



International Civil Aviation Organization

**The First Meeting of the APANPIRG ATM Sub-Group  
(ATM /SG/1)**

Bangkok, Thailand, 20 – 24 May 2013

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**Agenda Item 4: ATM Systems (Modernisation, Seamless ATM, CNS, ATFM)**

**DETERMINATION OF TRANSITION ALTITUDE**

(Presented by the ISLAMIC REPUBLIC OF PAKISTAN)

**SUMMARY**

This paper presents information regarding the difficulties in application of ICAO PANS-OPS criteria relating to determination of transition altitude above any aerodrome and its application by ICAO contracting states.

This paper relates to –

**Strategic Objectives:**

*A: Safety – Enhance global civil aviation safety*

**Global Plan Initiatives:**

- GPI-3 Harmonization of level systems
- GPI-5 RNAV and RNP (Performance-based navigation)
- GPI-8 Collaborative airspace design and management
- GPI-9 Situational awareness
- GPI-10 Terminal area design and management
- GPI-11 RNP and RNAV SIDs and STARs

**1. INTRODUCTION**

1.1 The provisions contained in PANS-OPS Volume I (ICAO Doc 8168) Part III Section 1 Chapter 2 requires that as far as possible, states **should** establish a common transition altitudes for all of its aerodromes or atleast for group of aerodromes. On the basis of an agreement, this harmonization of transition altitude may be extended for aerodromes of adjacent states, states within one ICAO region or even for aerodromes for two or more ICAO Regions. ICAO PANS-OPS provision also requires that the height above the aerodrome of the transition altitude **shall be as low as possible** but normally not less than 900 m (3000 ft).

1.2 In states where terrain height is low and uniform, a common low transition altitude may be practicable. For states like Pakistan where significant differences exist in the aerodrome elevation for its aerodromes, it becomes impracticable to harmonize the transition altitude if it has to be kept as low as 3000ft above the aerodrome. Moreover, a number of other associated constraints have been identified linked with the establishment of low transition altitudes around 3000ft above aerodromes.

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## 2. DISCUSSION

### Harmonization

2.1 There are chances for confusion and errors on the flight deck side if wide variety of Transition Altitudes is used. PANS-OPS therefore require harmonization of transition altitude at national or regional level to the extent possible and within regions as well with agreements. A number of countries have therefore adopted the approach of a harmonized transition altitude not only at aerodromes inside its territory rather over its entire airspace. Several studies have also been conducted in ECAC region also during last decade which have emphasized the need for Harmonized European Transition Altitude for entire Europe. Within APAC region, a number of states are also using transition altitude which falls in the medium level (above 10,000), significantly higher than 3000ft above aerodromes thus giving preference to harmonization rather than the PANS-OPS provision to keep Transition Altitudes lower close to 3000ft.

### Terrain Clearance

2.2 The altimeter corrections required to determine the true altitude from which the pilot can determine actual height above terrain can be complex enough and time consuming to be error prone or mis-applied. This could lead to either a loss of pilot situation awareness resulting in a collision with terrain. In airspace where transition altitudes have been established at relatively low altitudes and terrain clearance is a factor, there can be a significant safety risk. However, if the aircraft operated on the local QNH to a higher TA, the risk of a terrain accident due to an uncorrected pressure differential error could be eliminated.

### Cockpit Workload

2.3 Besides the harmonization, pilot forums are of general opinion that any transition altitude below 5000ft above aerodrome requires changing altimeter settings during critical departure and approach phases of flight. It results on extra burden on the cockpit workload without any advantage or benefit.

### Airspace Management

2.4 Different philosophies are being used for setting the transition level by different states. Few states have established the provision where transition level is determined by ATC based on the current QNH while majority of states uses fixed Transition Level above the transition altitude so as to ensure minimum vertical separation between Transition Level and Transition Altitude for all QNH values. A low transition altitude (3000 ft) in this scenario results in blocking of airspace within transition layer which is vital for airspace management and Air Traffic Control especially in busy terminal control areas. Favorable arguments have also been made by various ATS forums on raising the transition altitude to a medium level (8-10000ft) or high level (16-18000ft).

### Efficiency of Terminal Procedures

2.5 Performance Based Navigation is being implemented worldwide to take advantage of associated benefits and to comply ICAO Assembly Resolution A37/11. Terminal procedures using PBN concept, if appropriately designed, can lead to significant benefits in terms of safety and efficiency of aircraft operations including the benefits from CCO/CDO implementation. However, lower transition altitude established around aerodromes did not allow real optimization of vertical profile because of significant variation of transition layer width. This becomes more complex where a conflict between arrival and departure has to be managed in PBN airspace designing close to aerodrome.

Conclusion

2.6 According to the terminologies used in the PANS-OPS criteria, transition altitudes are desirable to be as low as possible generally 3000ft above aerodrome elevation. However, from the practical perspectives, numbers of constraints have been observed in application of the criteria in safe and efficient airspace management. Harmonization of Transition Altitudes by raising transitional altitude to medium or higher level has been proven beneficial and this strategy is being used by many states within and outside region. Different studies in aviation industry have also resulted in positive arguments in favour of medium and high level transition altitude in comparison to low transition altitudes.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper including limitations in harmonized application of PANS-OPS criteria regarding establishment of transition altitude;
- b) provide guidance to states for application of PANS-OPS criteria regarding establishment of transition altitude considering the benefits of medium and high level transition altitudes; and
- c) refer the matter to ICAO for further deliberation, if considered appropriate.

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