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## COMMAND OF AIR POWER: RECOMMENDATIONS FOR TACTICAL COMMAND AND CONTROL IN THE RCAF

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## **COMMAND OF AIR POWER: RECOMMENDATIONS FOR TACTICAL COMMAND AND CONTROL IN THE RCAF**

### **AIM**

1. To highlight current Canadian Armed Forces Aerospace Command and Control capabilities at the tactical level, and provide recommendations with an aim to align this capability with the mandates stated in *Strong, Secure, Engaged*.<sup>1</sup> Specifically, it will examine the atrophied state of present tactical Command and Control (C2) infrastructure, opportunities for increased operator training and experience in expeditionary operations, and the current reliance on Allies in the conduct of this function.

### **INTRODUCTION**

2. Current Royal Canadian Air Force (RCAF) doctrine defines the Theatre Air Control System (TACS) as the system of record employed to conduct C2 of air assets.<sup>2</sup> The focus of the system, originally designed and implemented by the United States Air Force, is to exercise centralized command and decentralized execution enabling the flexible application of air power across the spectrum of operations. The primary component of the TACS is the Combined Air Operations Centre (CAOC). This operational level headquarters “is the principle centre from which air operations are directed, monitored, controlled, and coordinated with other components.”<sup>3</sup> The CAOC exercises command and control through the publishing of numerous

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<sup>1</sup> Department of National Defence, *Strong, Secure, Engaged: Canada’s Defence Policy* (Ottawa: DND Canada, 2017), 39, <http://dgpaapp.forces.gc.ca/en/canada-defence-policy/docs/canada-defence-policy-report.pdf>.

<sup>2</sup> Department of National Defence, B-GA-401-000/FP-001, *Canadian Forces Aerospace Command Doctrine* (Ottawa: DND Canada, 2012), 22-23, [http://www.rcf-arc.forces.gc.ca/assets/AIRFORCE\\_Internet/docs/en/cf-aerospace-warfare-centre/b-ga-401-000-fp-001.pdf](http://www.rcf-arc.forces.gc.ca/assets/AIRFORCE_Internet/docs/en/cf-aerospace-warfare-centre/b-ga-401-000-fp-001.pdf).

<sup>3</sup> *Ibid.*, 23.

directives and tasking orders that allow subordinate entities to perform operations with limited contact back to the operational level during execution. The CAOC also provides the interface between the tactical and operational levels of warfare during operations. Another key element of the TACS is the Control and Reporting Centre (CRC). The CRC is the tactical level C2 node that “manages all defensive air, offensive air, and airspace management activities within an assigned area through surveillance, identification, weapons control...and link management.”<sup>4</sup> The CRC is also the primary entity responsible for the development of the overall common operating picture (COP). CRCs can be mobile, static, ground or air based and they are the principal link between the CAOC and airborne air assets conducting operations within the battlespace. Within Canada, the Canadian Air Defence Sector (CADS) in North Bay, Ontario, performs North American Air Defence Command (NORAD) CRC functions.<sup>5</sup>

3. *Strong, Secure, Engaged (SSE)* highlights the RCAF’s strategic reach as a “crucial enabler of...expeditionary operations, enabling joint action through control of the air,...surveillance and reconnaissance.”<sup>6</sup> Furthermore, *Strong, Secure, Engaged* puts emphasis on Canada being poised to fill a leadership role during future expeditionary operations through ensuring interoperability and operational expertise amongst its allies.<sup>7</sup> Presently, the RCAF does not have the infrastructure, expertise or doctrine to support expeditionary CRC operations abroad as described in the most recent defence policy. Two mobile radar units exist to perform this function; however, they employ antiquated equipment that is technically limited when supporting modern air warfare and network integration.

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<sup>4</sup> *Ibid.*

<sup>5</sup> *Ibid.*

<sup>6</sup> Department of National Defence, *Strong, Secure, Engaged...*, 38.

<sup>7</sup> *Ibid.*, 61.

## DISCUSSION

4. Outside of the CADS, the RCAF's CRC capabilities include two mobile radar units: 42 Radar Squadron and 12e Escadron de Radar, located at 4 Wing Cold Lake and 3 Wing Bagotville, respectively. The mission of these units is to provide a globally deployable surveillance and tactical control capability that is ready to move on 72-hours' notice.<sup>8</sup> Both units employ the Northrup-Grumman AN/TPS-70 radar procured in 1990-1991.<sup>9</sup> Although these units have been updated to incorporate certain datalink capabilities and other modern equipment, the core radar and C2 human interface, the radar scope, have had minimal lifecycle updates since being acquired in the early 1990s. A project to replace the technologically "unsupportable" radars failed in 2015 due to issues between the contractor, Thales Canada Ltd., and Public Works Canada.<sup>10</sup> This returned the project to the "statement of requirement" development stage, and forced an emergency refurbishment AN/TPS-70 radar systems.<sup>11</sup> While sufficient to conduct the primary surveillance and existing NORAD missions, the interim solution has left a technological capability gap in these units leaving them arguably ill-suited to conduct all potential doctrinal roles of a CRC within the full spectrum of conflict.

5. The cancellation of the AN/TPS-70 project has certainly stagnated the development of RCAF mobile radar units; however, there is a possible silver lining to this setback. The 2017

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<sup>8</sup> Government of Canada, "12 Radar Squadron," last modified 15 July 2013, <http://www.rcf-arc.forces.gc.ca/en/3-wing/12-squadron.page>.

<sup>9</sup> Government of Canada, "42 Radar Squadron," last modified 15 July 2013, <http://www.rcf-arc.forces.gc.ca/en/4-wing/42-squadron.page>.

<sup>10</sup> Dean Beeby, "Military Plans to Refurbish 'Unsupportable' Radar Systems," *CBC News*, 31 December 2015, <http://www.cbc.ca/news/politics/military-plans-to-refurbish-unsupportable-radar-systems-1.3384528>. The radars and control scopes were deemed unsupportable due to the original manufacturer and other contractors no longer manufacturing replacement parts.

<sup>11</sup> *Ibid.*

Defence Policy highlights the investment needed in this area citing a commitment to “acquire new tactical integrated Command, Control and Communications” systems under the RCAF investment umbrella. With the previous project coming in well under \$100 million, the inclusion of this requirement in *SSE* bodes well for the community receiving the infrastructure needed to realign Canada’s mobile radar units with contemporary capabilities in this field.<sup>12</sup> This second chance at procurement provides a unique opportunity for the RCAF to ensure it receives the right equipment capable of seamless integration with existing RCAF control suites and Canadian Allies, primarily the United States, as prioritized in *SSE*. Presently, all other RCAF and USAF CRC level entities including the CADS, US NORAD Sectors, USAF mobile radar units and USAF Airborne Warning and Control System (AWACS), employ a similar human interface for their tactical C2 systems. Known as the Tactical Display Framework (TDF), originally developed by Solipsys and later merged with military industrial leader Raytheon, the TDF is integrated into NORAD’s Battle Control System-Fixed (BCS-F), USAF tactical mobile radar OM-MOD project, and AWACS recent Block 40/45 upgrade.<sup>13</sup>

6. The fact that the USAF and NORAD have adopted a common control interface for their CRC level tactical units is significant and worth further evaluation. First, it signifies the capability of the TDF system versus competitors. This system was chosen over numerous others, including an already contracted and fielded upgrade, during the NORAD modernization post September 11, 2001. This change in interface was due to its ease of use and superior capability

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<sup>12</sup> David Pugliese, “Canadian Forces Tactical Radar Deal with Thales Fails – RCAF Trying to Figure Out Next Steps,” *Ottawa Citizen*, 31 July 2015, <http://ottawacitizen.com/news/national/defence-watch/canadian-forces-tactical-radar-deal-with-thales-fails-rcaf-trying-to-figure-out-next-steps>.

<sup>13</sup> Office of the Director, Operational Test and Evaluation, *DOT&E FY 2016 Annual Report* (Washington, DC: GPO, 2016), 353-354, 361, <http://www.dote.osd.mil/pub/reports/FY2016/>. Raytheon, “Tactical Display Framework,” last accessed 31 January 2018, <https://www.raytheon.com/capabilities/products/tdf/>.

relative competitors.<sup>14</sup> Second, being common to all USAF control platforms dictates that there are significant resources budgeted for its development and continued modernization; ensuring it continues to be a preeminent control suite. Finally, and possibly most importantly, a common control suite allows operators from both the USAF and RCAF to integrate seamlessly during operations. It allows efficiencies in training and attaining proficiency for the operators of both nations often deployed between international units for operations and training exercises.

Commonality would also minimize time and expense in the conduct of training RCAF aerospace control occupations for employment domestically, as it would allow operators to move between RCAF units with minimal spin-up; a key attribute in smaller militaries as personnel are often sourced across many units to meet taskings during times of heightened operational tempo.

Lastly, it allows RCAF members to quickly integrate into USAF CRCs deployed worldwide.

With the USAF aerospace C2 network nearly spanning the globe, this would the RCAF a significant ability to tactical level control to support operations in many potential theatres. The efficacy of commonality was clearly seen during the recent AWACS Block 40/45 upgrade.

RCAF co-manning aircrew with previous time serving in NORAD were found to be the most expediently trained and proficient operators on the TDF based system. This resulted in many Canadians becoming key instructors and subject matter experts during the Wing-wide upgrade as the system approached full operating capability (FOC). The RCAF must ensure that whatever system is the result of the current mobile radar procurement process, due consideration is given to the value of a common operating interface across all RCAF and USAF systems.

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<sup>14</sup> The Battle Control System-Fixed started life as a Raytheon product fielded to upgrade NORAD Air Defence Sectors (CRCs). Post September 11<sup>th</sup>, an interim commercial off the shelf system, Solipsys' Tactical Display Framework, was adopted to meet the immediate needs of NORAD in the new security environment. BCS-F was fielded and proven capable, however, the USAF and NORAD opted to work with Raytheon and Solipsys to merge both systems and provide a common, capable interface for operators.

7. With the modernization of the Canadian Armed Forces at the forefront of the political agenda and the relatively low cost associated with replacing the existing unsustainable system, it is highly likely that a new mobile radar system will be purchased in the near future. That said, there are steps that should be taken now to ensure our units and personnel are prepared to employ this modern equipment in an expeditionary manner; something that RCAF radar units have not exercised outside of North America in modern times. There are several avenues Canada can take to build the expertise our operators will need to achieve the full potential of new equipment. First, it is possible to harness existing relationships and agreements governing NORAD to establish positions for Canadian personnel at USAF mobile radar units. Presently, there are USAF officers stationed at RCAF mobile sites; however, this reciprocal relationship has not been established in the United States, with Canada opting instead to have RCAF personnel imbedded with NORAD and AWACS units. This would be the first step to build relationships across which expertise, experience and coordination would occur, much like we see within the NORAD enterprise. Second, Canada needs to establish positions abroad at USAF and North Atlantic Treaty Organization (NATO) CRC units to further build operator warfighting experience. There is a precedent for this under Operation *Foundation*; however, the details associated are beyond the classification of this document. Likewise, with Canada pulling out of the NATO AWACS and Allied Ground Surveillance program in 2014, our presence within NATO C2 structures has dwindled.<sup>15</sup>

8. This fact has been acutely evident during recent deployments of RCAF assets in support of Operation *Unified Protector* in Libya, and Operation *Reassurance* in the Balkans. A review of

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<sup>15</sup> Karolina MacLachlan and Zachary Wolfram, "Diplomacy Disturbed: NATO Conservative Morality and the Unfixing of a Middle Power," *British Journal of Canadian Studies* 28, no. 1 (2015): 44.



the aerospace C2 structure for these operations reveal that Canada divested near complete responsibility for the tactical control of air assets to its Allies. In Libya, the lack of ground-based sensor coverage made the use of USAF, British and NATO AWACS a critical node in the aerospace C2 architecture of the operation. These airborne CRCs controlled all Allied aircraft operating over Libya, including Canadian fighter and surveillance platforms. As Canada had recently pulled out of the NATO AWACS program, Canadians were not involved in this critical link of the “kill chain.” The lack of national control at this level of warfare can be overcome through procedures and policy, however, it clearly highlights the gap created by removing Canadians from the NATO AWACS programme. A similar situation exists presently regarding the control of RCAF fighters patrolling the Balkans in the conduct of the NATO Air Policing mission. These cases exemplify not only the continued need for a deployable ground-based surveillance and C2 system, but the need for RCAF operators to increase their presence within existing Allied and Alliance structures. Not only will this strengthen relationships with partner nations, but ensure Canadians are in place within all levels of the C2 structure when Canadian air assets are conducting operations. Most importantly, it will help personnel build the fundamental proficiencies required to properly execute C2 of air assets in modern conflict, a task that will undoubtedly be expected of RCAF operators once new equipment is procured.

9. Doctrinally, this lack of presence at the tactical level is out of sequence with the RCAF’s ability to exercise Command and Control at the operational level outside of North America. Canada currently employs a CAOC construct that allows proper reach back through an Air Component Headquarters (ACHQ) to deliver integration and planning for RCAF missions

worldwide.<sup>16</sup> Similarly, during the previously mentioned expeditionary operations and those in Syria and Iraq, Canadian personnel were either already present within combined headquarters and planning staffs, or established teams to specifically plan and coordinate RCAF air asset operations within the larger multinational campaign.<sup>17</sup> As Libya has shown, it is certainly conceivable for RCAF assets to be tasked with operations in austere regions that lack an established Allied aerospace C2 architecture. For the RCAF to meet the Government's intent of filling lead nation roles in support of expeditionary operations, this gap in aerospace C2 coverage and proficiency must be addressed.

10. The lack of capability and experience in expeditionary aerospace C2 has precipitated a lack of doctrine and the Concept of Operations (CONOPs) needed to govern RCAF mobile radar units during expeditionary operations. The key to the development of these standards is to leverage the relationships and personnel exchanges suggested above build proficiency and experience at the operator level. Once a cadre of expeditionary subject matter experts is resident within the RCAF aerospace control community, it can then be leveraged to develop, test and refine unique Canadian operating policies. The experience gathered working with Allies, primarily the USAF whose capabilities in this capacity are significant, will inform and streamline the process to produce coherent doctrine with a focus on interoperability. Furthermore, the inclusion of USAF members currently present within Canadian mobile radar units and RCAF higher headquarters should also be considered during this process.

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<sup>16</sup> Department of National Defence, *Canadian Forces Aerospace Command Doctrine...*, 23.

<sup>17</sup> Combined headquarters in these instances refer to USAF or NATO CAOCs abroad.

## CONCLUSION

11. Canada and the RCAF leverage the NORAD relationship and out of country positions to maintain a relatively robust level of baseline competencies within the tactical air control arena. That said, current deployable aerospace command and control capabilities are not in line with RCAF Aerospace Command and Control doctrine and the intent established in *Strong, Secure, Engaged*. The RCAF must procure a worldwide deployable tactical command, control and communications suite, ensuring interoperability with key allies. In the interim, the RCAF must prioritize building the expertise necessary in its operators to ensure they are capable of employing the new equipment to its full potential and are adept at full spectrum expeditionary operations. This experience should be accumulated now with an aim to prepare the required doctrine to employ the capabilities new equipment will deliver. The addition of a robust and modern tactical air control and surveillance platform will provide the comprehensive aerospace C2 capability likely required for future RCAF operations. It will also ensure Canada is in position to lead Allied aerospace operations at all levels of warfare.

## RECOMMENDATION

12. The following recommendations are provided for consideration:
- a. Prioritize procurement of interoperable modern command, control, communications and cryptographic equipment to allow the RCAF an expeditionary aerospace command and control capability;

- b. Consider efficiencies of acquiring a system that employs the Tactical Display Framework user interface, and weight them appropriately in the bid selection process;
- c. Establish an RCAF controller exchange with USAF mobile radar units;
- d. Increase the number of RCAF controller positions at NATO and Allied CRCs outside of North America; and
- e. Develop the doctrine and a Concept of Operations (CONOPs) to support expeditionary operations of RCAF mobile radar units.

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