



**WORKING PAPER**

**ASSEMBLY — 37TH SESSION**

**TECHNICAL COMMISSION**

**Agenda Item 36: NextGen and SESAR as part of the Global ATM system**

**PERFORMANCE-BASED NAVIGATION – THE IMPLEMENTATION CHALLENGE**

(Presented by Australia)

**EXECUTIVE SUMMARY**

ICAO Assembly Resolution A36-23 sets out a program for the adoption and implementation of performance-based navigation (PBN) and the associated approaches with vertical guidance (APV). Much effort has gone into the implementation of this resolution, including, in the Asia and Pacific Region, the formation of the PBN Task Force and completion of the regional PBN implementation plan.

Concern has been raised at the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) meetings over the capability of States to implement APV approaches to meet the scope and timing requirements of A36-23. Further, there does not appear to be widespread implementation of runway aligned approaches (i.e. “straight-in” approaches), which would provide a level of mitigation against controlled flight into terrain when compared to circling approaches.

**Action:** The Assembly is invited to review the modifications proposed in paragraph 2.5 with regard to A37-WP/13, TE/4 containing Resolution A36-23 and to adopt the changes suggested in this paper.

<i>Strategic Objectives:</i>	This working paper relates to Strategic Objectives A, D, and E with regards to all phases of flight.
<i>Financial implications:</i>	Insignificant.
<i>References:</i>	Doc 9902, <i>Assembly Resolutions in Force</i> (as of 28 September 2007) A37-WP/13-TE/4

## 1. INTRODUCTION

1.1 The current Assembly Resolution A36-23 sets out the goals and implementation targets for the introduction of performance-based navigation (PBN), including implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS) for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014.

1.2 Assembly working paper A37-WP/13 and its accompanying draft Resolution 36/1 recognizes that not all aircraft are currently capable of APV operations and recommends that any APV implementation should include lateral navigation (LNAV) only minima.

## 2. DISCUSSION

2.1 ICAO controlled flight into terrain (CFIT) studies have shown that runway-aligned approaches (LNAV only) are some 25 times safer than circling approaches, and that once some form of vertical guidance is added to these approaches the safety margin is increased again by a factor of eight.

2.2 There are a number of factors affecting APV implementation that limit the ability of States to comply with Resolution A36-23. Many aircraft are not equipped to fly either Baro-VNAV or satellite-based augmentation system (SBAS)-based APV and many States do not have SBAS or aerodrome infrastructure to support APV operations. Resourcing and expertise shortages will also impact the ability of aviation authorities to put in place the regulatory measures necessary for these operations. As a consequence, the majority of Asia Pacific (APAC) States are unlikely to meet the scope or timing requirements for APV implementation required by A36-23.

2.3 Papers and discussions within the APAC Region have recognized that many States have not implemented any form of runway-aligned approach and that many examples of circling approaches exist. Further, Resolution A36-23 does not explicitly include any requirement to develop LNAV approaches if APV cannot be achieved or as an intermediate step towards APV implementation. Accordingly, without a specific direction from ICAO to do so, many States are not taking advantage of readily available existing technologies and equipment to design and deploy runway-aligned lateral guidance only approaches (RNP APCH-LNAV).

2.4 Assembly working paper A37-WP/13 proposes an updated resolution which recognizes (at the 7th preambular clause) that not all aircraft are capable of APV operations and requires that LNAV only minima to be included with APV (operative clause 2 a) 2)). However, the updated resolution retains the explicit requirements for APV implementation without addressing the inability of States to meet the requirement where aircraft, airport equipment or infrastructure gaps will delay compliance. Additionally, the updated resolution does not consider any alternative approach procedure (for example a runway-aligned LNAV only procedure) either as an intermediate step or where APV cannot be achieved.

2.5 The following alternative text for the updated resolution in A37-WP/13 is provided:

*Preamble:*

**Delete:**

~~“Recognizing that not all aircraft are currently capable of APV operations but can perform approaches with only lateral guidance based on RNP specifications.”~~

**Insert:**

*“Recognizing that not all States have a GNSS augmentation capability, not all airports have the infrastructure to support APV and not all aircraft are currently capable of APV operations*

*Recognizing that many States already have the requisite infrastructure and aircraft capable of performing approaches with lateral guidance based on the RNP specifications;”*

*Operative :*

*“Resolves that:*

- a) States complete a PBN implementation plan as a matter of urgency to achieve:
  - 1) implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones; and
  - 2) implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014; and
  - 3) implementation of runway-aligned LNAV only procedures where APV cannot be implemented due to the lack of infrastructure or suitably equipped aircraft.

2.6 Assembly delegates should also consider reviewing the timetable for APV implementation retained in the draft resolution given that the first milestone of 30 per cent coverage by the end of 2010 is unlikely to be met by a majority of States in the APAC region

— END —