

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

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

**DISABLING ADS-B TRANSMISSIONS IN FLIGHT**

(Presented by Australia)

**SUMMARY**

This paper discusses the concept of disabling ADS-B transmissions in-flight.

**1. INTRODUCTION**

1.1 There has been considerable discussion about the need for training flight crew to manage the situation for ATC when ADS-B generates misleading positional information.

**2. HISTORICAL CONTEXT**

2.1 In the early days of ADS-B, Australia reasoned that it would be necessary to disable ADS-B in-flight because incorrect ADS-B transmissions could mislead other aircraft using ADS-B IN. It was recognized that the ATC system or operational procedures could be used to protect ATC. This led Australia to include the following words in the ADS-B regulations (Civil Aviation Order 20.18):

*“Unless otherwise approved in writing by CASA, the ADS-B transmitting equipment must:*

- (a) Transmit the current aircraft address; and*
- (b) Allow the pilot to activate and deactivate transmission during flight”*

2.2 However, early implementations of ADS-B (typically DO260) were not built with the technical capability allowing ADS-B to be turned off. The only option that existed was to turn off the transponder completely – resulting in loss of Mode S/SSR replies. In fact most ADS-B implementations do not support “ADS-B OFF” while retaining Mode S/SSR capability.

2.3 As a consequence, a note was added to the Australian regulation:

*Note: The requirement is met if the ADS-B transmitting equipment has a cockpit control that enables the pilot to turn the ADS-B transmissions on and off.*

However, clearly it is not desirable for a pilot to disable the transponder because TCAS protection would be lost and the aircraft would no longer be displayed as a radar track to ATC (in radar coverage).

Therefore, it would be appropriate for Australia to review the regulation that requires the equipment to allow the pilot to activate and deactivate transmission during flight.

### 3. THE ADS-B STANDARDS

3.1 The RTCA & EUROCAE do NOT require manufacturers to provide an ADS-B off capability. RTCA DO260 A and DO260B state:

#### **4.4.5 1090 MHz ADS-B Link Control (Optional)**

*At the manufacturer's option, a means may be provided for the flight crew to disable the 1090 MHz ADS-B link. Disabling results in the cessation of transmission and/or reception of ADS-B Messages on 1090 MHz. Control of transmission and reception of any other installed ADS-B systems is independent of the 1090 MHz ADS-B system status.*

3.2 The FAA AC 20-165A paragraph 2.2 requires the aircraft or rotorcraft flight manual (or supplement) to include details regarding ADS-B OFF capability if that functionality is provided as follows :

*Normal operating procedures. Describe normal and non-normal operating procedures for the system in the flight manual.*

*(1) Describe any actions expected of the pilot.*

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*(3) Describe any ADS-B OUT displays and provide instructions to the pilot on how to respond to any error conditions.*

*(4) Describe how the ADS-B OUT system can be disabled, if there is an ability to disable the ADS-B system, and the means through which the pilot can detect that the system has been disabled. The flight manual must address the ramifications of turning off the ADS-B OUT system, including the ramifications to the transponder and TCAS II if disabling the ADS-B OUT system also disables the transponder or the TCAS II.*

*(5) Include guidance in the flight manual on when to enable the ADS-B system. The ADS-B system must be enabled (turned ON) during all phases of flight operation including airport surface movement operations. ADS-B IN surface applications and ATC surface surveillance will use ADS-B broadcasts, thus it is important for aircraft ADS-B OUT systems to continue to transmit on the airport surface. If the ADS-B function is embedded in a Mode S transponder, the flight manual, checklists, and any operator procedures manuals must be updated accordingly with ADS-B operations guidance.*

3.3 FAA AC 90-114 Appendix 1 paragraph 1. c. (3) states:

*Operations manuals and checklists should indicate that when there is not an independent flight deck control selection between the ADS-B OUT on/off function and the ATC transponder on/off function, the crew must be fully aware that disabling the ADS-B function will also disable transponder and Traffic Alert and Collision Avoidance System (TCAS) functions.*

**4. THE AIRCRAFT CAPABILITIES**

4.1 Most aircraft have no capability for the crew to disable ADS-B transmissions without turning OFF the transponder.

Disable ADS-B transmissions:

- There is currently no capability in Boeing or Airbus aircraft to disable ADS-B transmissions.
- Embraer do provide the capability to disable ADS-B transmissions.

Select alternate transponder:

4.2 In aircraft with dual ADS-B installations, the crew is usually able to switch from transponder 1 to transponder 2; this is recommended as an initial action when any ADS-B fault is detected. In Boeing aircraft this also switches the ADS-B source to the alternate GPS.

**5. AUSTRALIA’S ATC OPERATIONAL PROCEDURES**

5.1 In cases of misleading ADS-B transmissions being detected (very few), the Australian ATC procedures are as shown below:

**9.6.9 Transponder error reporting - Mode A/C/S and ADS-B**

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**9.6.9.1 ATC actions**

If an expected surveillance track is not displayed, unexpectedly dropped or displayed in an incorrect position:

- a) advise the flight crew and instruct that they recycle the transponder and/or select secondary transponder as appropriate
- b) further advise the flight crew of the result of any transponder change, and request that the issue be checked post-flight
- c) record details for reporting including, in the case of SSR Mode A/C errors, the transponder type
- d) if ADS-B, and the issue remains unresolved, instruct the pilot to contact the National Operations Centre by telephone after arrival (phone 02 6268 5662).

**Note:** Point d. above will potentially trigger ADS-B 'blacklisting'. The total absence of ADS-B data (when otherwise expected), does not warrant blacklist consideration, but should be reported via CIRRIIS.

Together with the following information:

**9.6.4.9.3 ADS-B controls with SSR transponder**

Some ADS-B installations may share controls with the SSR transponder, meaning that independent operation of the two systems is not possible. If it is not possible to comply with a particular instruction, the pilot will advise ATC and request alternative instructions.

5.2 A formal report is created regarding the occurrence in an automated reporting system. This topic is addressed in another paper. A formal report is also created when aircraft fail to transmit ADS-B data.

**6. AUSTRALIA’S EXPERIENCE**

6.1 In ten years of operational ADS-B we are unaware of any pilot successfully switching off ADS-B transmissions in flight while retaining Mode S capability. On some occasions, an ATC request to disable ADS-B has been mis-interpreted as a request to disable ADS-C, with temporary loss of datalink capabilities.

There have been many cases when aircraft have been requested to changeover transponders - often resolving the observed defect. This changeover is also used for any transponder issue.

**7. SUMMARY**

7.1 Relatively few aircraft provide the capability to turn off ADS-B without turning off TCAS. It is not recommended to switch off ATC transponders (& remove TCAS protection).

7.2 The only action for most pilots of aircraft transmitting misleading data is to respond to ATC requests to switch to the alternate transponder.

7.3 Aircraft that do not support ADS-B OFF should have the details included in the flight manual including the undesirability of disabling TCAS.

**8. ACTION BY THE MEETING**

8.1 The meeting is invited to:

- a) note the information contained in this WP particularly the intent by Australia to review the requirement for equipment to be able to turn off ADS-B;
- b) discuss any relevant matters as appropriate; and
- c) Consider removing any reference to ADS-B switch off from the AIGD.

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