

**Boeing 787-9,  
G-ZBKF**

**En route from London  
Heathrow Airport to New  
Delhi Airport**

**29 April 2017**

**Serious Incident**

**Safety Recommendation 2018-008**

It is recommended that the Federal Aviation Administration require Boeing to modify the audio system fitted to the Boeing 787, so that sidetone signals recorded on the cockpit voice recorder crew channels are not masked when flight crew oxygen mask microphones are in use.

**Date Safety Recommendation made:**

5 July 2018

**LATEST RESPONSE**

**Response received:**

7 January 2019

The FAA is working with Boeing to investigate and identify any needed changes to address the safety recommendation. The FAA anticipates submitting its follow-on response by February 28, 2019.

**AAIB Assessment – Partially Adequate - Open**

**RESPONSE HISTORY**

**N/A**

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**Safety Recommendation 2018-009**

It is recommended that the European Aviation Safety Agency initiate a review to consider whether a repeatable and objective analysis technique can be applied to audio recordings to establish consistent installed performance of cockpit voice recorder systems.

**Date Safety Recommendation made:**

5 July 2018

**LATEST RESPONSE**

**Response received:**

8 October 2018

Today various technologies exist to measure the quality of an audio system. Those technologies have different objectives like the most original repetition of a sound used e.g. for music recording or the intelligibility of voice messages e.g. in the context of hearing aids. As a first step EASA considers it important to agree on the objectives for a methodology which is bringing repeatable results in the assessment of Cockpit Voice Recorder (CVR) recordings during various aircraft operation conditions.

As part of the work the existing technical audio requirements for the elements of the CVR system will be considered to maintain consistency with those requirements. This may help defining overall recording quality indicators.

Once such objectives are formalised an assessment of various techniques is possible which may have the potential for repeatable results.

EASA plans to involve experts from other organisations to ensure that sufficient expertise is available.  
EASA Status: Intermediate

**AAIB Assessment – Partially Adequate - Open**

**RESPONSE HISTORY**

N/A

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**Serious Incident**

#### **Safety Recommendation 2018-010**

It is recommended that the European Organization for Civil Aviation Equipment (EUROCAE) amend their document 'Minimum Operational Performance specification for Crash Protected Airborne Recorder Systems' (currently ED-112A) to include a repeatable and objective analysis technique to establish consistent installed performance of cockpit voice recorder systems.

**Date Safety Recommendation made:**

5 July 2018

#### **LATEST RESPONSE**

**Response received:**

8 January 2019

Upon receipt of the report, EUROCAE consulted the chairperson of the WG, which developed ED-112A, WG-90.

EUROCAE WG-90 was created in September 2011 to update the requirements for Minimum Operational Performance Specification (MOPS) ED-112 that would help increase the technological capabilities of the flight recorders in the light of the latest accident investigations (AF447 for example). ED-112A was published on September 2013 at the end of the work of the WG-90. EUROCAE WG-90 was composed of more than 70 members coming from the industry community (Airbus, Boeing, flight recorder manufacturers), accident investigation authorities (BEA, AAIB, NTSB, ATSB, etc.) and civil aviation authorities (DGAC, CAA, FAA, etc.).

Even if the review of the CVR section was not part of the WG's Terms of Reference, the group decided to review it and tried to improve the specifications for the audio quality check. Objective specifications for audio quality check were already an issue in 2011.

For example:

- As ED-112A was no longer dedicated to tape-based recorders, the assigning of specific audio recordings to channels was removed. The specifications on this issue are more performance based and the various information (Captain's audio panel; First Officer's audio panel; Additional flight crew positions; Cockpit Area Microphone) could be recorded on more than 4 channels.
- The polar response of the Cockpit Area Microphone (CAM) was improved to assess the situation of directional CAM audio saturation.
- The output level specifications were improved to accommodate different attenuation levels for noisy cockpit environments.

During the 2-year work, different actions were given to investigators and audio experts were asked to put forward wording to help an operator decide if a CVR recording was of an acceptable level of quality. Most of the proposed changes were found not appropriate by the group and resulted in no-change.

A large group composed of audio experts did not succeed in improving the specifications and creating an objective test to determine whether the audio performance of installed CVR systems meets the achievable minimum requirements for the large variety of aircraft and helicopter audio environments. Despite the specifications contained in ED-112A it should be noted that audio quality checks are not performed in every country or mandated by certification authorities.

The Flight Recorder Specific Working Group (FLIREC-SWG) of ICAO is developing the Manual Doc 10104 'Flight Recorder System Maintenance Manual' and the BEA recently proposed amendment related to CVR audio quality check to the manual. The proposed improvement is using the experience of the BEA to

facilitate a proper evaluation of the audio quality of the CVR. This document may be used to check if it answers the AAIB concerns.

In addition, the EASA European Flight Recorder Partnership Group (EFRPG) is currently developing a position regarding Audio Quality of recording of CVRs at installation. During this work, AAIB and BEA have identified several things which could be improved in ED-112A regarding the CVR specifications. Moreover, AAIB has sponsored research about objective methods to measure the audio quality of installed CVRs and they have interesting results to share. The EFRPG chair proposed to work on identifying aspects which could be updated in ED-112A regarding the CVR specifications. This would be for the longer-term prospect of amending ED-112A.

The EFRPG group of audio experts should assess if new methods or disruptive technologies will allow an improvement to the MOPS that was not possible 5 years ago.

I would like to emphasise that EUROCAE is committed to ensure our standards are of a high level of quality and reflect the current state of the art of any given technology. EUROCAE has put in place robust processes and procedures to make sure this is the case. Therefore, as soon as the results of the EFRPG and other relevant activities are available, we would be pleased to receive more details and proposals for amendment of ED-112A, which will then be submitted to the EUROCAE Council and Technical Advisory Committee for decision on a potential activity to update the standard.

**AAIB Assessment – Partially Adequate - Open**

## **RESPONSE HISTORY**

**N/A**