



International Civil Aviation Organization

**ELEVENTH MEETING OF THE SOUTH EAST ASIA/
BAY OF BENGAL SUB-REGIONAL ADS-B
IMPLEMENTATION WORKING GROUP (SEA/BOB
ADS-B WG/11)**



New Delhi, India, 17-20 November 2015

Agenda Item 4: Report on ground system and avionics performance monitoring and improvement in compliance

EQUIPAGE STATUS OF AIRCRAFT

(Presented by Singapore)

SUMMARY

This paper updates the Working Group on the equipage status of aircraft and monitoring of avionics performance.

1. Introduction

1.1 This paper shares with the Working Group the equipage status of aircraft, as observed by the ADS-B stations used by the Civil Aviation Authority of Singapore (CAAS) and the monitoring of avionics performance.

2. Distribution of Avionics Type

2.1 The distribution of DO-260, D0-260A and DO-260B avionics equipage of the general aircraft population as observed by ground stations used by CAAS are as shown in the following table. The percentages of aircraft equipped with D0-260, D0-260A and D0-260B are as follows:

	Late 2014	Early 2015	Late 2015
DO-260	90.07%	86.81%	83.9%
DO-260A	6.27%	9.71%	10.3%
DO-260B	3.66%	3.48%	5.7%

Table 1: distribution of avionics type

2.2 A study was conducted on the equipage status of the Singapore registered operators. The results as shown below are also based on observations from the data received by the ADS-B ground stations used by CAAS.

Operator	Aircraft Type	Avionics Type	Number of aircraft	Remarks
SIA Cargo	B747-F	DO-260	10	
Singapore Airlines	B777	DO-260	58	
	A330	DO-260	32	
	A380	DO-260B	19	ADIRU L4.3 was installed to address the lack of Geo Alt.
Scoot	B777	DO-260	2	
	B787	DO-260A	7	Will be DO-260B after application of service bulletin
Silk Air	B737	DO-260	13	
	A320	DO-260	12	
	A319	DO-260	5	
Tiger Air	A320	DO-260	23	
	A319	DO-260	2	
Jetstar Asia	A320	DO-260	17	

Table 2: Status of Singapore registered operators

3. Other Avionics Issues

Toggling between high and low NUC

3.1 Singapore monitors aircraft which sent NUC values toggling between high and low without apparent reasons. It is observed that these airframes have consistency in such behavior. Currently, there are fifteen aircraft observed with such behavior.

Consistent low NUC

3.2 Singapore is also monitoring aircraft which consistently transmit low or zero NUC. Currently, there are sixty-nine aircraft observed with such behavior. Most of these aircraft are considered “unequipped”.

B787 ADS-B Positioning Error

3.3 In October 2014, an aircraft was observed by Singapore ATC to be 60 NM left off track while travelling on N891 airway. The aircraft was queried by Singapore ATC if it will be returning to the planned track. In actual fact, the aircraft was travelling on the planned track and this was verified by Kuala Lumpur and Ho Chi Minh radar systems. Good NUC was shown throughout the flight.

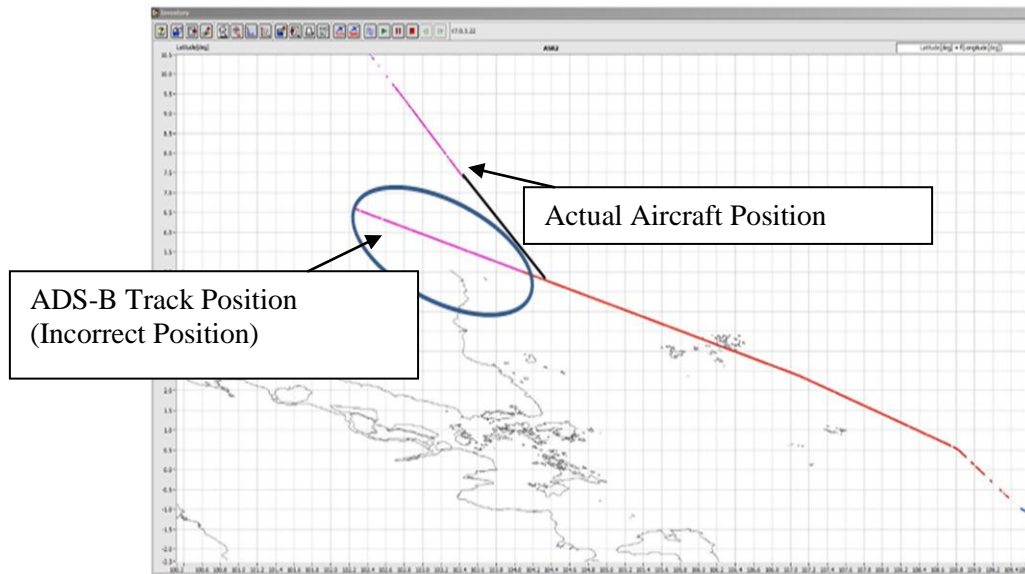


Fig 1: ADS-B Track position observed VS Actual Position

3.4 Boeing investigated the incident and identified that the fault was caused by the Rockwell Collins Integrated Surveillance System (ISS) on board the aircraft. According to Boeing, a service bulletin expected in November 2015, will resolve this issue and at the same time upgrade the avionics to DO-260B.

3.5 Thus far, we only observed one aircraft with this issue.

Multiple ADS-B Tracks

3.6 In December 2014, an aircraft was observed to have multiple ADS-B tracks, while showing good NUC. The aircraft was equipped with Rockwell Collins TPR901 transponder. We understand that the fault may occur when the aircraft crosses longitude 180. The current workaround is to power down the transponder completely after the aircraft crosses longitude 180.

3.7 Another aircraft from a different airline was observed with similar behavior in both December 2014 and January 2015. This was feedback to the State of registry via the ANSP. We have yet to encountered similar issues since then.

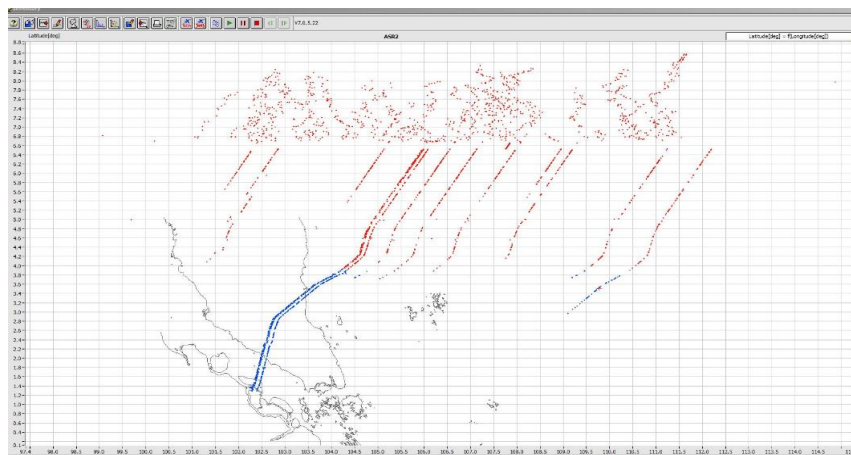


Fig 2: Multiple ADS-B Tracks

4. Conclusion

4.1 The meeting is invited to:

- a) note the above information;
- b) urge States to share observations, especially with a neighboring State who is likely to observe the same issue; and
- c) urge airlines to work with ANSPs to aid in the investigation.
