



WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

Agenda Item 4: Optimum capacity and efficiency – through global collaborative ATM

4.2: Dynamic management of special use airspace

RESOURCE IMPLICATIONS FOR THE INTEGRATION OF REMOTELY PILOTED AIRCRAFT (RPA) IN THE AVIATION SYSTEM BLOCK UPGRADES (ASBUs)

(Presented by the Civil Air Navigation Services Organisation)

SUMMARY

This paper provides CANSO's proposals to support the development of ICAO provisions for the gradual and planned integration of remotely piloted aircraft (RPA) into non-segregated airspace and in support of the aviation system block upgrade (ASBU) modules related to optimum capacity and efficiency.

Action: The Conference is invited to consider the recommendation contained in paragraph 4.2.

1. INTRODUCTION

1.1 The establishment of ICAO provisions for remotely piloted aircraft (RPA) technology and certification methods would avoid the introduction of interim, non-harmonised national positions, benefit safety and could reduce additional costs in the long-term. Similarly, the development of provisions to harmonize procedures for RPA in non-standard situations would enhance predictability and benefit safety. In the opinion of the Civil Air Navigation Services Organisation (CANSO), the advent of RPA places air navigation service providers (ANSPs) in a familiar position, that of accommodating new potentially unproven technology. Air traffic control officers have historically risen to the challenge to continue to provide access to all airspace users in a non-discriminatory manner. While these aircraft may pose unique challenges, CANSO believes that ICAO provisions can and will allow RPAs to be initially accommodated and eventually fully integrated within the ATM system without discrimination.

2. DISCUSSION

2.1 The working document for the ASBU, issued following the Global Air Navigation Industry Symposium of September 2011, includes details of such sequential performance improvement activities (B1-90, B2-90, B3-90) that recognise the emerging role and increasing importance of RPA and which will ultimately lead to the transparent integration of RPA into the ATM system. To date, activity in the ICAO Unmanned Aircraft Systems Study Group (UASSG), and its various sub-groups, has not looked closely at the operational integration

¹Arabic, Chinese, English, French, Spanish and Russian versions provided by CANSO.

of RPA, and has had to instead focus on issues related to airworthiness certification; command, control and communications (C3); and detect and avoid (DAA). Whilst all of these elements are essential to eventual RPA integration, it is felt that the operational interface between RPA and air traffic control (ATC) is also of significant importance and should receive additional attention. It is felt that due to the lack of overarching guidance, both RPA manufacturers and States are currently left with no other option than to define individual specifications and procedures, which could lead to a disharmonised and fragmented approach.

2.2 In most routine, standard situations, it is expected that RPA can operate and be handled by ATC in the same way as manned aircraft. However, in some non-routine situations, whilst RPA manufacturers and operators will always endeavour to comply with existing procedures for manned aircraft, because their technical capabilities are different to manned aircraft, it is acknowledged that some procedures may be unsuitable for RPA. In such cases, to maintain a comparable level of safety, different procedures may need to be developed. Examples of such non-routine situations could include loss of the command and control link and some unique emergency procedures, although these will need to be fully evaluated. The challenge is made more difficult by the varying degrees of performance and categories of remotely piloted aircraft systems (RPAS) that may dictate establishing different procedures for each class of RPAS. The global standardization of RPA behaviour in non-routine situations, and the development of a standardized ATC response to those behaviours, will be required. That these global provisions are available through ICAO will increase predictability, enhance safety and assist in the global integration of RPA. To achieve the performance improvements as identified by the ASBU framework will require the input of specialist RPA subject-matter expertise and the collaborative engagement of both RPA stakeholders and the broader ATM community.

2.3 Currently, ICAO has minimal resident resources in the field of operational integration of RPA. The standardization of ATC procedures for RPA would require more direction, focus and subject-matter expertise and with sufficient collaborative engagement between ATM and RPA stakeholders to achieve successful integration. CANSO therefore recommends that RPAS be elevated in the ICAO prioritization strategy plan to enable the work to be adequately planned and accomplished, to corroborate with the proposed development of aviation standards for RPA currently underway in RTCA and EUROCAE. CANSO also recommends that the ICAO UASSG, where it is also represented, should begin work immediately on the identification and standardization of ATC procedures for RPA. Furthermore, CANSO offers to promote the ANSP role in working with international industry and regulatory stakeholders to develop the necessary international standards and recommended practices that will ensure the safe, efficient and cost-effective integration of RPA operations within both segregated and non-segregated airspace.

3. ACTIVITIES NECESSARY FOR THE INTEGRATION OF RPA

3.1 The ASBU framework specifies linked activities within each block that, when achieved, will allow RPA to operate seamlessly alongside manned aircraft in the ATM system. For example, while the following list is not exhaustive, Block 1 upgrades identified for RPA (B1-90 Initial integration of RPA systems into non-segregated airspace) include:

- a) determine the requirements to access non-segregated controlled airspace in similar manner to manned aircraft;
- b) define airworthiness certification for RPA;
- c) define operator certification;
- d) define remote pilot licensing requirements;

- e) define detect and avoid technology performance requirements and certification to provide both airborne separation and a 'safety net' for collision avoidance manoeuvres;
- f) consideration for integration into aerodrome operations; and
- g) spectrum requirements including designation of frequency bands and use of allocations that are not considered "protected bands" provided that similar safety-related attributes are adhered to.

3.2 Block 2 upgrades (B2-90 RPA integration in traffic) will explore the need for any necessary development of incremental operational procedures that may cover issues like command and control (C2) link loss and ATC communications (including a unique squawk code for lost link) as well as enhanced detect and avoid technology, where standards may be needed for the regulatory approval of the following:

- a) failure modes and lost link procedures and standards;
- b) specific special purpose transponder code for lost link;
- c) updated ATM procedures to allow for the unique integration features of RPAs into en-route and terminal airspace; and
- d) update airworthiness standards and procedures.

3.3 At the operational level, for air traffic controllers to provide a safe, efficient environment, it is important that contingency and emergency operations are highly predictable. In the case of RPA, due to their unique technical attributes and capabilities, existing procedures for manned aircraft in each segment of flight will need to be reassessed and in some cases modified or in other cases entirely new procedures will have to be developed. This assessment and procedure development will require input not only from the RPA community, but also operational airspace expertise from air traffic controllers and ANSPs.

3.4 In the final ASBU, Block 3 upgrades (B3-90 RPA Transparent management) foresee RPA operations on aerodromes and in non-segregated airspace in a manner that does not impact manned aviation. Necessary procedures (air and ground) to achieve B3-90 include:

- a) certified ATM procedures, if necessary, for RPAS to operate in all classes of airspace;
- b) procedures that allow for multiple RPA's in the same airspace at the same time;
- c) procedures that allow RPA's to operate out of all classes of airports;
- d) procedures that allow for autonomous operations including autonomous responses in any situation; and
- e) where RPAs are operating alongside manned aircraft there needs to be ground and air procedures that insure harmonious operations.

3.5 To achieve the goals identified in the ASBU will require the allocation of substantial, appropriately-qualified human resource, both internal and external to ICAO, detailed coordinated work plans and a clear strategic roadmap that clearly identifies the role of each stakeholder. ICAO provisions should include RPAS approval, certification and airworthiness standards, licensing and operator certificate requirements and

unique ATM procedures. Whilst it is appreciated that significant amounts of work is already underway, it is the view of CANSO that as key stakeholders, ANSPs could play a far greater role in the RPA development and integration process. CANSO proposes to take a leading role in this collaboration process.

4. CONCLUSION

4.1 For new categories of airspace user such as RPA, sufficient and appropriate resource allocation and effective stakeholder engagement, including ANSPs experience and best-practices, will be essential if the outcomes proposed are to be successfully realised. It is CANSO's view that RPA should be given greater priority within the ICAO work programme and the Organization stands ready to assist in the development of necessary ICAO provisions and coordination of RPA activities. The Conference is invited to approve the following recommendation:

Recommendation 4/x – Resource implications for the integration of remotely piloted aircraft in the aviation system block upgrades

That the Conference:

- a) recognizes that the integration of remotely piloted aircraft into the air traffic management system should be a high priority item within the work program and included in the Fourth Edition of the ICAO Global Air Navigation Plan;
- b) agrees that additional focus, direction and resources should be made available for the establishment of necessary subject matter expertise in order to complete work on the regulatory framework for remotely piloted aircraft operations in non-segregated airspace; and
- c) requests that ICAO begin work immediately to identify the unique remotely piloted aircraft system requirements and integration challenges for initial remotely piloted aircraft integration into airspace and airport operations, and endeavour to minimize, where possible, the potential change to the existing air traffic management system.

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