

IMRBPB Annual Meeting (IAM) Action Item 2023-03

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Presented by Jeffrey Phipps
Chief, Operational Airworthiness
Standards Branch, Transport Canada Civil Aviation (TCCA)



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Action Item (AI) 2023-03

- TCCA to develop a new regulatory CIP to cover the FDR/CVR issue related to AI 2019-06 and AI 2019-07.
- Intent: to amend MSG-3 to accommodate safety related system to produce tasks to maintain integrity of such systems (e.g. FDR, CVR, DLR, ULB/D, and ELT).

Flight Recorder Systems

Review of:

- ICAO SARPs
- Industry Standards
- NAA regulatory frameworks
- MRBRs

ICAO Annex 6 and Doc 10104

| Equipment | Task | Interval |
|-----------|-------------------------------|--|
| CVR | Operational | Prior to first flight |
| | Functional | N/A |
| | Recording Inspection | 1 or 2 years (depending on system integrity) |
| | Overhaul | N/A |
| FDR | Operational | Prior to first flight |
| | Recording Inspection | 1 or 2 years (depending on system integrity) |
| | Sensor inspection/calibration | ICAs or no ICAs - 2 or 5 years (depending on sensor) |
| | Overhaul | N/A |
| DLR | Operational | Prior to first flight |
| | Functional | N/A |
| | Recording Inspection | 2 or 4 years (depending on system integrity) |
| | Overhaul | N/A |

Recording Inspection:

CVR: analysis and examination of recorded data from each aircraft source and relevant external sources shall be carried out by replay to verify that all required signals meet intelligibility standards.

FDR: analysis and examination of recorded data, in engineering units, to evaluate the validity of all recorded parameters.

DLR: analysis and examination of recorded messages shall be carried out by replay.

ULB/ULD: no SARP on maintenance. DOC 10104 recommends following manufacturer's recommendations.

EUROCAE ED-112A and SAE 8045A

| Equipment | Task | Interval |
|-----------|-------------------------------|---|
| CVR | Operational | Daily |
| | Functional | 6 months |
| | Recording Inspection | 1 to 2 years (depending on system integrity) |
| | Overhaul | N/A |
| | | |
| FDR | Operational | Pre-flight |
| | Recording Inspection | 1 or 2 years (depending on system integrity) |
| | Sensor inspection/calibration | 15000 HRS/ 60 months (or by analysis of system) |
| | Overhaul | Manufacturer's recommendations (MR) |
| | | |
| DLR | Operational | N/A |
| | Functional | 24 months |
| | Recording Inspection | 2 or 4 year (depending on system integrity) |
| | Overhaul | MR |
| | | |
| ULB/ULD | Operational | MR (voltage and operation) |
| | Battery Replacement | MR |

NAA Regulatory Framework

| Equipment | Task | Interval – NAA #1 | Interval – NAA #2 | Interval NAA #3 |
|----------------|-------------------------------|---|-------------------|---------------------------------|
| CVR | Operational | Daily | ICA | Daily or every 7 days |
| | Functional | 12 months or 3000hrs | ICA | 1 or 2 years (system integrity) |
| | Recording Inspection | 12 months or 3000hrs (Intelligibility) | ICA | 1 or 2 years (system integrity) |
| | Overhaul | MR | N/A | |
| | | | | |
| FDR | Operational | N/A | ICA | Daily or every 7 days |
| | Recording Inspection | 12 months or 3000hrs | ICA | 1 or 2 years (system integrity) |
| | Sensor inspection/calibration | MR | ICA | MR or every 5 years |
| | Overhaul | MR | N/A | N/A |
| | | | | |
| DLR | Operational | Daily | ICA | |
| | Functional | N/A | ICA | |
| | Recording Inspection | 12 months – 3000hrs | ICA | |
| | Overhaul | N/A | N/A | |
| | | | | |
| ULB/ULD | Operational | 12 months | ICA | |
| | Battery Replacement | MR | ICA | |

MRBR Tasks

| Equipment | Task | MRBR #1 | MRBR #2 | MRBR #3 |
|----------------|-------------------------------|-----------|-------------------------|----------------------|
| CVR | Operational (OPC) | 3 years | 12000 flight hours (FH) | 6000 FH or 18 months |
| | Functional | N/A | N/A | N/A |
| | Recording Inspection | N/A | N/A | N/A |
| | Overhaul | N/A | N/A | N/A |
| FDR | Operational (OPC) | N/A | 12000 FH | N/A |
| | Recording Inspection | 24 months | N/A | 6000 FH or 18 Months |
| | Sensor inspection/calibration | N/A | N/A | N/A |
| | Overhaul | N/A | N/A | N/A |
| DLR | Operational (OPC) | N/A | N/A | N/A |
| | Functional | N/A | N/A | N/A |
| | Recording Inspection | N/A | N/A | N/A |
| | Overhaul | N/A | N/A | N/A |
| ULB/ULD | Operational (OPC) | 3 years | 12000 FH | 2 years |
| | Battery replacement (DIS) | MR | MR | MR |

Results of Review

- **Not all NAA's aligned to ICAO Annex 6 and/or industry standards:**
 - Some are aligned and some are not.
- **Different MSG-3 outcomes:**
 - Intervals different,
 - Types of tasks and procedures are different (e.g., intelligibility, reasonableness, correlation, inspection, etc.),
 - MSG-3 task terminology/criteria not aligned with industry standards.
- **MRBRs reviewed – tasks are FEC 9.**

Is it MRB process? Is it PPH procedures?

Is it MSG-3? Is it WG assumptions?

Results of Review (cont'd)

IMPS and MSG-3

- **Influence of National requirements (IP 169):**
 - IP trying to solve the problem of some safety/emergency equipment may not have been identified as an MSI.
 - IMPS (chapters 4 & 5) and MSG-3 (2-1-2.3 & 2-3-1) amended to state the development of scheduled maintenance shall not be unduly influenced by National Requirements, which was intended to mean the MSI selection process should not be influenced.
 - May have helped with the identification of an MSI but may have prevented task selection?

Results of Review (cont'd)

MSG-3 Analysis

- **Even if functional failures (evident or hidden) are identified, lack of direct adverse effect to safety:**
 - E.g., prevent the continued safe flight and landing.
- **Definition of safety/emergency systems or equipment:**
 - Flight data recorders do not enhance aircraft evacuation, and
 - When failed, does not have an adverse effect on safety.
- **Does not consider other functions of recorder or equipment:**
 - Such as, data integrity, data preservation, use for accident/incident investigation and associated recommendations, and SAR.
- **Current MSG-3 task selection is not aligned with typical tasks associated with recorder system maintenance.**

Potential Options

1. **NAA's have a responsibility to establish/maintain national requirements inline with ICAO and industry standards:**
 - Daily, Operational Check, and Recording inspection.
 - Not sure if all NAAs follow ICAO requirements or if they have filed a difference.
2. **Amend MSG-3 to ensure systems/equipment used for accident/incident investigation and SAR purposes are analyzed:**
 - Impact on definitions such as safety (adverse effect), direct adverse effect on operating safety, safety/emergency systems or equipment and MSI.
 - Impact on logic diagram and analysis.
3. **Develop new analysis to address systems/equipment used for accident/incident investigation and SAR purposes, which may include flight recorders (FDR/CVR/DLR), ULD, and distress transmitters such as ELT and GADSS.**

Option 3 - New logic in MSG-3

- **New definitions required to address systems/equipment used for accident/incident investigation and search and rescue purposes.**
- **New logic analysis to consider:**
 - Recording, data accuracy, integrity/preservation, location transmissions, as part of the analysis procedure (Functions, functional failures, failure effects, failure causes),
 - International maintenance standards need to also be considered (type of task, intervals, how to perform).
- **Where would it fit into MSG-3?**
 - Part of current MSI selection?
 - New dedicated MSI item? [e.g., MSI-AI (accident-investigation)];
 - As part of 2.3 Aircraft Systems/Powerplant analysis procedure?
 - New 2.7 after L/HIRF?

Option 3 – Road Map

- Gather examples of analysis for these systems (next 6 months),
- Review examples and draft CIP (March 2025),
- Send draft CIP out for review (April 2025),
- Review CIP during 2025 IAM,
- Revise CIP based on comments received following 2025 IAM,
- Prepare and submit final version of the CIP (February 2026),
- Review CIP during 2026 IAM.

Questions?

