



**International Civil Aviation Organization**

**NINTH MEETING OF THE  
COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND  
METEOROLOGY SUB-GROUP OF APANPIRG  
(CNS/MET SG/9)**

Bangkok, Thailand, 11–15 July 2005

**Agenda Item 13: Review CNS/ATM systems planning and implementation:  
2) MET related issues**

**PROVISION OF AUTOMATED AIRCRAFT OBSERVATIONS**

(Presented by Hong Kong, China)

**SUMMARY**

This paper presents a proposal to extend the provision of automated aircraft observations to also cover the approach phase of flight, in addition to the climb-out and en-route phases, and to increase the resolution of the observations during the climb-out and approach phases for wind shear warning application.

**1. INTRODUCTION**

1.1 Para. 5.3.1 of Chapter 5, Annex 3 recommends that “*When air-ground data link is used and automatic dependent surveillance (ADS) is being applied, automated routine observations should be made every 15 minutes during the en-route phase and every 30 seconds during the climb-out phase for the first 10 minutes of the flight*” (Note: subject to approval, the use of Mode S, in addition to ADS, for automatic air-reporting will be included in Amendment 74 to Annex 3). It is apparent that automated routine aircraft observations are currently not required during the approach phase of flight.

1.2 This paper presents a proposal to extend the provision of automated aircraft observations to also cover the approach phase of flight for low-level wind shear warning application. It is also proposed to increase the resolution of the observations during the climb-out and approach phases of the flight.

**2. DISCUSSION**

2.1 Para. 6.1 of Appendix 6, Annex 3 recommends “Evidence of the existence of wind shear should be derived from: .... c) aircraft observations during the climb-out or approach phases of flight to be made in accordance with Chapter 5”.

2.2 Furthermore, para. 5.3.2 of Chapter 5, Annex 3 requires that “When voice communications are used, routine observations shall be made during the en-route phase ....”. Therefore there is currently no provision of routine aircraft observations during the approach phase of

flight, no matter whether automatic data downlink or voice communications are used. The only means is thus through the requirement of “other non-routine aircraft observations” under para. 5.6 of Chapter 5, Annex 3, which relies on the judgment of the pilot-in-command. However, from low-level wind shear warning experience in Hong Kong, China and discussions with pilots, such reporting of wind shear by the pilots is based on their subjective assessment although the importance of the accuracy of such reports is appreciated. Due to cockpit workload constraints, the pilot would normally estimate the wind shear magnitude from the airspeed indicator without considering the available wind information, even though the airspeed could be affected by flight control inputs such as the application of power or pitch control. It is therefore highly desirable for the evidence of the existence of low-level wind shear to be derived from automated aircraft observations of the wind during both the climb-out or approach phases of flight.

2.3 As regards the resolution of the automated aircraft observations, the current specification of 30 seconds in para. 5.3.1 of Chapter 5, Annex 3, is equivalent to approximately 2.5 km at typical aircraft approach speed ( $\sim 80 \text{ ms}^{-1}$ ). While this is within the typical spatial scale range of wind shear (400 m to 4 km), smaller-scale events such as terrain-induced wind shear would possibly be missed unless the resolution of the observations is increased to adequately cover the lower end of the scale range. Considering the typical aircraft approach speed, it is proposed to increase the temporal resolution of automated aircraft observations from 30 seconds to 4 seconds when the aircraft is between runway level and 500 m above that level – the altitude range in which low-level wind shear warning is required according to para. 7.4.1 of Chapter 7, Annex 3. The meeting may wish to note that 4-second resolution is currently implemented by automated AMDAR observations collected in Hong Kong, China.

2.4 The meeting is invited to consider the merits of extending the provision of automated aircraft observations to also cover the approach phase of flight, and increasing the resolution of the observations during the climb-out and approach phases for low-level wind shear warning application, and formulate the following draft Conclusion:

**Draft Conclusion 9/xx – Extending the Provision of Automated Aircraft Observations for Wind Shear Warning Application**

That, ICAO is invited to consider, for low-level wind shear warning application, extending the the provision of automated aircraft observations to:

- a) cover the approach phase of flight; and
- b) increase the resolution to 4 seconds during the climb-out and approach phases when the aircraft is between runway level and 500 m above that level.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- (a) note the information in this paper; and
- (b) agree on the proposed draft conclusion.

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