International Civil Aviation Organization

AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST SEMINAR AND FOURTEENTH MEETING OF AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST (ADS-B) STUDY AND IMPLEMENTATION TASK FORCE (ADS-B SITF/14)

Christchurch, New Zealand, 14 – 17 April 2015

Agenda Item 8: Any other business

AUSTRALIAN USE OF DAPS

(Presented Australia)

SUMMARY

This paper presents describes the Australian plan to utilise Mode S Downlink of Aircraft parameters (DAPS).

1. Introduction

1.1 Many Mode S transponders are capable of downlinking data parameters which can support ATC. However these parameters are not being used in most ATC systems.

2. Mode S data registers

2.1 Mode S radars have the ability to interrogate the "registers" inside airborne (and taxiing) aircraft to obtain useful information for ATC. This information is then typically conveyed to the ATC centre in Asterix Cat48 messages.

2.2 Some ADS-B transmissions include the same data, which can be conveyed to ATC centres in Asterix Cat 21 messages.

Information already available from a large number of aircraft includes the following:

2.1 Register 2,0 Aircraft identification

This information is the Flight ID or callsign information. It is identical to the Flight ID received in ADS-B messages.

This can be used to correlate radar/ADS-B tracks to flight plans.
It could be used before departure to ensure that the Flight ID is correctly set.
It can be used to identify the callsign of aircraft without flight plans.

2.2 Register 4,0 Selected vertical intention

The following information can be extracted from register 4,0

1	MCP/FCU SELECTED ALTITUDE	This is the level selected by the pilot as the "cleared" level
2	FMS SELECTED ALTITUDE	This is the level selected by the flight management system and can include levelling off that may occur due to economic or other constraints.
3	BAROMETRIC PRESSURE SETTING	This is the QNH setting in the aircraft. It could be used to detect mismatches between aircraft QNH settings and that expected by ATC

2.3 Register 5,0 Track and turn report

The following information can be extracted from register 5,0

1	ROLL ANGLE	These registers could perhaps be used to improve tracking, detect maneuvers earlier or provide better estimates of speed than possible by calculation of position differences per scan
2	TRUE TRACK ANGLE	
3	GROUND SPEED	
4	TRACK ANGLE RATE	
5	TRUE AIRSPEED	

2.4 Register 6,0 Heading and speed report

The following information can be extracted from register 5,0

1	MAGNETIC HEADING	These registers provide speed indicated to the crew. These can be used for better prediction and for flow, sequencing purposes.
2	INDICATED AIRSPEED	
3	MACH	
4	BAROMETRIC ALTITUDE RATE	
5	TRUE AIRSPEED	
6	INERTIAL VERTICAL VELOCITY	

Detailed information is available from ICAO document Doc 9871 AN/460

3. Airservices Australia use of DAPS

3.1 Airservices Australia uses or plans to use DAPS as follows, in the medium term :

- Currently uses Flight ID from WAM, and ADS-B to support matching of flight plans with surveillance tracks. Use of Flight ID from radar is currently disabled (Flight ID is not transmitted to the ATM System) due to processing limitations of the ATM system.

- Is introducing ATC automation capability (expected in 2016) to generate a controller alert when the selected level (MCP/FCU) is different to the ATC cleared level. This will allow ATC to detect some level busts before they occur!

- Australia is expected to commission a new nationwide ATC system in 2018 called CMATS. This is a joint civil-military ATC system. The system will support the display of DAPS to ATC allowing, for example, display of IAS & Airspeed.

  The Australian Bureau of Metrology (BOM) is expecting to use DAPS in support of wind measurement and wind modelling

4. Implications for operators

4.1 It is important that any transmitted DAPS be correct.

CASA Civil Aviation Order 20:18 says ;

9C.6 The aircraft flight identification must:

(a) if a flight notification is filed with ATC for the flight — correspond exactly with the aircraft identification mentioned on the flight notification; or

(b) if no flight notification is filed with ATC for the flight:

(i) for an aircraft registered on the Australian Civil Aircraft Register — be the aircraft registration mark; or

(ii) for an Australian aircraft registered by a RAAO — be in accordance with the RAAO's operations manual; or

(c) be another flight identification directed or approved for use by ATC.

*9C.7 Mode S transponder transmission of the aircraft flight identification is optional for any aircraft that was first registered in Australia before 9 February 2012 (an **older aircraft**). However, if an older aircraft is equipped to transmit, and transmits, an aircraft flight identification then that aircraft flight identification must be in accordance with paragraph 9C.6.*

9C.8 If the equipment transmits any Mode S EHS DAPs, the transmitted DAPs must comply with the standards set out in paragraph 3.1.2.10.5.2.3 and Table 3-10 of Volume IV, Surveillance and Collision Avoidance Systems, of Annex 10 of the Chicago Convention.

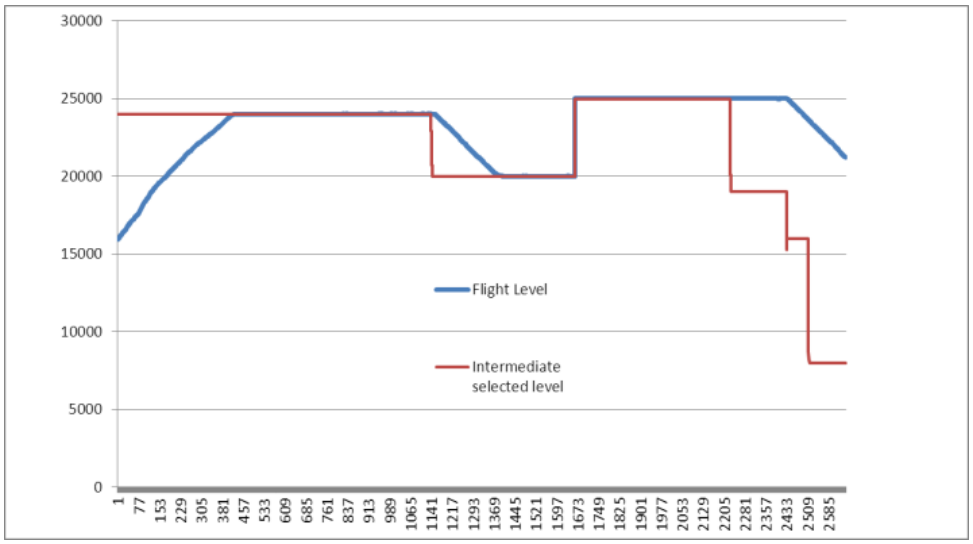
Note 1 Paragraph 3.1.2.10.5.2.3 includes 3.1.2.10.5.2.3.1, 3.1.2.10.5.2.3.2 and 3.1.2.10.5.2.3.3.

Note 2 Australian Mode S SSR are EHS DAPs-capable, and operational use of EHS DAPs is to be introduced in Australia. Implementation of Mode S EHS DAPs transmissions that are not in accordance with the ICAO standards may be misleading to ATC. Operators need to ensure that correct parameters are being transmitted.

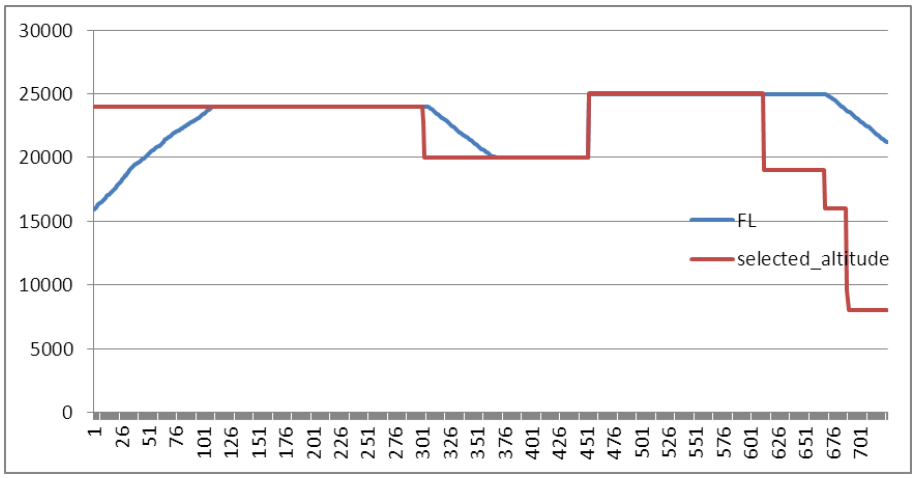
5. Examples of selected altitude downlink

5.1 The following plots show selected altitude (MCP/FCU) and actual flight level.

Case 1 : Qantaslink Dash8 Q400 (DO260B)

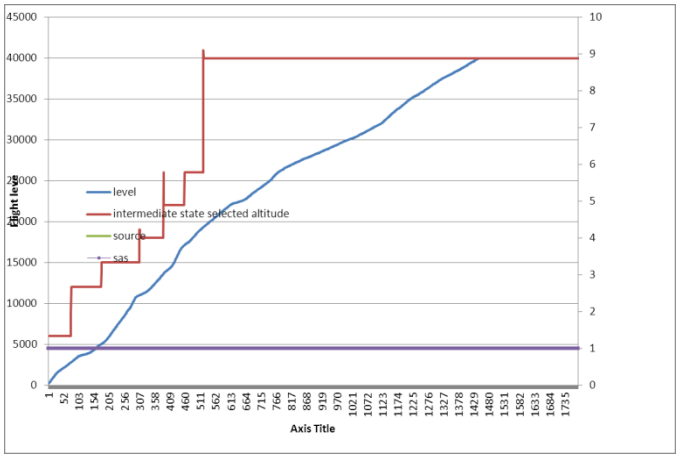


ADS-B data from Asterix Cat21 from this DO260B capable aircraft

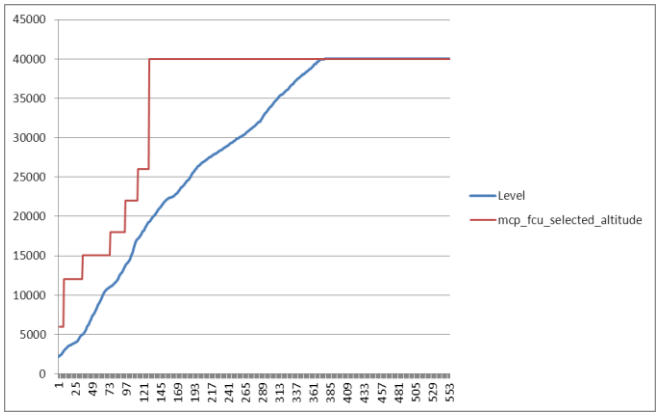


Radar from Mode S radar from Asterix Cat48

Case 2 : Air AsiaX Airbus A330 (DO260A)

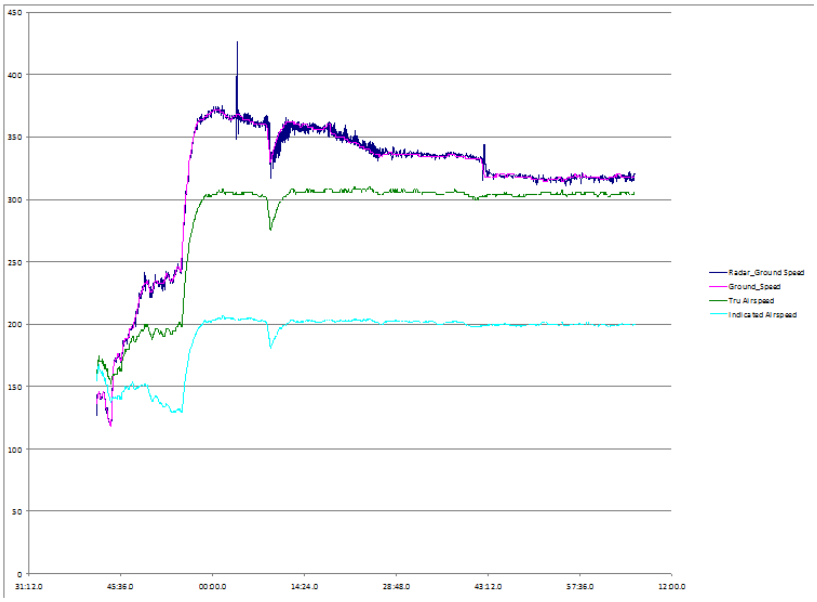


ADS-B data from Asterix Cat21 from this DO260A capable aircraft

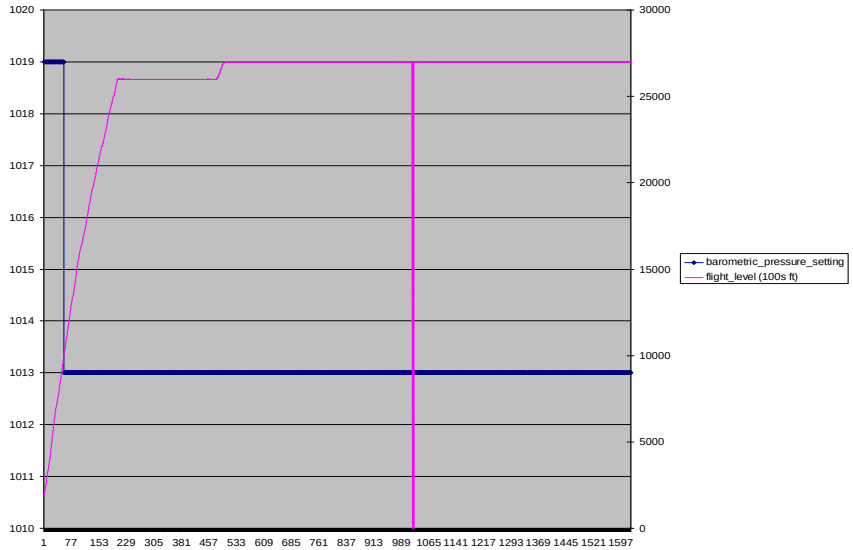


Radar from Mode S radar from Asterix Cat48

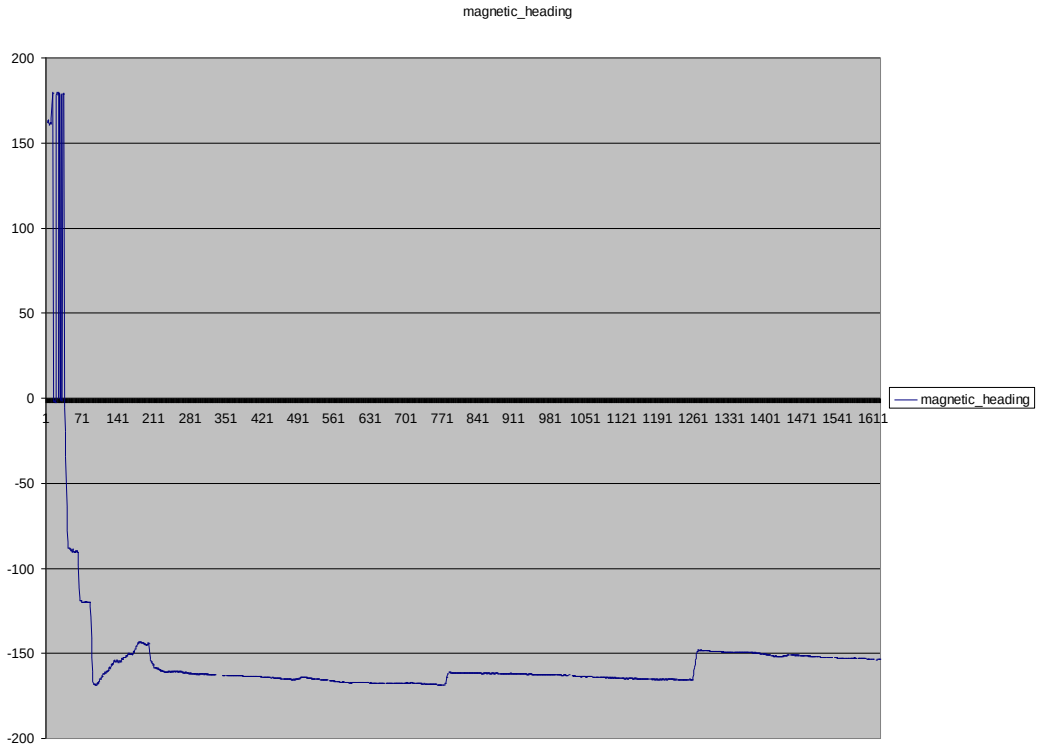
Case 3 : B350 (DO260A)



Speed data from Mode S radar (Asterix Cat48)
Radar determined ground speed, GPS ground speed
Indicated airspeed & True airspeed



QNH setting data from Mode S radar (Asterix Cat48)



Magnetic heading data from Mode S radar (Asterix Cat48)

6. Action by the meeting

The meeting is invited to:

a) note the information contained in this paper; and

b) consider the role of the ADS-B SITF regarding the use of Mode S DAPS

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