



ICAO

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Automation System Task Force of APANPIRG
(ATMASTF/1)**

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Agenda Item 5: Issues and Challenges in implementation

5.7 DAPs applications

APPLICATION OF DAPS IN ATM AUTOMATION SYSTEM IN SINGAPORE

(Presented by Singapore)

SUMMARY

This information paper provides information on the application of DAPs in ATM automation system in Singapore

1. INTRODUCTION

1.1 With the upgrade to all of Singapore's radars to be Mode S capable, the DAPs received is now used in the ATM automation system in Singapore to improve ATC's awareness allowing for safer and more efficient provision of Air Traffic Services.

2 APPLICATIONS OF DAPS IN ATM AUTOMATION SYSTEM

2.1 The ATM automation system in Singapore was upgraded in 2018 adding the capability of the multi-sensor tracking system to process and display DAPs on the Air Situation Display(ASD). The following DAPs were selected to be displayed to controllers:

1. ACAS Resolution Advisory notification (BDS code 3,0)
2. MCP/FCU Selected Altitude (part of Selected Vertical Intention, BDS code 4,0)
3. Indicated Airspeed (part of Heading and Speed report, BDS code 6,0)
4. Mach Number (part of Heading and Speed report, BDS code 6,0)
5. Magnetic Heading (part of Heading and Speed report, BDS code 6,0)

2.2 The display of the indicated Airspeed, Mach number and Magnetic heading can be viewed by controllers in the extended aircraft label allowing for easy access to the information while preventing such information from cluttering the ASD of controllers unnecessarily. Mach number information allows for efficient use of Mach number technique reducing the need to request the cruising Mach number in the application of Mach number technique for reduced longitudinal separation; Indicated Airspeed information allows for monitoring of non-compliance to speed restrictions on the STARS increasing safety.

2.3 Besides the display of information obtained from DAPs, the ATM automation system in Singapore was also enhanced to incorporate the information in its processing of existing safety nets. These safety nets, which include the Short Term Conflict Alert and Mid Term Conflict Detection tool,

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was enhanced to take into account the Final State Selected Altitude to better predict potential conflicts earlier.

2.4 New safety nets were also introduced in the ATM automation system. Using the MCP/FCU Selected Altitude information in DAPs, the ATM automation system compares the information with the Executive Flight Level (EFL) keyed in by the controllers and present an alert on the aircraft label when it detects a mismatch. This MCP/FCU Selected Altitude mismatch alert was configured with a timeout period of 21s after controller keys in a new EFL. This allows ample time for the pilot to initiate the level changes on the FMS preventing unwanted alerts. The timeout period is not applicable in the scenario where there was no change in EFL allowing controllers to quickly identify if another aircraft mistakenly took the clearance intended for aircraft being cleared. Since the introduction of the MCP/FCU Selected Altitude mismatch alert, multiple potential level bust had been mitigated as the MCP/FCU Selected Altitude mismatch alerts provided controllers an additional layer of defence enhancing safety that was previously solely reliant on readback and hearback of clearances.

2.5 The application of ACAS Resolution Advisory notification allowed the ATM automation system to present a prominent notification on the flight label providing controllers enhanced situational awareness that the flight was on a RA manoeuvre. The indication may be acknowledged and is removed only when the ACAS RA is resolved.

3 ISSUES AND CHALLENGES IN IMPLEMENTATION

3.1 Whilst the implementation of using DAPs in ATM automation has brought about numerous benefits, there were several issues encountered as well.

3.2 One of the issues encountered was due to erroneous 24-bit addresses being transmitted by an aircraft. This resulted in the ATM automation system dropping the track as it now takes the Mode S data into consideration in processing of tracks and criteria for coupling.

3.3 Another issue observed was when the MCP/FCU Selected Altitude mismatch received by aircraft was showing incorrect values (i.e. constantly jumping flight level, double the actual flight level). This resulted in alerts triggered by the ATM automation system causing distraction and workload for controllers as they would need to follow up to check to ensure that there was no safety risk.

3.4 These issues can be resolved by placing the 24-bit addresses of such airframes in a blacklist so that the ATM automation system will discard the DAPs received. This will prevent the unnecessary alerts from being triggered due to erroneous data and the airframes can be removed from the blacklist after verifying with the airlines that the issues have been resolved.

4 ACTION BY THE MEETING

4.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matter as appropriate
