The longer duration missions made possible by larger aircraft with a longer endurance enable greater persistence over the battlefield as compared to a fighter such as the Hornet. The ability to conduct precision strike coupled with the constant stare over the battlespace multiplies the benefit of persistent ISR. A follow on benefit is the confidence in the war fighter on the ground that they are being supported by ISR assets with a precision strike capability and rapid sensor to shooter reaction time. Canadian

Forces experiences in Afghanistan, Libya as well as the on-going Op Impact have demonstrated the need and benefit for both persistent ISR as well as precision strike.

RECOMMENDATION

17. It is recommended that programs to mount land attack weapons internally and externally on the Aurora be initiated immediately. Additionally programs to replicate the improved Harvest Hawk system on both the AAR capable HT Hercules as well as the entire J model Hercules fleet. As roll-on, roll-off capabilities aircraft can be modified but not be restricted from carrying out their present role. An additional benefit would be realized domestically as the HT Hercules fleet is also tasked with conducting Search and Rescue. The addition of an ISR sensor would be a significant enhancement to the domestic SAR role. Conducting these modifications would greatly enhance the flexibility and versatility of the RCAF to project Air Power in any theatre. The persistence over the battlespace that such capabilities would enhance the RCAFs ability to support any allied or coalition force in any theatre.

BIBLIOGRAPHY

Defense Update: International Online Defense Magazine, "Urban C4I: Accelerating the Kill Chain, Closing the Sensor-to-Shooter Cycle," last accessed 04 Feb 2016, http://defense-update.com/features/du-1-06/urban-c4i-7.htm.

Government of Canada, "Canada First Defence Strategy", last accessed 04 Feb 2016 http://www.forces.gc.ca/en/about/canada-first-defence-strategy-summary.page.

Deptula, LGen "Air Combat Platforms and ISR", *Defence Today*, March 2009, 42-44. last accessed 04 Feb 2016, http://www.ausairpower.net/SP/DT-Deptula-March-2009.pdf.

Thatcher, Chris. "RCAF seeks new costing data for long-range UAS system", *Skies*, 21 January 2016. accessed 04 Feb 2016, http://skiesmag.com/news/article/RCAFseeksnewcostingdataforlongrangeUASsystem.

Canada. Department of National Defence, B-GA-400-000/FP-000, *Canadian Forces Aerospace Doctrine.* Ottawa: DND Canada, 2010.

Eruebi, Wright. "Canada's modernized CP-140 Aurora has 'James Bond' properties", *Royal Canadian Air Force News*, 20 May 2014, last accessed 5 Feb 2016, http://www.rcaf-arc.forces.gc.ca/en/article-template-standard.page?doc=canada-s-modernized-cp-140-aurora-has-james-bond-properties/hvexurrt.

Canada., Department of National Defence, D2-290/2011E-PDF, *Project Laminar Strike: Canada's Air Force: Post Op Athena.* Ottawa: DND Canada, 2011.

Defense Industry Daily, LLC. "Harvest Hawk Aims to Arm USMCS KC130J Aerial Tankers", last accessed 06 Feb 2016, http://www.defenseindustrydaily.com/harvest-hawk-aims-to-arm-usmcs-kc-130j-aerial-tankers-05409/.

Strategy Page. "Air Weapons: Upgrading Harvest Hawk", last accessed 06 Feb 2016, https://www.strategypage.com/htmw/htairw/20150108.aspx