TECHNICAL GUIDANCE MATERIAL
MONITOR FLIGHT DATA RECORDERS

SUBJECT: Technical Guidance Material for Monitor Flight Data Recorders

Effective Date: 17 July 2013

REFERENCES:
CAR 91.04.10
CAR 121.05.18
CAR 135.05.10

PURPOSE
This section provides guidance for monitoring flight data recorders (FDR), to ensure that performance levels are maintained.

REQUIREMENTS
A. Definitions
   1) Flight time (airplanes): The time from the instant the airplane begins the takeoff roll until the airplane has completed the landing roll.
   2) Flight time (rotorcraft): The time that the rotorcraft begins liftoff until the time that the rotorcraft has landed at its destination.

B. Data Review
A review of data extracted from FDRs has shown a significant loss of data during takeoffs, touchdowns, flights through turbulence, and unusual vibration situations. Due to these data losses, CAA inspectors need to ensure that an air operator’s monitoring procedures and inspection schedules will maintain the required FDR performance levels.

C. Digital Monitoring Flight Data Recorders (FDRs)
State-of-the-art advancements in certain digital FDRs incorporate the use of continuous self-monitoring and fault condition alert capabilities. These types of digital FDRs are being accepted by airlines as new or direct replacements for foil recorders.

D. FDR Regulatory Requirements
   1) An Air Service Operator shall ensure that the aircraft specified in Document SA-CATS 135, 121 and 127 is equipped and operated with the FDR specified therein.
   2) An operator shall ensure that the FDR required by 1) complies with the specifications prescribed in Document SA-CATS 135, 121 and 127.
   3) The parameters of the FDR shall be determined to be within the ranges, accuracies and recording intervals as prescribed in Document SA-CATS 135, 121 and 127 and, where required by 1), shall comply with the requirements of —
a. a Type I/IIA FDR capable of recording the parameters that accurately determine the aircraft flight path, speed, altitude, engine power, configuration and operation; or

b. a Type I/IIA FDR capable of recording the parameters that accurately determine the aircraft flight path, speed, altitude, engine power and configuration of lift and drag devices.

4) No Operator may operate an aeroplane equipped with a FDR using —

a. metal foil;

b. photographic film technology; or

c. From 1 January 2016, magnetic tape.

5) The FDR required by 1) shall be capable of retaining the data recorded during at least the last 25 hours of its operation except for the Type IIA FDR which shall be capable of retaining the information recorded during at least the last 30 minutes of its operation.

6) The data obtained from a FDR shall be obtained from aircraft sources which enable accurate correlation with information displayed to the flight crew.

7) The FDR shall start automatically to record the data prior to the aircraft being capable of moving under its own power and shall stop automatically after the aircraft is incapable of moving under its own power.

8) An aircraft may commence a flight with the FDR inoperative: Provided that —

a. for aircraft with an approved MEL, the aircraft is operated in accordance with that MEL and such MEL incorporates the provisions of paragraph b. below; or

b. for aircraft without an approved MEL—

i. the aircraft shall not depart from an aerodrome where repairs or replacements to such FDR can be made;

ii. the aircraft does not exceed six further consecutive flights with the FDR unserviceable;

iii. not more than 48 hours have elapsed since the FDR became unserviceable; and

iv. Such FDR is not a CVR combined with the FDR and the CVR is serviceable and functioning in accordance with the requirements of the regulation.

E. Acoustic Underwater Locator Beacon Maintenance

1) In order to ensure the timely activation of underwater acoustic beacons associated with FDRs, the inspector should evaluate their certificate holder's maintenance and inspection programs to ensure that procedures for testing beacons, conducted concurrently with battery replacement, provide for functionally testing the beacons prior to replacing the old battery.

2) Operators' maintenance programs should also be evaluated to ensure that operational testing is being accomplished, consistent with the recorder or beacon manufacturer's recommended procedures, at specified intervals and when possible, in conjunction with a numbered or phase inspection, e.g., “A,” “B,” or “C,” check.

3) These requirements must be reflected on work cards or other inspection cards to ensure system-wide compliance.
F. INSPECTIONS OF FLIGHT RECORDERS

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, shall be monitored.

2) Annual inspections shall be carried out as follows –
   a) the read-out of the recorded data from the FDR and CVR should confirm 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 whether 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;

3) The results of the annual inspections shall be recorded and retained for a period of five years calculated from the date of such check.

4) Flight recorder systems should be considered unserviceable if there is a significant period of poor quality data, unintelligible signals or if one or more of the mandatory parameters is not recorded correctly.

5) When requested, a report of the annual inspection should be made available to the Director for monitoring purposes.

6) Calibration of the FDR-system –
   a) the FDR-system shall be recalibrated 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, a recalibration shall be performed as recommended by the sensor manufacturer or at least every two years.

G. PREREQUISITES AND COORDINATION REQUIREMENTS.

1) Prerequisites
   • Knowledge of the regulatory requirements of parts 91, 121, 127, and/or 135, as applicable
   • Experience with the equipment being inspected
   • Completion of the Airworthiness Inspector Indoctrination course, or previous equivalent

2) Coordination. This task requires coordination with the operator or the aircraft maintenance organisation.

H. REFERENCES, AND FORMS

1) References. The CAA may carry out inspections of the CVR during the following inspections:
   • Ramp Inspections
   • Certificate of airworthiness inspection
   • Conduct Spot Inspection of Operator’s Aircraft;
   • AOC Surveillance / renewal and
   • Cockpit En route Inspections.
2) Forms
   i. Form CA21-26 Aircraft inspection checklist
   ii. Form CA21-22 inspection checklist for large multi-engine aeroplanes above 5700kg.

PROCEDURES

A. Initiate the Inspection
   The Unit Manager/ senior manager assigns an inspector to carry out aircraft ramp inspection/ conduct spot inspection/ cockpit en route inspection/ Certificate of airworthiness inspection.

B. Perform the Inspection
   1) Determine the type of FDR currently in operation.
   2) Evaluate the operator's maintenance program. Accomplish the following:
      a) Ensure that the FDR system test program is accomplished in accordance with the manufacturer's recommendations or an approved equivalent method. The program must:
         - Describe the components of the system
         - Describe scheduled maintenance tasks with respect to the components
         - Describe required functional checks
      b) Verify that the continuous self-monitoring and fault condition alert capabilities (digital FDRs) will detect the loss or deterioration of input signals before periodic readouts are allowed to be waived
      c) Ensure that the performance levels for ranges, accuracies, and recording intervals are maintained by periodic FDR bench checks and detailed analysis of recording tapes
      d) Operators should have a separate document entitled, Data Conversion DFDR (or equivalent) which shall enable accurate conversion of recorded digital values to their corresponding engineering units or discrete states. This document must be kept current and any modifications/retrofits to DFDR system must be documented and accounted for. Review the operator's FDR, computer readouts, ramp test set readouts, and compare for the following:
         - Missing parameters
         - Data loss
         - Deterioration of signals
      e) Review the certificate holder's maintenance procedures for acoustic underwater locator beacons. The manufacturer's recommendations must be closely followed, including the procedures for the battery check. A function check should be included as a task at the conclusion of the battery check.
      f) Ensure that the digital FDR ramp equipment, if used, can detect the loss or deterioration of input signal from sensors or transducers before periodic readouts are allowed to be waived.
      g) Ensure that the manual includes procedures that prevent the operator from destroying recorded data from the removed unit until the aircraft has accumulated the appropriate amount of operating time for that type of aircraft.
      h) Ensure that the performance levels for ranges, accuracies, and recording intervals are maintained.
   3) Inspect the operator's recordkeeping system. Accomplish the following:
      a) Ensure that the most recent instrument calibration and recorder correlation is being retained by either the air carrier or another agency keeping the records on their premises, to include the recording medium from which this calibration is derived.
      b) Review the operator's FDR readouts and calibration records for the following:
         - Missing parameters
         - Data loss
• Deterioration of signals
  c) Examine the FDR readouts to ensure that the actual data is within the ranges, accuracies, and recording intervals as specified in part 121, 127 and 135.

B. Analyze Inspection Results
   Review the inspection results and discuss any discrepancies with the operator and after the audit /inspection write a report.

TASK OUTCOMES

A. Task Completion
   Completion of this task may result in a revision to the operator's maintenance program/manual or where the operator has been found to have contravene with the law the inspector shall recommend for enforcement action against the Operator.

B. Task Documentation
   C. Document the task. File all supporting paperwork in the operator's office/ aircraft file.

FUTURE ACTIVITIES.
   Perform a follow-up as required.

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