



International Civil Aviation Organization

**The Twenty-First Meeting of the Regional Airspace Safety Monitoring
Advisory Group (RASMAG/21)**

Bangkok, Thailand, 14-17 June 2016

Agenda Item 5: Airspace Safety Monitoring Activities/Requirements in the Asia/Pacific Region

RECENT CHANGE IN A320'S ALTIMETRY SYSTEM ERROR

(Presented by the Monitoring Agency for Asia Region)

SUMMARY

This paper presents MAAR's study of Altimetry System Error (ASE) of 2,078 A320 aircraft observed by their ADS-B Height Monitoring System (AHMS). The findings include deteriorating ASE of 49 A320 aircraft in recent years and a sudden change in ASE in 31 aircraft, presumably as a result of Airbus' maintenance program.

1. INTRODUCTION

1.1 During the recent meeting of the Monitoring Agencies Working Group of the Asia Pacific region (RASMAG/MAWG) in December 2015, some observations were raised regarding ASE of A320 aircraft, which is one of the two largest monitoring groups in Asia Pacific region. As a result of the discussion, the Asia Pacific RMAs were tasked to review available monitoring data for A320 aircraft and assess if any appreciable change has occurred during 2015, and any identified data should be shared with other RMAs.

1.2 MAAR, therefore, reviewed the A320 monitoring data collected from their ADS-B Height Monitoring System (AHMS) since its introduction in November 2011. The findings are presented in this paper.

2. DISCUSSION

2.1 MAAR's AHMS has observed a total of 2,078 A320 airframes since November 2011. The first analysis attempt was to find any pattern between the performance of A320 fleets and their operators. MAAR did not find any relationship between the two. The second attempt was to analyze A320's ASE with the aircraft's serial numbers. **Figure 1** shows a plot of ASE values of all A320 airframes monitored by MAAR's AHMS and sorted by their serial numbers.

2.2 The chart shows that airframes with serial numbers lower than 5000 have different characteristics when compared to airframes with serial numbers higher than 5000. The airframes with serial number above 5000 seem to have consistent ASE values, between -50 and +150 feet, while the airframes with serial number below 5000 exhibit dispersive ASE performance, varying from -200 to +200 feet.

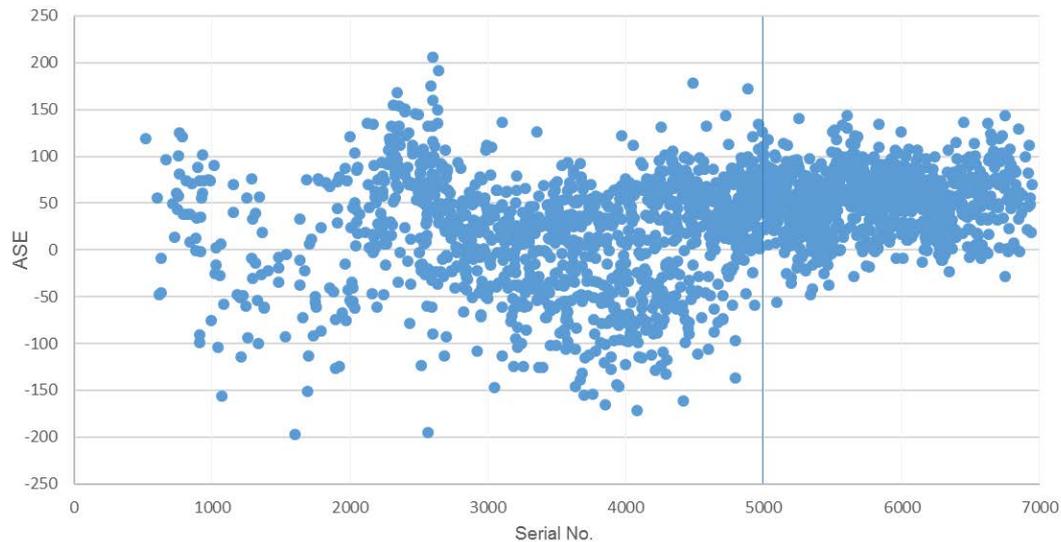


Figure 1: A320 ASE values sorted by serial numbers

2.3 The MAAR then discovered that 49 A320 airframes have degrading ASE, all of which have serial numbers below 5000. The MAAR also found 31 airframes exhibiting a sudden change in ASE performance. 18 airframes have degrading ASE, and later a sudden change in their ASE.

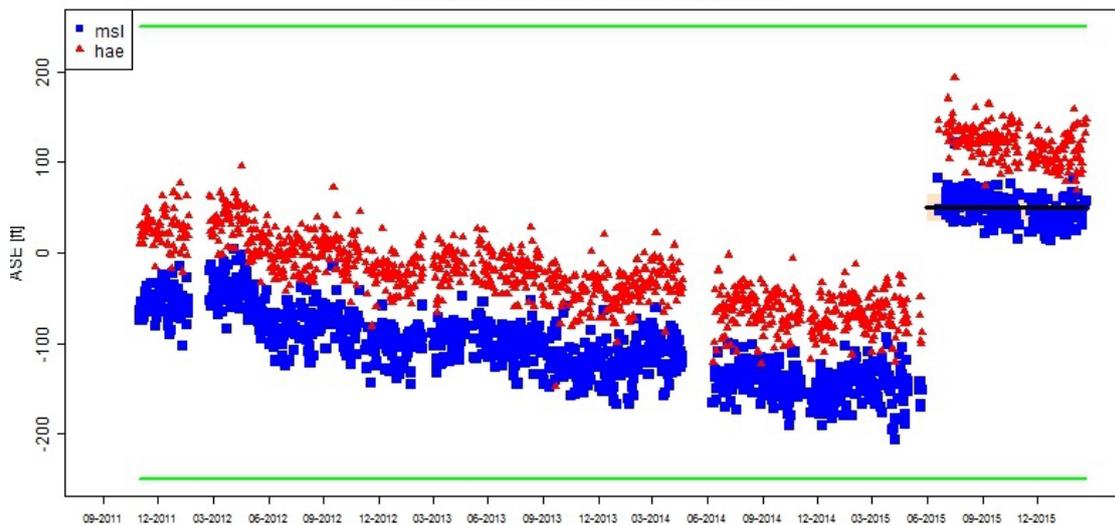


Figure 2: Example of an A320 airframe with a degrading ASE trend and a sudden step-change in ASE performance

2.4 **Figure 2** shows an example of an A320 airframe exhibiting both a degrading ASE trend over a 3.5 year period and a sudden change in ASE during June 2015; its ASE changed from approximately -150 feet to +50 feet (refer to the blue dots). This change was reported by the operator as a result of the new Airbus maintenance program released in 2015. Another interesting observation is that the ASE started to degrade again after the jump.

2.5 In MAAR's AHMS, the 31 airframes with a jump in ASE performance all have serial numbers between 2500 and 4500. These airframes were highlighted in **Figure 3**, where orange squares represent ASE values before the change and red squares represent ASE values after the change. MAAR also observed that the step changes in ASE of A320 aircraft occurred significantly since March 2015.

2.6 Please also note that a few of the changes actually made the ASE value farther away from zero since the old ASE value was close to zero and the change brought the ASE up to approximately 100 feet.

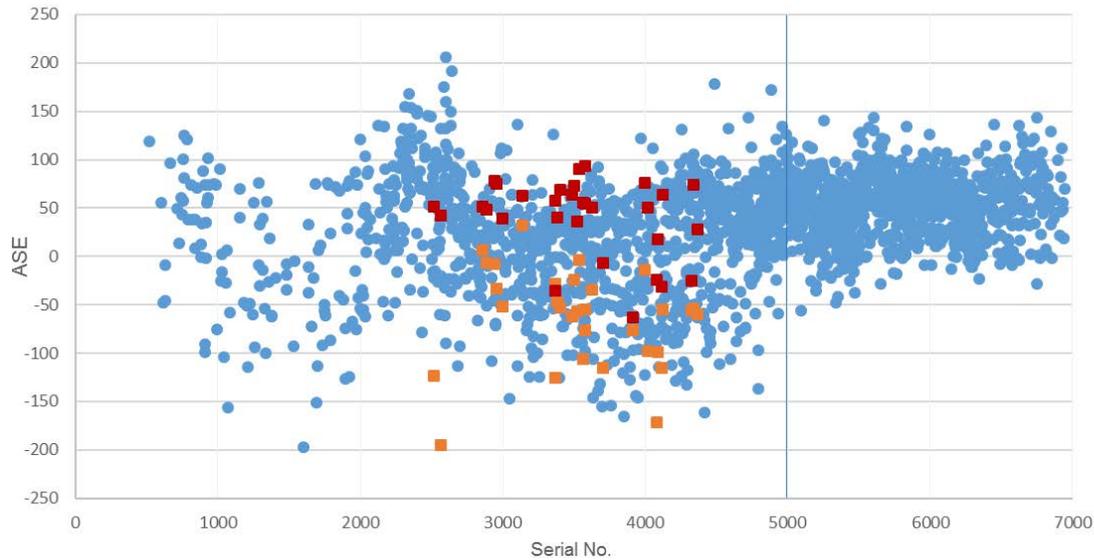


Figure 3: A320 ASE values before and after step-change

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the possibility of degrading aircraft height-keeping performance and the recent change in A320's altimetry system error and;
- b) note the importance of aircraft height-keeping performance monitoring requirement according to Annex 6 Operation of Aircraft; and
- c) discuss any relevant matters as appropriate.

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