Observing Altimetry System Error (ASE)
B737 Fleet

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Overview

• B737s are split in two separate groups based on their expected ASE performance characteristics
  + B737CL and B737NG

• Large Altimetry System Error (ASE) was identified in several B737 airframes

• Initial analysis examined the performance differences between these two groups

• The identified cause and corrective actions are provided for discussion
ASE Group Performance Requirement

Results for Airworthiness-Approved Airframes

Note: ASE variance estimates reduced by assumed measurement variance of (45.4 ft²)
Date of Chart: Friday, February 15, 2019
ASE Observations B737 Classic
ASE Observations B737 NextGen

Results for Airworthiness-Approved Airframes B737NX

Reference Statistics
Aircraft Group: B737NX
Group Mean: 0.0
Airframe Near S.D.: 0.0

Airframe

Date of Chart: February 13, 2015

FAA

nextGEN
ASE Evaluation Process

- AGHME
- EGAMU
- AHMS
- Other RMA Data

RVSM System Performance Monitored

FAA Technical Center (NAARMO) conducts QA process on monitoring data

- Deteriorating performance or event greater than 200'
  - No: Post data as appropriate
  - Yes: NAARMO coordinates with AFS-470, AFS-360 and CHDO to consider suspension of RVSM Authorization

- Is Event greater than 245'
  - Yes: NAARMO produces ASE-R and Cover Letter
  - No: Add to watch list

- Determine if ASE-R is to be sent
  - Yes: See Part 2
  - No: Continue monitoring
Issue for Discussion

• Several B737 aircraft have been identified in Altimetry System Error Reports (ASE-Rs)
• Job-Aid ASE-R flow chart decision blocks are evaluated by an experienced team aware of ASE measurement challenges and error distribution
• Individual ASE measures greater than 245ft do not always automatically trigger an ASE-R
  ✤ ASE must be taken in context of an ensemble of measurements from a particular AGHME or aircraft
  ✤ Extreme ASE measures trigger an automatic report
ASE-R Example Charts

**Measurements of ASE on all other aircraft where a large ASE was observed on the subject aircraft**

**Average ASE of all other aircraft in the subject aircraft’s monitoring group**
ASE Measurement
737-7H4 First Flight 6/25/1999

Repeated AGHME Measurements AC1
December 7, 2014 to December 13, 2015

ASE-R
Issued
Resolution Aircraft 1

- Operator performed Boeing AMM task 34-21-00 to test the Air Data Modules on both primary systems. Test confirmed that both Air Data modules for the static source systems were defective and replaced. RVSM critical area was inspected with no findings. Work Completed 22 Feb, 2016
ASE Measurement
Aircraft 1 Resolved

Repeated AGHME Measurements AC1
December 3, 2013 to March 7, 2016

ASE-R Closed
Example ASE Measurement
737-7H4 First Flight 6/25/1999

Repeated AGHME Measurements AC2
December 1, 2014 to December 11, 2015
Resolution AC2

- Operator performed Boeing AMM task 34-21-00 to test the Air Data Modules on both primary systems. Test confirmed that both Air Data modules for the static source systems were defective and replaced. RVSM critical area was inspected with no findings. Work Completed 22 Feb, 2016
ASE Measurement Aircraft 2 Resolved

Repeated AGHME Measurements AC2
December 9, 2013 to March 8, 2016

ASE-R Closed
B737 Long-Term Trend AC3
B737 Long-Term Trend AC4

AGHME ASE Measurements for AC4

Altimetry System Error (ft)

Date of Measurement

B737 Long-Term Trend AC5

AGHME ASE Measurements for AC5

Date of Measurement

Altimetry System Error (ft)
B737 Long-Term Trend AC6
Summary

- Large ASE reported for AC1 and AC2 has been addressed by replacement of static Air Data Modules which were found to be out of tolerance
  - Error developed over 10 years of aircraft service
- Similar long-term trend was identified in additional B737 aircraft
- Maintenance did not detect the failing ADMs