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LASER TARGET DESIGNATION: KEEPING THE AURORA RELEVANT IN THE OVERLAND ROLE AND INTO THE FUTURE

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Service paper for DCOMD Force Generation

AIM

1. This paper will examine how the Aurora's overland role and the development of the Intelligence Surveillance and Reconnaissance (ISR) overland mission have highlighted a capability gap. This gap is related to target designation and if addressed will not only bridge the RCAF gap but will increase the capabilities across the joint force. This paper will highlight areas of further study with a Course of Action recommendation on how to bridge the Gap that currently exists.

INTRODUCTION

2. This paper addresses the future of Air component capabilities in relation to the Aurora Long Range Patrol (LRP) Aircraft. It was written to examine developments in the recent increases in the overland capabilities of the CP140 Aurora. As the government and strategic level become more involved in fragile states, the overland role is becoming the more likely mission for the Aurora. The risk aversion of politicians influences the future towards faster mobile forces. The full capability of examining these increased overland missions is, however, being held back by the imaging sensor that is the eyes of the aircraft itself. The WESCAM MX-20 electro-optical infrared (EO/IR) camera that was installed in the Aurora in 2006 has proven to be the key in opening the door to the overland role. The problem is that although the MX-20 has indeed opened the overland door, it has only been partially opened limiting its full potential in the new ISR dynamic mission environment.

3. The approach of this paper will be to identify the current Aurora capabilities so as to show the actual capability gap that exists. This will be followed by the proposed course of action recommendation including areas of further study.

DISCUSSION

4. After more than 26 years of service it became necessary in 2006, to replace the existing forward looking infrared camera. The WESCAM MX-20 (EO/IR) was chosen as the replacement. The electro optical and Infrared Camera is an extremely versatile sensor that has beyond line of sight capability. There was already a move in the Aurora community to adapt to the changing world and recognize that the joint environment was the way of the future. With this EO/IR and the capability it introduced, the overland ISR role began to take shape.

5. Before one can talk ISR and the overland capabilities it is first important to mention why ISR is currently so important from a strategic viewpoint. As has been mentioned previously as risk aversion increase the new government will continue to look at airpower as a means of interdiction or coercion in conflicts where public opinion does not have the appetite to lose troops on the ground fighting a ground war. Air power offers the alternative of low risk - high reward missions that have the ability to generate a strategic effect felt by the politicians but executed at the tactical level. As mentioned in the RCAF doctrine, "Doctrine uses strategic guidance and joint guidance to describe the conditions that shape the force and determine the government's options for its employment."¹ The functions that the RCAF uses to do this, COMMAND, SENSE, ACT, SHIELD, SUSTAIN and GENERATE are important when considering missions in both a domestic and international framework. ISR effectively falls under

¹ Canada. Department of National Defence. B-GA-400-000/FP-000, RCAF DRAFT "Air Doctrine", Last accessed 25 January 2016, 1-5.

the domain of the SENSE function. Through the SENSE function the commander is given Situational Awareness (SA) with the aim to give the decision maker of the command decision superiority.² From a strategic viewpoint, this decision superiority allows commanders to increase their SA exponentially. The commander that has more information than his enemy, can carry out the other RCAF functions such as ACT in a more expeditious and efficient manner. ISR provides this capability to commanders from the strategic, operational and tactical level. Not only does this increase the strategic commanders decision superiority but is also goes all the way to a national strategic level. He who has most accurate information has most potential for control.

CAPABILITIES

6. What then is the actual ISR capability the Aurora brings to the overland role? For the scope and size limits of this paper, ISR will be limited to the examination of that which is capable from the MX-20. First we have mentioned the imaging capability but the Aurora can also interact across the other components. As RCAF doctrine states under the ISR section; “RCAF ISR systems must be interoperable with those of the entire joint force.”³ This is essential in the overland role because an Aurora will not be involved in a conflict by itself. Its ISR product will have an end user, which may be other aircraft, ground forces be they SOF or conventional army, the navy or the commander himself. IT also has the persistence capability. As Captain Daniel Arsenault and Captain Josh Christianson state, “Perhaps one of the most valuable features of the Aurora is one that has existed all along: its endurance. Its ability to loiter over 12 hours allows for an unparalleled level of persistence typically only seen with unmanned aerial

² NATO. AJP-3.3.2(A), “Allied Joint Doctrine For Close Air Support And Air Interdiction,” (2009), 4-4.

³ Canada. Department of National Defence. B-GA-400-000/FP-000..., 5-7.

systems.”⁴ As one can see an advanced EO/IR, long persistence and RCAF highly trained crew provide a very nice capability to the commander. The problem is that in theatre this capability can be accomplished by an UAV. Although UAVs are very versatile assets, the difference in the equation is the human component. As Col Iain Huddleston states; “ Compared to an unmanned aerial vehicle, the Aurora is more capable of shifting its focus ‘on-the-fly’, benefiting both from the size and experience of its crew and also from the fact that they physically are above and still operating with the battlespace.”⁵ So the capability can be defined as a persistent high quality ISR asset with a flexible intelligent crew. These capabilities were combined with a game changing capability that was created in Libya during Operation Mobile. The capability developed was strike coordination and reconnaissance (SCAR) missions. SCAR is defined as;

SCAR missions can be tasked in order to allow aircraft to seek-out and attack enemy targets beyond the battlefield area. SCAR allows aircrews to be directed into areas where potential targets exist, and to subsequently coordinate multiple attacking flights and reconnaissance units through the target area in order to maximize the effectiveness of each sortie. ⁶

This new potential capability represents a fundamental shift in the Aurora overland role. On top of the SENSE function providing SA via ISR to commanders, the Aurora could now link SENSE to ACT and actually coordinate target prosecution. They can coordinate kinetic effects onto targets. The Find-Fix-Target cycle’s time window can be reduced with the Aurora operating between the SENSE and ACT functions. The strategic, operational and tactical implications that this brings to commanders cannot be understated. Not only would a commander have current information in a dynamic environment but he could actually ACT on it as he saw fit. The level of

⁴ Arsenault, Daniel and Christianson, Josh, “Punching above its Weight. The CP140 Aurora Experience within Task Force Libeccio and Operation Mobile.” *The Royal Canadian Air Force Journal*, Vol 1, No 3 (Summer 2012): 29.

⁵ Huddleston, Iain. “Changing with the Times: The Evolution of Canada’s CP-140 Aurora.” *Canadian Naval Review*, Vol 11, No 1 (2015): 11.

⁶ Royal Air Force, “Attack,” last accessed 12 January 2016, <http://www.raf.mod.uk/role/attack.cfm>.

persistence and detailed imagery that the Aurora brings to the fight has the potential to provide a capability that the Navy, Army, SOF and the RCAF have never seen on a Canadian asset before.

THE GAP

7. MX-20 is a very capable sensor and in Libya, Auroras would fly 12 SCAR-Coordinator(C) missions, three of which were flown by all Canadian crews. They were very successful and this new SCAR capability continues to have enormous potential.

The benefits of the Aurora in these types of missions were that it identified targets well, arguably better than many UAVs with smaller, less capable cameras, and efficiently relayed movements details, ongoing battle damage estimation and coordinate strike actions. In addition, it remained overtop the area for sustained periods, allowing the time to build an accurate picture of activities, patterns of life, further target correlation, collateral damage estimates, and final post attack damage assessments.⁷

SCAR missions ultimately involve coordinating the kinetic effects of armed fighter aircraft on identified targets. What is impressive but also troubling is that Aurora crews accomplished these missions with no laser designator, infrared pointer or range finding capabilities (LTD/IR) on their MX-20. Their SCAR-Coordination was completely accomplished by talking the attack aircraft onto the target. These ‘talk-on’ procedures were used to identify ground features or points of interest that pilot flying the fighter aircraft could see and follow in order to find the target itself in order to drop or launch his weapons. This is where the major capability Gap lies. As the NATO joint doctrine document states, “Collateral damage and fratricide are undesirable aspects of warfare. Causes include, but are not limited to, misidentification of targets, target location errors, weapon technical failures, and loss of situational awareness during planning or execution.”⁸ Every one of these except weapon failures is possible when an operator is operating

⁷ Arsenault, Daniel and Christianson, Josh, “Punching above its Weight...”, 33.

⁸ NATO. AJP-3.3.2(A), “Allied Joint Doctrine...”, 4-6.

the MX-20 without a laser target designation capability or infrared pointer. Without LTD/IR you introduce the possibility of these errors. One event with unintentional fratricide or collateral damage that could have been prevented is one too many. The capability gap can be fixed by adding the capability of LTD/IR.

8. Introducing the LTD/IR capability also would allow the Aurora to focus the effort in the battle space. The implications of this focused effort would not only impact the RCAF but the Navy and the Army as well. Currently precision guided munitions have to be guided onto target either by the attacking aircraft itself, another ISR asset or some type of allied ground force in proximity to the target, i.e. imbedded SOF. Bridging this Gap would allow the Aurora to accomplish this role freeing assets for other missions and reducing wasted resources. SOF assets would not have to laser designate targets from the ground and could be freed for other missions. As one of the SCAR- Coordinators that flew during Op Mobile on the Aurora states, “Without the integrated LTD, the sensor’s ability to designate targets with laser energy and produce high confidence coordinates is non-existent. As such, bomb on coordinate engagements are not realistically achievable, further limiting the options to the Joint Force.”⁹

9. The Aurora also proved the potential for Navy uses of an MX20 LTD/IR capability. During Op Mobile in Libya, Forward Air controllers from the British Royal marines were integrated into the existing Aurora crew and actually conducted naval gunfire support along the Libya shoreline. The operation although a success in using a forward positioned Aurora to act as the eyes of the ship, it identified major gaps in the capability. Without a LTD/IR capability on

⁹ Joyce, Derek. End of Tour Report-Task Force Libeccio. Annex A, “Future CP140 Overland Prospects.” Nov 2011. A2-5/6.

the MX-20, range finding was non-existent and ranging was accomplished with operator error and lack of precision. An LTD/IR capability would eliminate these shortcomings.

10. The lack of LTD/IR is a significant detractor to this new overland capability and severely limits the amount that the Aurora can participate in these types of operations. The capability the Aurora currently brings to theatre can be described as an almost there solution. The Aurora has the potential to not only move overland but to do so in a leading role with an ability to play in the offensive air support role as a leading contributor instead of being relegated to lower and less important missions because the equipment is just not good enough. Joint commanders are not willing to take the risk to allow an asset to operate in the SCAR-C role without the required equipment. A LTD/IR capability on the Aurora MX-20 would close the gap and exponentially increase their overland ISR joint capability.

COURSES OF ACTION

11. This section will present the possible courses of action (COAs) when considering the capability gap in the Aurora overland role.

COA 1

12. This course of action will be to maintain the status quo. The current ISR product that is produced by the Aurora is of an extremely high quality. The EO/IR is a very capable sensor and with the block 3 upgrade of the AIMP program, the ISR product will only increase in contribution to the SENSE function. The product that originates from Aurora crews is highly regarded. Canada does not currently have a UAV capability either domestically or deployable and thus the Aurora is more than suited to provide commanders with a reliable non kinetic ISR product.

COA 2

13. This course of action is to acquire the LTD/IR capability on the existing MX-20. When the MX-20 was installed in 2006, there was actually a LTD capability that military requested to be removed and replaced with ballast. This COA involves the further investigation into the possibility of removing this ballast and replacing it with an LTD/IR capability. The LTD/IR introduction to the MX20 would complete the full capability of the Aurora's overland role in both a joint and coalition environment.

COA 3

14. COA 3 will only be necessary if COA 2 is unsuccessful due to software or differences in current LTD technology and what is found in the current MX-20. Further investigation would be required to examine the procurement of a new variant of the MX-20 EO/IR with LTD/IR capability. It is beyond the scope of this paper to examine cost related questions. Further study would be required if COA 3 is chosen.

CONCLUSION AND RECOMMENDATION OF COA

15. The recommended course of action is COA 2. It is assessed to be essential that the RCAF acquire LTD/IR capability on the existing MX-20. The Aurora has become an unmatched RCAF asset for achieving the SENSE function in the domestic environment. Although COA 2 represents what seems like a small tactical change, the strategic effect that it carries with it is enormous. The overland role maintains the relevancy of the Aurora in current conflicts overseas. With relevancy comes visibility and when an asset is both relevant and visible to commanders and politicians, the costs for keeping this asset relevant and visible become less important. It can be said that relevancy pays the bills. We now find the Aurora maturing into a serious contender in joint deployed operational situations. The ISR product that is provided from the Aurora is of

very high quality. When ISR assets begin to move further and further inland as the enemy ground threats begins to lessen precision ISR is paramount. As mentioned in the new Air Doctrine: “CAF and its allies operate under stringent engagement criteria that dictate the use of weapons that are increasingly precise. These criteria require detailed and highly accurate intelligence supported by robust ISR.”¹⁰ Bridging the capability gap with acquiring LTD/IR designation on the Aurora MX-20 will only serve to increase the accuracy of the ISR that is provided to RCAF coalition partners, other RCAF assets and to commanders themselves. The key to having superiority in making your decisions is to have the latest information. One cannot do this from the sidelines and thus we must be directly involved in operations. This is not only because it gives our commanders a say at the table with the latest SA and information but it also ensures that we are not putting allies or civilians on the ground at risk to fratricide or unnecessary collateral damage. Closing this Gap that exists will only push the Aurora further into the future of overland ISR operations. The solution and recommended COA is equipping the MX-20 with Laser Target Designation. As Col Iain Huddleston states, “ the CP-140M Block 3 Aurora is rapidly being established as the pillar upon which Canada’s overall intelligence, surveillance and reconnaissance system will be built.”¹¹ If this pillar is built properly, then the Aurora will not only serve as a pillar for the RCAF but also for the joint operating environment aiding in the accomplishment of future operational and strategic objectives.

¹⁰ Canada. Department of National Defence. B-GA-400-000/FP-000..., 5-7.

¹¹ Huddleston, Iain. “Changing with the Times...”, 15.

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