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WORKING PAPER

ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 31: Aviation Safety and Air Navigation Standardization

USING PRESSURE ALTIMETER EQUIPMENT FOR CATEGORIZATION OF DRONES

(Presented by India)

EXECUTIVE SUMMARY

Advent of unmanned aircraft systems (UAS) for a broad range of activities necessitates facilitation of access for UAS to all airspaces. This would lead to operational integration of manned and unmanned systems but would require compatible equipage. Manned aircraft utilize pressure altimetry whereas UAS utilize global positioning system (GPS) based altimetry. Application of safe separation thereby becomes a challenge due to the divergent nature of the altitude measuring systems. This paper proposes to categorize UAS based on altimeter equipage. Such equipage will be a key enabler for integration with manned aircraft operations.

Action: The Assembly is invited to take note of this issue and incorporate the requirement of barometric equipment with remote subscale setting on-board towards categorization of UAS. This would enable integration of unmanned and manned aircraft operations above 400 feet AGL.

Strategic Objectives:	This working paper relates to RPAS – operations and integration
Financial implications:	NIL
References:	Doc 10019, *Manual on Remotely Piloted Aircraft Systems (RPAS)* ICAO Model UAS Regulations Part 101 and Part 102 Advisory Circulars AC 101-1 and AC 102-1

1. INTRODUCTION

1.1 Aviation has been able to continuously improve the level of safe operation primarily through a common standard equipage and uniform application. Magnetic compass, altimeter and speed indicators have been a part of aviation since a long time. The use of altimeter is significant as it is used for safe vertical separation between aircraft. All manned aircraft use altimeters to measure altitude with reference to barometric equipment on board, set to QNH or standard atmosphere. Unmanned aircraft (UA), on the other hand, have no altimeter and measure altitude by reference to GPS equipment.

1.2 For a given altitude, therefore, there could be a mismatch between the two readings of up to a couple of hundred feet, which could be a major deterrent in integrating manned and UA operations.

2. DISCUSSION

2.1 The ICAO Model UAS Regulations Part 101 & Part 102 and Advisory Circulars Part 101-1 and Part 102-1, issued by ICAO as part of ICAO Model UAS regulations, provide guidance regarding UAS operations. These do not state any equipment requirement, even for operations above 400 feet AGL.

2.2 Any UA that intends to fly at altitude exceeding 400 feet AGL would be a safety concern for manned aviation. This is not just due to the altitude though. It is also because of the inherently divergent standards used to measure altitudes. An overwhelmingly vast majority of UA would measure their altitude by referencing with GPS or GLONASS or similar systems. On the other hand, traditional manned aviation utilizes pressure altimetry for its altitude measurement and referencing.

2.3 This could lead to an anomalous situation in the instant case (altitude exceeding 400 feet AGL). UA would be indicating 2000 feet on GPS whereas manned aircraft would be indicating 2500 feet on pressure altitude. The difference between the two could, in actuality, be just a couple of hundred feet instead of 500 feet. This could lead to safety concerns and could increase the likelihood of incidents.

2.4 The solution proposed is to apply barometric altimeter equipage as a criterion towards UAS categorization. Such a categorization will be able to support safe integration of UA with manned aircraft as it enables application of standard separation. This could also be considered as a requirement, within the Advisory Circulars, of barometric equipment with capability of remote subscale setting for all UA with flight intent above 400 feet AGL.

2.5 Further, such a requirement may be advisable even below 400 feet AGL. Such a requirement, it is proposed, may be considered as a mandate for operations within all controlled airspace (Class A-E), in the vicinity of airports and in uncontrolled airspace for operations above 400 feet AGL.

2.6 This would help bring the new stakeholders in aviation (viz. UA) on par (in terms of altitude measurement and referencing) with the present stakeholders (viz. manned aviation) without disadvantaging the latter and would help the UAS operators plan their equipage as per their business requirements. This would also be helpful in integrating vertiports with airports and UAM/UTM with ATM.

2.7 ICAO has issued the *Manual on Remotely Piloted Aircraft Systems (RPAS)* (Doc 10019) for RPAS operations. The solution proposed may be considered for incorporation in Doc 10019 and within the Advisory Circulars.

3. CONCLUSION

3.1 Categorization of UAS based on equipage of barometric altimeter, with capability of remote subscale setting on-board, is a key enabler that can support enhanced airspace access for UA, contributing to their safe integration in controlled airspace.

3.2 ICAO Assembly is requested to consider a global standard for categorizing UAS as presented in this paper. It is hoped that this suggestion is duly considered and incorporated into the appropriate documentation so as to address the issue raised herein.

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