3180-0 (DAR 8-2)

BRIEFING NOTE TO DCAF

UAV OPERATIONS IN CANADIAN DOMESTIC AIRSPACE

ISSUE

1. Provide background with regard to High Altitude Long Endurance (HALE) and Medium Altitude Long Endurance (MALE) UAV integration into Canadian domestic airspace and the related regulatory factors concerning DND, Transport Canada (TC) and NAV CANADA. This BN outlines the intended course of action to ensure the permissive conduct of UAV domestic operations.

BACKGROUND

2. The Joint UAV Surveillance and Target Acquisition System (JUSTAS) and the proposed HALE UAV project intend to deliver the capability to conduct expeditionary and domestic operations and operate safely and effectively in either environment. However, when deployed the acceptance of greater technical and operational risk is necessarily more commonplace than in a domestic context. In the domestic environment in both high-use and uncongested airspace regions the employment of military unmanned aircraft will provide greater challenges. The regulatory and operational relationships between DND, TC and NAV CANADA, the high profile of domestic UAV operations and the highly publicized issues between the US Department of Defense (DoD) and the Federal Aviation Administration (FAA) all combine to bring the issue of "UAV flight in non-segregated airspace" to a position of interest.

3. DAR 8 is aware of these concerns. In many cases, potential problems have already been addressed in the Statement of Operational Requirement (SOR), or do not directly impact the intended operation of our proposed UAVs. Furthermore, the project staff has developed a considered, flexible approach to ensure that residual concerns do not present a risk to the routine domestic operation of our UAVs. This approach is outlined below.

DISCUSSION

Regulatory Structure/Cooperation

4. DND is the legal regulator for all military aircraft in Canada and does not require any TC or NAV CANADA approval to operate a UAV in Canadian domestic airspace. Although CF UAVs currently do not routinely operate outside of restricted airspace in Canada, this constraint is entirely CF self-imposed. As the regulator, DND must be satisfied that all military registered aircraft, including UAVs, can operate safely and effectively. The Atlantic Littoral ISR Experiment (ALIX) in 2004 included the first example of UAV flight in general use airspace in Canada. Significant effort was expended to satisfy DND's airworthiness requirements, not TC's. The CU163 Altair used during the

ALIX experiment was in CF livery, operated under a CF call sign and the flight permit was a military document signed jointly by the TAA and OAA, both CF. Nowhere was civilian approval or permission required or sought.

5. As the civil regulatory body, TC Civil Aviation (TCCA) has undertaken several efforts to establish a civil regulatory framework to allow the use of civil UAVs in non-segregated airspace. DND continues to support these efforts with the aim of providing our lessons learned and ensuring that our regulatory efforts are harmonized. Specifically, DND has participated in TC's initial WG to develop a way ahead for civil UAVs and have continuously met with TC to ensure good communications with our latest meeting held on 24 Aug 11. Additionally, DND supports the TC UAV Program Design Working Group. For specific UAV related issues, such as the USAF/German Air Force Global Hawk over-flights and the Barracuda test flight program in Goose Bay, DND was the regulatory authority however we cooperated closely with TC and NAV CANADA to ensure stakeholders were aware of our ongoing activities.

International Efforts

6. Significant effort is underway to set international civil standards and regulations. Although still several years away, the FAA continues to move forward with its efforts to establish a solid regulatory structure for unmanned aircraft. However, it is important to note that the relationship between DND and TC is not the same as that between DoD and FAA. In the United States the FAA is the single aviation regulatory authority and the DoD must abide by the regulations promulgated by the FAA. While the regulatory concerns in the US and the DoD/FAA relationship are noteworthy to DND, they are not shared by the CF UAV community.

7. The European Organisation for the Safety of Air Navigation (Eurocontrol) has also developed a number of specifications for military UAV flight in non-segregated airspace and NATO is working to address these specifications by developing guidelines to allow the cross-border operation of UAVs. The CF has been actively involved in these processes including significant contributions to the NATO UAV Flight in Non-segregated Airspace (FINAS) Working Group where Canada now chairs the working group.

Phased Approach

8. Despite DND's legal and regulatory authority over the operation of CF UAVs in domestic airspace, the UAV project staff along with 1 Cdn Air Div/A3 UAV will ensure maximum stakeholder participation and understanding of the requirements and rationale behind our UAV airspace integration efforts. Critical to this approach is the requirement for aircraft procured under the either UAV project to be IFR certified to the same standards as manned aircraft. Although IFR certification of UAVs is in its infancy the technology, regulations and processes for this certification all exist. In general, these include considerations such as navigation performance, system redundancy/reliability and

fault and error detection. The same regulations that permit IFR operation of manned military aircraft in Canada, will apply to the CF HALE and MALE UAVs.

9. A layered solution that builds on a hierarchy that starts with procedural flight requirements, then air traffic management, followed by traffic collision and avoidance systems (TCAS) and, finally, an autonomous "sense and avoid" capability will be pursued to permit ever increasing access to Canadian Airspace. Initially, an IFR Certified UAV will permit operational UAV transits and most employment within the existing domestic IFR airspace architecture without further segregation. For those times when required to conduct a domestic operational mission outside of IFR-only or military controlled airspace, the CF will either seek the appropriate airspace segregation (transit corridors, ALTREVs and patrol boxes) or use a ground based "sense and avoid" solution. This procedure is routinely employed for CF aircraft conducting operations or exercises within Canadian airspace and has been used for both UAVs and manned military aircraft.

10. The final milestone for UAV access to non-segregated airspace and the ability to conduct "Due Regard" operations will be the ability to "file and fly". This will require a capability to replace the manned aircraft see and avoid function with a technical sense and avoid solution able to detect other air traffic. This technology is a recognized enabler for employment throughout the global UAV community, and is the subject of significant research and development. The US Navy Broad Area Maritime Surveillance (BAMS) UAV Program is expecting delivery of its first Global Hawk UAV with a "sense and avoid" radar in the 2014 – 2015 timeframe.

CONCLUSION

11. DND is the regulatory agency which must be satisfied that entry of UAVs into non-segregated airspace is safe and hence permit UAVs to operate domestically. To ensure safe and effective operations of the unmanned aircraft procured in the future, the UAV system will be required to meet the stringent equipage requirements and similar safety standards as manned aircraft. Significant effort has been completed on refining requirements, development of DND regulatory guidance, and integration of existing and developing technologies. Currently there are no significant risks to the achievement of routine domestic operation of CF HALE and MALE UAVs.

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