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International Civil Aviation Organization

FIFTEENH MEETING OF THE ADS-B STUDY AND IMPLEMENTATION TASK FORCE (ADS-B SITF/15)

Bangkok, Thailand, 18 - 20 April 2016

Agenda Item 4:Review States' activities and interregional issues on implementation of
ADS-B and multilateration

INCORRECT PROCESSING OF DO-260B DOWNLINKS BY NON DO-260B UPGRADED GROUND STATIONS

(Presented by Australia)

SUMMARY

ADS-B Ground stations which are not designed to support DO-260B may include incorrect data in the Asterix output. States using ground stations which do not support DO-260B are encouraged to upgrade as a priority.

1. INTRODUCTION

1.1 Since the introduction of ADS-B, the Minimum Operational Performance Standards (MOPS) for ADS-B avionics have evolved through RTCA DO-260 (Version 0) in 2000, DO-260A (Version 1) in 2003 and DO-260B (Version 2) in 2009. Each version has brought additional avionics reporting and changes to data structures in the DF17 or DF18 downlink messages.

1.2 ADS-B ground stations need to be able to correctly decode DF17/DF18 messages, in order to correctly populate the data distributed to the Air Traffic Control system – typically via Asterix Category 21 message.

1.3 Incorrect decoding of DF17/DF18 messages can lead to incorrect information, or no ADS-B track information, being presented to ATC.

1.4 The FAA and Eurocontrol ADS-B mandates (2020) both specify DO-260B only. Consequently, in Asia Pacific, there is an increasing proportion of DO-260B equipped aircraft requiring ADS-B services.

2. DECODING ERRORS OBSERVED IN AUSTRALIA

2.1 Australian ADS-B ground stations are supplied by either Thales (standalone AS680 ADS-B receivers) or Saab Sensis (as part of the wide area multilateration system). The Australian Thales ground stations were upgraded to support DO-260B before many aircraft were equipped to this

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standard, so Australian experience of the Thales ground station behaviors without DO260B capability is limited.

2.2 The Saab Sensis ground stations were upgraded later; consequently Australia noted operational issues with decoding of DO-260B avionics in the period before the upgrade was applied. These are described below.

a) The DF17/18 Format Type Code 29 changed significantly between the 3 DO-260x versions. For DO-260, format type code 29 was reserved, but it became functional in DO-260A as the Target State and Status Information Message.

DO-260A utilises Format Type Code 29 subtype = 0. Amongst other data items in the extended squitter, bits 54-56 of the extended squitter are used to indicate Emergency/Priority Status.

DO-260B utilises Format Type Code 29 subtype = 1. In this version, the DO-260A Emergency/Priority Status bits (54-56) were replaced by an LNAV Mode engaged bit plus 2 "reserved" bits.

The Ground station was not configured to test the type code 29 subtype (this was not regarded as necessary for DO-260A implementation).

Consequently, if the LNAV Mode Engaged bit is set in a DO-260B aircraft, (e.g. B787 aircraft upgraded to DO-260B set this bit) the Saab Sensis ground station would misinterpret this as indicating a Radio Communications Failure. This is then encoded into the Asterix Cat 21 message, and sent to the ATM system. A corresponding alert would present to the Air Traffic Controller. When this occurs the controller is still required to (once only for each flight) confirm the aircraft is actually "operations normal" and not subject to a real radio failure. On occasion, controllers have (in error) sent an ADS-C preformatted message "CONFIRM ADS EMERGENCY" via CPDLC which has caused confusion on the flight deck.

b) Airborne Position Messages were sometimes being misinterpreted such that the figure of merit in the Asterix Cat 21 message would be incorrectly set to zero. This intermittent decoding error would resulted in "good" ADS-B data from DO-260B aircraft not being displayed to ATC. ATC would consider the possibility that the ADS-B system on board the aircraft had failed. The ADS-B track data would become available to ATC when the aircraft entered coverage of a Thales ground stations (which were already upgraded to support DO-260B).

2.3 The above are examples of decoding errors which result when the ground station and aircraft avionics are not compatible. It is possible there are other data decoding errors that could occur, with the manifestation through to operations really determined by how many of the relevant data items are used by a particular ANSP.

3. **DISCUSSION**

3.1 As DO-260B avionics installations become more widespread, where supporting ground stations are not upgraded in support, the frequency of downlink mis-interpretation increases. In the case of false radio communications failures being displayed to ATC, this increases workload, and may risk pilot or ATC confusion as to the aircraft's true operational status. There is also a risk that ATC could become "desensitized" to the alerts and perhaps not respond correctly in the event of a real failure situation.

3.2 The potential non-display of ADS-B data is also a safety concern, particularly in those airspaces where ADS-B derived separation services are provided.

3.3 States are encouraged to progress the upgrade of ground stations to ensure support for DO-260B avionics.

4. ACTION BY THE MEETING

- 4.1 The meeting is invited to:
 - a) note the information contained in this WP;
 - b) consider an amendment to the AIGD to emphasize this issue;
 - c) consider a letter from ICAO to relevant states on the issue; and
 - d) discuss any relevant matters as appropriate.
