Twenty Eighth Meeting of the
Informal South Pacific ATS Co-ordinating Group
(ISPACG/28)

Papeete, Tahiti
5-7 March 2014

Agenda Item 4. Review Open Action Items (AI 27-3)

ADS-B Flight Planning Inconsistencies

Presented by Airservices Australia

SUMMARY

This WP provides observations by Australia concerning the flight planning of ADS-B capability, and the various interpretations of ICAO flight plan requirements. This WP makes recommendations to clarify the ICAO flight planning requirements associated with ADS-B.

1. INTRODUCTION

1.1 Amendment 1 to the 15th Edition of ICAO Doc 4444 (November 2012) introduced new, and more detailed, flight planning requirements. A particular emphasis of the amendment was improving the description of navigation and avionics capabilities of aircraft in flight plan fields 10 and 18.

1.2 Descriptors for surveillance equipment capabilities are now provided for in Field 10b of the Flight Plan. Descriptors for ADS-B capability are provided in both the "SSR Mode S" and "ADS-B" ranges of descriptors.

1.3 Air Traffic Control operations using ADS-B require that flight plan information can be relied upon for traffic management planning purposes. ATC planning and situational awareness can be adversely affected if aircraft expected to be ADS-B equipped are not actually equipped.

1.4 Examination of recent Flight Plan data indicates that serviceable ADS-B capability is not consistently indicated.

2. DISCUSSION

2.1 There are currently a number of perceived ambiguities in the Doc 4444 Appendix 2 flight planning requirements concerning the flight planning of ADS-B capability. To better achieve the believed intent, a revision to the current text is proposed in the recommendations contained in this working paper.

2.2 The differences in the understanding of the flight planning requirements undermines the reliability of information presented to the Air Traffic Controller for planning and traffic management purposes.

2.3 Aircraft operators should consider the implications of operating ADS-B equipment without operational approval where this is required by their state of registry.

2.4 Flight Planning requirements for ADS-B carriage (ICAO DOC 4444 Appendix 2)

2.4.1 SSR Mode S descriptors in the flight plan include two options for indication of extended squitter (ADS-B) capability:

- **E**: Mode S, including aircraft identification, pressure-altitude and extended squitter (ADS-B) Capability
- **L**: Mode S, including aircraft identification, pressure-altitude, extended squitter (ADS-B) and enhanced surveillance capability

2.2 ADS-B descriptors in the flight plan include 6 options for ADS-B capability:

- **B1**: ADS-B with dedicated 1 090 MHz ADS-B "out" capability
- **B2**: ADS-B with dedicated 1 090 MHz ADS-B "out" and "in" capability
- **U1**: ADS-B "out" capability using UAT
- **U2**: ADS-B "out" and "in" capability using UAT
- **V1**: ADS-B "out" capability using VDL Mode 4
- **V2**: ADS-B "out" and "in" capability using VDL Mode 4

2.3 The term "capability" comprises the following elements:

a. The presence of the relevant, serviceable equipment on board the aircraft;
b. The flight crew being appropriately trained and qualified to use the equipment; and
c. Authorization having been received from the appropriate authority (if applicable)

3 Ambiguities in current flight planning requirements

3.1 The SSR Mode S descriptors "E" and "L" provide for extended squitter (ADS-B) capability. A Mode S transponder may have an extended squitter capability, but not have a suitable GNSS / ADS-B input. Possible interpretations for the flight planning of "E" or "L" may include:

- Flight plan "E" or "L" based only on the extended squitter capability of the transponder, without regard for actual ADS-B compliance/capability.
- Flight plan "E" or "L" based on ADS-B capability.

3.2 The ADS-B descriptors U1, U2, V1 and V2 are clear. However B1 and B2 include the term "dedicated", which may be taken to suggest an ADS-B transmitter which is

separate from the Mode S transponder. Possible interpretations for the flight planning of B1 or B2 may include:

- Flight plan "B1" or "B2" based on the ADS-B capability, regardless of the transmitter hardware (being either the Mode S transponder or a discrete unit); or

- Flight plan "B1" or "B2" only where the ADS-B transmitter is separate from the Mode S transponder.

  Note: Because capability is defined as a function not only of serviceable equipment, but also flight crew qualifications and authorization from the appropriate authority, it is possible that valid ADS-B data is transmitted, even if "capability" is not strictly achieved. This will be the case where an aircraft operator without "operational approval" has not disabled ADS-B out.

3.3 The majority of ADS-B equipped flights operating in Australia are flight planning both the SSR Mode S capability, and the associated ADS-B capability (e.g. EB1, LB1, LB2).

3.4 Some ADS-B equipped flights, however, have been observed to be flight planning "E" or "L", but without "B1" or B2". The reasons for this are mostly unclear. One operator has advised Airservices Australia that they have been instructed by their regulator not to plan "B1" or "B2" until operational approval is provided. However this operator's aircraft are still planning an "extended squitter (ADS-B)" capability, and transmitting valid ADS-B data.

4 ATC Interpretation of Flight Plan information (Australian experience)

4.1 An expectation of each aircraft's ADS-B capability is important for the air traffic controllers' traffic management and planning purposes. Prior to an aircraft transiting from SSR-only coverage to ADS-B-only coverage, the controller needs to know if the aircraft can be expected to remain identified (for the ongoing provision of ATS surveillance services - including separation), or transition to a non-surveillance position symbol. For an aircraft entering ADS-B coverage from non-ATS surveillance airspace, the information is also relevant and useful from a traffic planning perspective.

4.2 Two options were considered for evaluation flight plan data to indicate carriage of ADS-B. These evaluations are carried out before the aircraft enters ADS-B coverage (once in coverage the ADS-B capability of an aircraft, or the lack of it, is readily apparent).

4.2.1 Option 1:

Scan the flight plan for presence of "B1" or "B2" in Field 10b. Consider the aircraft equipped only if either these descriptors are present. This option tends to provide a "false negative" outcome on occasion – this will occur where a pilot has filed "E" or "L" as indicating an ADS-B capability, but not planned "B1" or "B2". The controller

will be expecting the aircraft to display as a non-ATS surveillance position symbol, but ADS-B data will actually be received from the aircraft.

Arguably this is the safer, more conservative approach.

4.2.2 Option 2:

Scan the flight plan for presence of "E" or "L" or "B1" or "B1" in Field 10b. Consider the aircraft equipped if any 1 or more of these descriptors are present. This option tends to provide a "false positive" outcome on occasion – this will occur where a pilot has filed "E" or "L" as indicating an extended squitter capability, but is not actually providing valid ADS-B output.

In this case the controller would be expecting the aircraft to display as an ATS surveillance position symbol, but it won't.

4.2.3 Currently, the Australian ATM system assesses the flight plan and provides an indication to the controller of expected ADS-B status via an indication on the track label displayed on the air situation display. Option 1 (described above) is the method currently used to provide this indication.

4.3 Notwithstanding the content of the flight plan concerning ADS-B capability, in Australia ATS will still provide ADS-B services to any aircraft transmitting valid ADS-B data. The provision of services utilising ADS-B in Australia does not rely on "operational approval" from the state of registry. The assessment in Australia has been, and continues to be, that the use of valid ADS-B data and the provision of ADS-B services, even where operational approval has not been granted provides a safer outcome than not using the data.

4.4 Recommendation

4.4.1 It is recommended that consideration be given to amending Doc 4444 Appendix 2 as follows:

- E Transponder — Mode S, including aircraft identification, pressure-altitude and ~~extended squitter (~~ADS-B out~~)~~ Capability
- L Transponder — Mode S, including aircraft identification, pressure-altitude, ~~extended squitter (~~ADS-B out~~)~~ and enhanced surveillance capability

- B1 ADS-B ~~with dedicated 1 090 MHz ADS-B~~ "out" capability using 1 090MHz extended squitter.
- B2 ADS-B ~~with dedicated 1 090 MHz ADS-B~~ "out" and "in" capability using 1 090MHz extended squitter.

5. ACTION BY THE MEETING

5.1 The meeting is invited to:

a) note the information contained in this working paper;

b) discuss any relevant matters as appropriate; and

c) consider the recommendations made in this working paper.