



WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

Agenda Item 2: Aerodrome operations – improving airport performance

2.2: Performance-based navigation (PBN) – a practical way to improve airport performance with safety and efficiency

**FACILITATION OF INDEPENDENT SIMULTANEOUS APPROACHES
USING RNAV 1/RNP 1 STARs**

(Presented by the Republic of Korea)

EXECUTIVE SUMMARY

As air navigation systems constantly evolve and improve, the navigational accuracy of aircraft operating on the track of standard terminal arrival routes (STARs) has improved and approach procedures have become more precise. This means that it is time to review the current regulations to confirm whether they are reflecting air navigation system developments.

This working paper reviews the current development of air navigation systems and the possibility of the independent simultaneous approach of aircraft using area navigation (RNAV) 1/required navigation performance (RNP) 1 STARs instead of radar vectors. Also, the paper requests ICAO to review the possibility to amend the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444) and related documents on this issue.

Action: The Conference is invited to agree to the recommendations in paragraph 3.

1. INTRODUCTION

1.1 ICAO urged Member States to complete implementing area navigation (RNAV) 1/required navigation performance (RNP) 1 standard terminal arrival routes (STARs) for airports to improve the efficiency of terminal airspace operations by 2016. In line with this, each State has established its national performance-based navigation (PBN) implementation plan and has been establishing RNAV 1/RNP 1 STARs for its airports.

1.2 However, in the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444) and relevant documents, there are still provisions stating that radar vectoring is used to intercept the independent simultaneous approach course. Therefore, it is impossible for aircraft to use STARs for the independent simultaneous approach even though aircraft has accurate track-keeping performance and is supported by ground surveillance systems.

2. DISCUSSION

2.1 Most modern aircraft can accurately maintain the designated air traffic service (ATS) route thanks to the development of air navigation systems using the Global Navigation Satellite System (GNSS) and computerized systems. In addition, air traffic controllers can identify the position of aircraft exactly and take measures when contingency situations occur thanks to the improvement of ground surveillance capability using radar, automatic dependent surveillance - broadcast (ADS-B), etc.

2.2 Also, these days, more and more airports have been implementing RNAV 1/RNP 1 STARs which are connected to instrument landing system (ILS) approaches to efficiently manage air traffic flow in terminal airspace. While using a STAR connected to an ILS approach, aircraft will be able to continuously descend all the way to the runway.

2.3 However, it is impossible to connect STAR to ILS approaches when independent simultaneous approaches are in use at the airport because the current provision published in ICAO documents requires radar vectors to intercept the final approach course when executing independent simultaneous approaches. As a result, radar vectors disrupt the continuous descent of aircraft at the final phase and expand the area of operation within the terminal airspace to adjust the traffic flow.

2.4 It is common knowledge that by using radar vector, air traffic controllers can accommodate and maintain increased air traffic flow but, on the contrary, it has several problems that need to be solved as follows:

- a) difficulty to precisely calculate and load burn-off fuel for flight operation within the terminal airspace because of the flexibility of flight course and distance;
- b) difficulty to apply the continuous descent operations (CDO) due to lack of expectancy; and
- a) increased holding time of radio frequency and number of air traffic controllers' instructions, resulting in the increase of pilots and air traffic controllers' workload, and so on.

2.5 Considering the improvement of aircraft air navigation performance, ground surveillance capability and implementation of RNAV 1/RNP 1 STARs, etc. the aircraft are expected to execute independent simultaneous approaches, in condition with RNAV 1/RNP 1 STARs connected to ILS approach and aircraft operation monitored by air traffic controllers using ground surveillance systems. If this is possible, it will improve the operational efficiency of terminal airspace by facilitating CDO and will reduce pilots and air traffic controllers' workload through minimizing the need of radar vectors.

2.6 In the Republic of Korea, RNAV 1 STARs have been implemented at Incheon International Airport where it has the capability to serve independent simultaneous approaches. The STAR is connected to the ILS approach of each parallel runway and is vertically separated by 1 000 ft (300 m) when the aircraft is intercepting the final approach course of each ILS (see the appendix). In addition, air traffic control systems of Incheon Airport enable air traffic controllers to closely monitor the approach area using two surveillance radars and respond promptly when one aircraft infringes the other aircraft on the final approach course. Nevertheless, air traffic controllers are applying radar vectors only, as guided by ICAO documents, to operate independent simultaneous approaches causing inefficiencies.

2.7 In recent surveys questioning pilots which method is used for independent simultaneous approaches, some airports used radar vectors while others did not apply. This means that it is time to

review the current rules and guidelines to reflect the development of air navigation systems and ground surveillance systems.

2.8 In this context, ICAO needs to review the conditions related to independent simultaneous approaches, especially the radar vectors requirements. If RNAV 1/RNP 1 STARs, which is connected to an ILS approach is used in the independent simultaneous approach environment, these will bring many benefits including accurate flight planning, fleet management improvement, facilitation of CDO application, efficiency improvement of the terminal airspace operations, workload reduction of air traffic controllers and pilots, and so forth.

2.9 Furthermore, it is expected that an accurate flight planning environment will facilitate the 4D trajectory which is essential to future air traffic management. Also, it is expected that independent simultaneous approaches using STARs could be applied to other precision approaches such as ground-based augmentation system (GBAS) landing systems (GLS).

3. CONCLUSION

3.1 The Conference is invited to agree to the following recommendation:

Recommendation 2/x – Facilitation of independent simultaneous approaches using area navigation (RNAV) 1/required navigation performance (RNP) 1 standard terminal arrival routes (STARs)

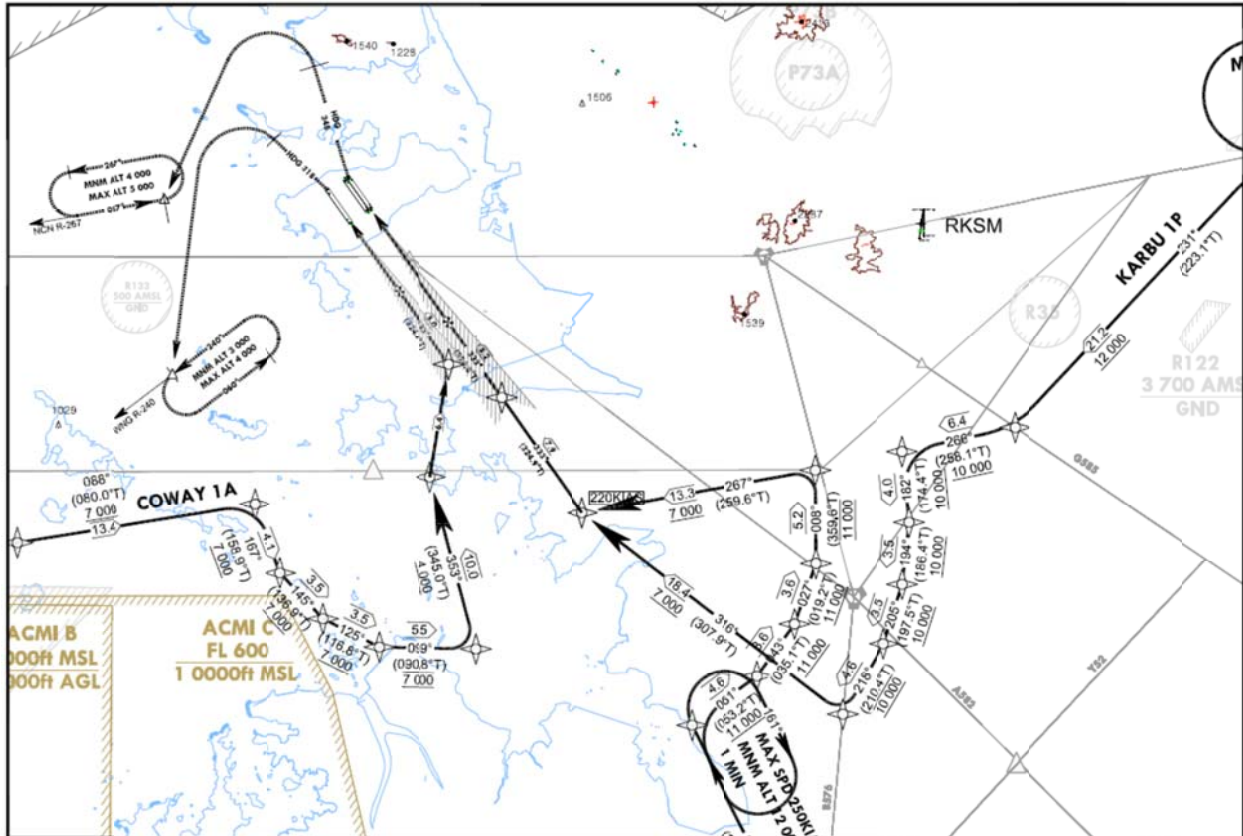
That the Conference:

- a) note the contents of this paper; and
- b) request ICAO to consider the amendment of the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) and other documents relating to the application of independent simultaneous approaches, to put flexibility in the radar vectoring requirements, considering current developments of air navigation systems and ground surveillance systems.

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APPENDIX

INDEPENDENT SIMULTANEOUS APPROACH PROCEDURES IN INCHEON AIRPORT



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