EASA Safety Information Bulletin

SIB No.: **2009-28**
Issued: **09 December 2009**

Subject: **Flight Data Recorder and Cockpit Voice Recorder Dormant Failures**

Ref. Publications: Flight Data Recorder Read-Out, Technical and Regulatory Aspects, a study performed and published by the Bureau d'Enquêtes et d'Analyses (BEA) of France, which is available on http://www.bea.aero/etudes/fdrstudy/fdrstudy.pdf

Description: 1. Accident Investigators have reported several cases in which the Flight Data Recorders (FDR) or Cockpit Voice Recorders (CVR) have not recorded data as expected, due to a malfunction of the unit or the installation. Such failures may remain hidden for a certain amount of time, as it is difficult / impossible to determine the full system functionality onboard the aircraft. This behaviour is described as a dormant failure.

Recorder issues are further discussed in detail in the study performed by BEA.

2. The European Organization for Civil Aviation Equipment (EUROCAE) has developed ED-112, the most recent industry standard for FDR and CVR. The adoption of that document as European Technical Standard Order (ETSO) is in process (see Notice of Proposed Amendment NPA 2009-11). In order to allow detection of dormant failures the document recommends performing the following maintenance actions:
For FDR:

- Every 3 000 flight hours or every 12 months, whichever occurs first, download and analyse at least a whole flight recording. Check that all mandatory parameters are active and are of acceptable quality.
- Pre-Flight: check for no-failure.

For CVR:

- At intervals not exceeding 6 months, inspect the installation. Confirm by means of the CVR controller monitor jack, proper recording on each audio channel from area microphone(s), receiver audio, sidetone, interphone, public address (if recorded) and boom microphone (including 'hot mike' function, i.e. interphone

OFF). Confirm proper function of the inhibit logic for the bulk erase.

ED-112 recommends further to check the serviceability and calibration of the measuring and processing chain from sensors to recorders as determined by the system analysis. This is important especially for those sensors which are dedicated to the recording system and not used/monitored by other aircraft systems.

These recommendations are similar to those provided in EUROCAE ED-55 and ED-56A, the predecessor documents of ED-112.

3. In addition, ICAO Annex 6 Part I Attachment D provides slightly different detailed guidance:

"3. Inspections of FDR and CVR systems
3.1 Prior to the first flight of the day, the built-in test features on the flight deck for the CVR, FDR and Flight Data Acquisition Unit (FDAU), when installed, should be monitored.

3.2 Annual inspections should be carried out as follows:
- *a) The read-out of the recorded data from the FDR and CVR should ensure that the recorder operates correctly for the nominal duration of the recording;*
- *b) The analysis of the FDR should evaluate the quality of the recorded data to determine if the bit error rate is within acceptable limits and to determine the nature and distribution of the errors;*
- *c) A complete flight from the FDR should be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention should be given to parameters from sensors dedicated to the FDR. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems;*
- *d) The read-out facility should have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals;*
- *e) An annual examination of the recorded signal on the CVR should be carried out by re-play of the CVR recording. While installed in the aircraft, the CVR should record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards; and*
- *f) Where practicable, during the annual examination, a sample of in-flight recordings of the CVR should be examined for evidence that the intelligibility of the signal is acceptable.*

[…]

3.5 Calibration of the FDR system:
- *a) The FDR system should be re-calibrated at least every five years to determine any discrepancies in the*

engineering conversion routines for the mandatory parameters, and to ensure that parameters are being recorded within the calibration tolerances; and

b) When the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, there should be a re-calibration performed as recommended by the sensor manufacturer, or at least every two years."

Note: ICAO Annex 6 Part III, Attachment B contains the same instructions but applies to helicopters.

On ICAO level the process to update the flight recorder guideline is started. The new proposal (State Letter SP 55/4-09/56 17. August 2009) does affect the maintenance guidelines as well. Main areas of change are

1. acceptance of automatic checks for the daily monitoring
2. the bit error quality monitoring, as described above in ICAO Annex 6 Part I Attachment D 3.2.b, is clarified to include those errors introduced by the recorder, the acquisition unit, the source of the data on the aircraft, and by the tools used to extract the data from the recorder
3. the calibration need is limited to sensors dedicated only to the FDR and are not checked by other means.

4. In Accordance with the Guidance Material to European Commission Regulation (EC) 1702/2003, Part 21A.3B (b) 'Determination of an unsafe condition', the Agency may take mandatory action if there is a deficiency in systems used to assist in the enquiry following an accident or serious incident (e.g. FDR, CVR), preventing them to perform their intended function. Consequently, any malfunction of FDR or CVR should be considered as reportable occurrence.

Recommendations: EASA recommends the following:

Design Approval holders of (Supplemental) Type Certificates that include FDR and CVR installation(s) should review the relevant instructions for continued airworthiness and should ensure that they meet the most stringent requirements of ICAO Annex 6 Attachment D maintenance Criteria and EUROCAE ED-112 and as a minimum the ICAO guidelines. Less stringent instructions than recommended by the current ICAO guidelines should be justified.

Commercial Operators, when developing the aircraft maintenance program, should consider the instructions for continued airworthiness provided by the TC or STC Holder for the CVR/FDR and the ICAO guidelines as described above as a minimum.
FDR and CVR malfunction occurrences should be reported to the competent authority and to the TC / STC Holder.

Aircraft Maintenance Organisations should perform FDR and CVR maintenance in accordance with the applicable aircraft maintenance program, when required by the aircraft operator. In absence of detailed instructions, the guidelines of ICAO Annex 6 Attachment D maintenance criteria should be used.
FDR and CVR malfunction occurrences should be reported to the competent authority and to the TC / STC Holder.

National Aviation Authorities should harmonise their FDR, CVR maintenance policy with the above or adopt this recommendation.

Note: Examples for FDR maintenance policy may be found in CAP 731, Approval, Operational Serviceability and Readout of Flight Data Recorder Systems, CAA UK, 2. edition July 2006 or in CAAP 42L-4(0), Flight Data Recorder Maintenance, Civil Aviation Safety Authority Australia, October 2002.

Applicability:

All aircraft having a FDR and/or CVR and/or a combination recorder installed.
The affected equipment is known to be installed on, but not limited to, Part (FAR, JAR, CS) 25 certificated aeroplanes and Part 29 certificated helicopters.

Contacts:

For further information contact the Airworthiness Directives, Safety Management & Research Section, Certification Directorate, EASA; E-mail: ADs@easa.europa.eu.