



**ASSEMBLY — 36TH SESSION**

**TECHNICAL COMMISSION**

**Agenda Item 30: Other safety matters**

**ADDRESSING UNMANNED AIRCRAFT SYSTEM (UAS) ACCIDENT INVESTIGATION  
AND PREVENTION BY ICAO MEMBER STATES**

(Presented by the United States of America)

**EXECUTIVE SUMMARY**

This working paper proposes that the ICAO Assembly take actions to endorse the Air Navigation Commission's announced proposal for an Accident Investigation and Prevention Group (AIG) meeting in 2008 with specific attention toward the investigation and prevention of unmanned aircraft system (UAS) accidents and serious incidents. In addition to expanding the existing ICAO Annex 13 definition of aircraft accident to include UASs, a common UAS accident and serious incident safety data collection and processing system (SDCPS) is necessary for this rapidly developing aviation sector.

**Action:** The Assembly is invited to:

- a) endorse the conclusions in paragraph 4 above regarding the subject of UAS accident investigation in principle;
- b) direct the Council to redefine the definition of accident contained in Chapter 1, ICAO Annex 13, to include UASs; and
- c) direct the Council to develop guidance on the types of UAS accidents and serious incidents that should be reported and analyzed by ICAO member States in conjunction with the provisions outlined in Chapter 8, ICAO Annex 13.

<i>Strategic Objectives:</i>	This working paper relates to Strategic Objective A
<i>Financial implications:</i>	No additional resources required.
<i>References:</i>	

## 1. INTRODUCTION

1.1 Unmanned Aircraft System (UAS) operations in civil airspace are now being conducted worldwide. The development of these unmanned operations for public and civil use is expected to substantially increase in the coming years. Although UAS standards to assist and guide regulatory development by individual ICAO member States is evolving, Standards and Recommended Practices (SARPs) and state laws and regulations for UAS operation and design are not yet in place. Preliminary findings from a U.S. National Transportation Safety Board UAS accident investigation suggest that numerous issues of public safety exist in the area of UAS operations in U.S. national airspace. In this formative period of initial UAS integration into civil airspace, it is imperative that ICAO member States investigate UAS related accidents and communicate the lessons learned to prevent accidents among all users and assist in the development of UAS SARPs and local regulations.

1.2 In January 2007, the Air Navigation Commission (ANC) consulted with States and appropriate international organizations on convening an Accident Investigation and Prevention Group (AIG) meeting in 2008 to discuss subjects in the field of accident investigation. One of the proposed subjects for discussion is the amendment of the definition of accident in Chapter 1 of Annex 13 to include events involving unmanned aerial vehicles (UAV). This is an important step in encouraging investigative authorities to obtain the information necessary to identify and correct safety deficiencies and institutionalize lessons learned to prevent future accidents. In addition to this action, ICAO is invited to take a leadership role in encouraging the use of safety data collection and processing systems (SDCPS) to monitor UAS operations and determine appropriate preventative actions to ensure an acceptable level of safety for the world aviation community.

## 2. BACKGROUND

2.1 The U.S. National Transportation Safety Board (NTSB), the independent accident investigation authority of the United States, is currently investigating an accident involving a UAS in Nogales, Arizona on April 25, 2006. The final report of this accident will be released in the near future; however, preliminary findings suggest that the results of accident investigations will play an important role in the development of strategies to safely integrate UAS operations into the international civil aviation environment.

## 3. DISCUSSION

3.1 The use of UAS platforms for both public and civil use is expanding worldwide. As an example, over the past 12 months, the U.S. Federal Aviation Administration has received more than 200 requests for operational approval within the United States and estimates that the numbers will continue to rise.

3.2 UAS design is consistent with the current definition of "aircraft," contained in Chapter 1, ICAO Annex 13.

3.3 The current definition of an aircraft accident in Chapter 1, ICAO Annex 13, was developed before the advent of unmanned aircraft. Because this definition does not specifically address occurrences where persons are not present on board the aircraft, investigative authorities may be reluctant to or prevented from investigating UAS accident events or coordinating those investigations with other countries under the provisions of ICAO Annex 13.

3.4 The purpose of conducting aircraft accident investigation is to prevent future accidents, minimizing loss of life and property. Historically, though pre-emptive efforts to prevent accidents have met with a level of success, not all hazards in aircraft operation have been successfully anticipated in advance or adequately controlled in operation, and accident investigation has been used to fill the gap. Given the infancy of UAS operations in civil airspace, it is likely that, despite the proactive efforts of regulators, operators, and manufacturers, accidents will occur. It is imperative that UAS accidents and serious incidents be investigated to assure that deficiencies in planned safety controls are identified and analyzed and that the resulting lessons learned are passed on to the international community to prevent future accidents.

3.5 The risk of mid-air collisions between UASs and manned users of civil airspace is a primary safety concern for UAS operations worldwide. In general, UAS accidents, even in cases that do not involve collision with manned users of civil airspace or injury to persons and/or damage to property on the ground, should still be investigated to determine what aspect of the operation failed, whether additional, previously unanticipated hazards were contributory, and what deficiencies need to be corrected to prevent such an event from progressing to a more serious outcome in the future

3.6 Preliminary findings in the U.S. National Transportation Safety Board's ongoing investigation of a UA accident in Nogales, Arizona reveal specific areas of safety consequence that are relevant to UAS operations. In particular, issues related to the functional and human-interface design of the UAS and its supporting, ground-based systems are being investigated as well as maintenance programs related to the continuing airworthiness of the systems. Pilot qualification and emergency training as well as coordination procedures between UAS operators and the respective air traffic management organizations are also being examined.

3.7 Incidents involving UASs that do not result in an accident but carry the potential, in combination with other circumstances, to impact the safety of other users of civil airspace and persons and property on the ground are another valuable source of data to evaluate deficiencies in UAS operations. The unique attributes of unmanned vehicles will require re-examination of existing guidelines for aircraft incident reporting. ICAO member States should examine the factors involved with UAS operations and determine appropriate categories of safety-related incidents that UAS operators must report.

#### 4. CONCLUSION

4.1 The integration of UASs into the international civil aviation environment has introduced and will continue to introduce potential safety risks to other civil airspace users.

4.2 UASs are aircraft as defined by Chapter 1, ICAO Annex 13.

4.3 Investigation of accidents involving UASs operating in the civil airspace of ICAO member States is essential to identify and correct potential safety deficiencies that may present unacceptable safety risk to other airspace users, and to persons and property on the ground.

4.4 To endorse the investigation of accidents involving UASs, ICAO should modify the current definition of "accident" in Chapter 1, ICAO Annex 13 to include occurrences associated with the operation of a UAS.

4.5 Analysis of serious safety-related incidents involving UAS operations is also a valuable tool for international accident prevention. To endorse the use of this important accident prevention measure, ICAO should identify the types of UAS incidents that are relevant to safety and provide SDCPS guidance to the member States.

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