



WORKING PAPER

ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 31: Aviation Safety and Air Navigation Standardization

**ESTABLISHMENT OF TERRAIN CLEARANCE BY SAFE MARGIN ALONG DESTINATION
ALTERNATE ROUTE**

(Presented by the United Arab Emirates)

EXECUTIVE SUMMARY

The ICAO Annex 6 Part I, II and III, Chapter 5, aircraft performance limitation has caused debated issue with respect to terrain clearance requirement along destination alternate route or commonly known as point B to C or destination to alternate.

This working paper proposes that the applicable Standards and Recommended Practices (SARPs) to be amended after further study and reassessment have been carried out.

Action: The Assembly is invited to:

- a) take note of the content of this working paper;
- b) provide recommendations to amend Annex 6 paragraphs 5.2.9, 5.2.10 and 5.2.11; and
- c) take into consideration the following:
 - 1) to define destination alternate route as part of the route or planned diversions route found in Annex 6, paragraph 5.2.9 and 5.2.10; and
 - 2) to extend Annex 6, paragraph 5.2.11 requirement on terrain clearance, beyond the approach path, in order to cover all segments of the diversionary destination alternate route.

<i>Strategic Objectives:</i>	This working paper relates to Strategic Objectives on Safety.
<i>Financial implications:</i>	This working paper has no direct financial implications
<i>References:</i>	Annex 6 — <i>Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes, Part II — International General Aviation — Aeroplanes and Part III — International Operations — Helicopters</i> , paragraphs 5.2.9, 5.2.10 and 5.2.11.

1. INTRODUCTION

1.1 The International Civil Aviation Organization (ICAO) Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes*, Part II — *International General Aviation — Aeroplanes* and Part III — *International Operations — Helicopters*, paragraph 5.2.9, 5.2.10 and 5.2.11 have raised many concerns involving safety, clarity and rationality. Operators are finding difficulties to differentiate the safety implications between en-route alternate route and destination alternate route with respect to terrain clearance, by a safe margin. Commanders too, are beginning to challenge the need to operate along such route, where terrain clearance by safe margin is not guaranteed.

2. DISCUSSION

2.1 Annex 6, Parts I, II and III, paragraphs 5.2.9, 5.2.10 and 5.2.11 state the following:

- a) Annex 6, paragraph 5.2.9 - one engine inoperative. The aero plane shall be able, in the event of the critical engine becoming inoperative at any point along the route or planned diversions therefrom, to continue the flight to an aerodrome at which the Standard of 5.2.11 can be met, without flying below the minimum flight altitude at any point;
- b) Annex 6, paragraph 5.2.10- two engines inoperative. In the case of aero planes having three or more engines, on any part of a route where the location of en-route alternate aerodromes and the total duration of the flight are such that the probability of a second engine becoming inoperative must be allowed for if the general level of safety implied by the Standards of this chapter is to be maintained, the aeroplane shall be able, in the event of any two engines becoming inoperative, to continue the flight to an en-route alternate aerodrome and land; and
- c) Annex 6, paragraph 5.2.11 - The aeroplane shall, at the aerodrome of intended landing and at any alternate aerodrome, after clearing all obstacles in the approach path by a safe margin, be able to land, with assurance that it can come to a stop or, for a seaplane, to a satisfactorily low speed, within the landing distance available. Allowance shall be made for expected variations in the approach and landing techniques, if such allowance has not been made in the scheduling of performance data.

2.2 The applicability of Annex 6 paragraph 5.2.9 and 5.2.10, associated to obstacle clearance by a safe margin had led to several interpretations. Many consider en-route as just from departure to destination aerodromes route (point A to B) while there are those who define destination alternate route (point B to C) as part of the en-route. It needs to be explained further, so that consistency can exist in its implementation.

2.3 In addition to the clarity issue, many from the aviation industry had aired its safety implication and rationality behind such ruling. If Annex 6, paragraphs 5.2.9 and 5.2.10 requirements are exclusive for en-route alternates along departure to destination route, the logical safety basis for such a rule is difficult to justify. All diversionary routes, including destination alternate route should be treated the same as in any risk assessment, the severity associated to terrain, is identically catastrophic.

2.4 It appears that requirement associated to Annex 6 paragraph 5.2.11 necessitate only clearing of obstacle in the approach path by a safe margin. Flight ought to clear all terrain by a safe margin along its route, in order to reach the approach path. In light of this account, terrain clearance by safe margin must be applied beyond the approach path to be logically justified.

2.5 2A survey on UAE operators disclosed that terrain clearance by a safe margin for the destination alternate route is implemented by all as part of obligatory safety. But, there are cases where terrain clearance is not computed for in an engine failure scenario. Lack of clarity in the ruling compounded by low probability in the risk assessment are the likely reasons behind the non-performance.

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