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WORKING PAPER

ASSEMBLY — 39TH SESSION

Agenda Item 35: Aviation safety and air navigation standardization

SINGLE SET OF UNITS OF MEASUREMENT TO BE USED IN AIR AND GROUND OPERATIONS

(Presented by the United Arab Emirates)

EXECUTIVE SUMMARY

This working paper presents the United Arab Emirates (UAE) proposal for the reconsideration of a singular set of Units of Measurement for Air and Ground Operations. It acknowledges the existing Annex 5 — *Units of Measurement to be Used in Air and Ground Operations* Standards and Recommended Practices (SARPs) and the ambiguity of the implementation thereof.

It also contextualises the abilities of modern digital and legacy avionics suites and their possible impact on Human Factors experienced by crews under stress whilst operating under unfamiliar units of measurement.

Action: The Assembly is invited to:

a) note the information contained in this paper;

b) encourage States and international organisations to reconsider the need for a singular set of Units of Measurement to be used in Air and Ground Operations; and

c) invite States and international organisations to provide comment in relation to their own status and issues with the use of diverse units of measurement.

Strategic Objectives:	This paper relates to the Safety and Air Navigation Capacity Strategic Objectives.
Financial implications:	
References:	Annex 5 — *Units of Measurement to be Used in Air and Ground Operations*

1. INTRODUCTION

1.1 Whilst acknowledging ICAO Annex 5 to the Convention on International Civil Aviation, Units of Measurement to be used in Air and Ground Operations; and Contracting States historically diverse use of units, this paper will question whether the time has come for world aviation to consider the need for a singular system of units of measurement to be used in air and ground operations.

2. DISCUSSION

2.1 ICAO by way of ICAO Annex 5 to the Convention on International Civil Aviation, has adopted the International System of Units (SI) as the standard units of measurement for all aspects of international civil aviation air and ground operations.[1] However further in ICAO Annex 5, Chapter 3[2] a permanent dispensation with respect to Non-SI units is provided where it states "*The non-SI units listed in Table 3-2 shall be used either in lieu of, or in addition to, SI units as primary units of measurement*" (tonne, degree, minute, second, degree Celsius, minute, hour, day, week, month year and litre) thus authorising their usage despite the Standard contained in Chapter 3.1.1. Further in Chapter 3.2.2[3] provision is made for a further set of Non-SI units (nautical mile, foot and knot) to be used on a temporary basis with reference to a table Chapter 4[4] for the termination dates of usage. The status of "temporary use" however is debateable as no termination date has been prescribed Table 4-1.

2.2 Contracting States worldwide at present therefore have the option of the use of SI or Non-SI units and have generally implemented one or the other or even a combination of the two (e.g. Non-SI units and metres (an SI unit) for RVR). Contracting States are however required to provide notification and publish any differences to the Standards and Recommended Practices contained in Annex 5 to the Convention[5].

2.3 A large amount of worldwide commercial civil aircraft (Boeing, Airbus, etc.) are designed and calibrated primarily for use of Non-SI units operationally (feet, nautical miles, knots, etc.). However, the advent of digital avionics systems has allowed for the customisation of the displays of the units to be tailored to requirements, thus allowing the switch between the display of SI and Non-SI units to be performed in the cockpit. The ease of this switch however does have a Human Factor impact on crews, particularly those who have trained predominately in a particular set of units and who are now switched to different unit set. When the complexity of operations in adverse weather conditions and unfamiliar airports is added, certain errors as to the judgement of distance, height, speed, etc., can be expected from pilots. In aircraft where a modern digital avionics system with the ability to switch units is not fitted the situation requires a large amount of coordination and usage of conversion tables which again significantly impacts crew performance under stress.

[1] ICAO Annex 5 Units of Measurement to be Used in Air and Ground Operations, Chapter 3, Paragraph 3.1.1
[2] ICAO Annex 5 Units of Measurement to be Used in Air and Ground Operations, Chapter 3, Paragraph 3.2.1
[3] ICAO Annex 5 Units of Measurement to be Used in Air and Ground Operations, Chapter 3, Paragraph 3.2.2
[4] ICAO Annex 5 Units of Measurement to be Used in Air and Ground Operations, Chapter 4, Table 4-1 Termination dates for Non-SI alternative units
[5] ICAO Annex 5 Units of Measurement to be Used in Air and Ground Operations, Foreword, Action by Contracting States

3. CONCLUSIONS

3.1 In light of the ambiguity contained in ICAO Annex 5 to the Convention on International Civil Aviation and the Human Factors impact of the use of diverse units of measurement in flight, it is proposed that the need of a singular system of units of measurement be given renewed, due consideration by the Assembly.

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