



European Union Aviation Safety Agency
Comment-Response Document 2018-03

Appendix 1
to ED Decision 2019/013/R

RELATED NPA 2018-03 — RMT.0249 (MDM.051) — 15.7.2019

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1. Summary of the outcome of the consultation

61 comments were received from 13 users.

The commentators represented the industry (Airbus Helicopters, Airbus Commercial Aircraft, Embraer, Gulfstream Aerospace), national aviation authorities (FAA (USA), FOCA (Switzerland), LBA (Germany), the CAA UK (United Kingdom)), Eurocontrol, unions (European Cockpit Association, Europe Air Sports, Norsk Helikopter Ansattes Forbund), and one individual.

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General

The commentators were, overall, supportive of the proposed amendments, and some of them made proposals to clarify parts of the text.

Proposed amendments to Part-CAT and the related AMC & GM

The proposed amendments mainly relate to the requirement for an alternate power supply for the cockpit voice recorder (CVR) and the cockpit-mounted area microphones of some large aeroplanes.

This part of the NPA received only a few comments.

For instance, Airbus (Commercial Aircraft) wished to ensure that EASA would also recognise the content of an FAA Issue Paper ELOS (Equivalent Level of Safety) on 'independent power source', as otherwise, some of their designs could be impacted, and therefore the economic impact mentioned in the NPA may not be negligible. EASA considers that the content of the proposed AMC 25.1457 (now also referred to in the new GM to Part-CAT, CAT.IDE.A.185(i) for better clarity) allows design solutions similar to the ones accepted via the FAA ELOS.

Overall, the proposed rule and the AMC & GM have been slightly modified to better align the text with the FAA rules and CS-25, to improve some wording, or remove any unnecessary guidance.

Proposed amendments to CS-25

The comments that were received were mainly supportive of the proposed amendments, and they contributed to improving the clarity of the text.

Based on these comments and further analysis by EASA, the CS-25 text has been improved, and the following changes may be highlighted:

- (a) CS 25.1457(d)(1), on cockpit voice recorder (CVR) electrical power, has been fully aligned with the corresponding FAA FAR-25 rule.
- (b) CS 25.1457(d)(2) and CS 25.1459(a)(5), on automatic means to stop the recording of CVRs and flight data recorders (FDRs) within 10 minutes after a crash impact, have been amended to make these requirements applicable only if the recording duration is less than 25 hours. Indeed, operational regulations require a minimum of 25 hours recording duration for many aeroplanes (in the case of Regulation (EU) No 965/2012, for aeroplanes with a maximum certificated take-off mass (MCTOM) of more than 27 000 kg operated in commercial air transport (under some conditions)). For recorders with such recording duration capability, after a crash impact, the electrical power to the recorders should be shut down within a reasonable time (by exhaustion of the emergency battery if applicable, action of the flight crew, or action of the rescue services), such that there should not be any overwriting of the part of the recording that is useful for the accident investigation. EASA anticipates that applicants would have asked for an equivalent safety finding (ESF)/equivalent level of safety (ELOS) if the rule had been maintained as applicable to all aeroplanes.
- (c) The CVR alternate power minimum time of availability of CS 25.1457(d)(6) has been revised to indicate a requirement for 10 minutes, while accepting a 1 minute tolerance in AMC 25.1457.
- (d) CS 25.1457(d)(7), related to deployable CVRs, has been amended to clarify the conditions of engagement of the automatic deployment function, and that the safety assessment of the failure conditions leading to unintended deployment must take into account the effects on persons other than aeroplane occupants and the effects on search-and-rescue services.
- (e) CS 25.1457(e), related to the installation of CVR containers, has been improved to better deal with the threats applicable to non-deployable recorders on one side and deployable recorders on the other side.
- (f) CS 25.1459(a)(3), on electrical power for FDRs, has been fully aligned with the corresponding FAA FAR-25 rule.
- (g) CS 25.1459(a)(7) has been deleted: it is considered that the case of an installation of a single combined recorder is not relevant because it is not allowed by Regulation (EU) No 965/2012 (on air operations) and by ICAO Annex 6.
- (h) CS 25.1459(b) has been amended in a similar way to CS 25.1457(e).
- (i) CS 25.1459(f) has been deleted. This sub-paragraph was written for consistency with the CVR specifications. However, ED-112A Chapter II-2.1.7 states that no means for the erasure of the



records shall be provided. Therefore, there is no need to define conditions for the erasure function of an FDR.

- (j) In AMC 25.1457, point 5.(a) has been deleted, as it could be misleading (if the CVR also records the data link, the power source should simply be coherent with the system that provides this data link capability).
- (k) In AMC 25.1457, point 5.(c), the recommended time to stop the electrical power to the CVR function after the loss of power on all engines and the APU has been changed to 10 minutes.
- (l) In AMC 25.1457, Section 7 (deployable CVRs) has been revised to provide more guidelines on:
 - (1) the assessment of the effects of an unintended deployment;
 - (2) the deployment capability in the case of a collision;
 - (3) how to address the risk of injuries from an unintended deployment while the aeroplane is on the ground; and
 - (4) how to limit the effects of an unintended activation of the ELT that is integrated into the CVR, after unintended deployment of the recorder. In order to prevent an increase of the current rate of false alerts from ELTs, it is recommended to consider the unintended deployment as at least a major failure condition.

Proposed amendments to CS-29

The comments that were received were mainly supportive of the proposed amendments, and they contributed to improving the clarity of the text.

Based on these comments and further analysis by EASA, the CS-29 text has been improved, and the following changes may be highlighted:

- (a) CS 29.1457(d)(1), on CVR electrical power, has been fully aligned with the corresponding FAA FAR-29 rule.
- (b) CS 29.1457 (d)(4) and (d)(5), both addressing CVR single electrical failures, have been merged and the text is now harmonised with CS 25.1457(d)(4).
- (c) The CVR alternate power minimum time of availability of CS 29.1457(d)(6) has been revised to indicate a requirement for 10 minutes, while accepting a 1 minute tolerance in AMC 29.1457.
- (d) CS 29.1457(e), on the installation of CVR containers, has been amended to harmonise it with CS 25.1457(e) (except the aspects related to deployable recorders).
- (e) CS 29.1457(g), on making CVR containers easy to identify, has been amended in harmonisation with CS 25.1457(g) (except the aspects related to deployable recorders) and with ICAO Annex 6 Part III, 9th Edition, requirements for containers of non-deployable recorders.
- (f) CS 29.1459(a)(3), on FDR electrical power, has been fully aligned with the corresponding FAA FAR-29 rule.
- (g) CS 29.1459(b), on the installation of FDR containers, has been amended in harmonisation with CS 25.1459(b) (except the aspects related to deployable recorders).



- (h) CS 29.1459(d), on means to facilitate locating FDR containers, has been amended to directly refer to the specifications of CS 29.1457(g), in a similar manner to CS 25.1459(d).
- (i) CS 29.1459(e) has been deleted. This sub-paragraph was written for consistency with the CVR specifications. However, ED-112A Chapter II-2.1.7 states that no means for the erasure of the records shall be provided. Therefore, there is no need to define conditions for the erasure function of an FDR,
- (j) In AMC 29.1457, point 4.(b) has been deleted, as it could be misleading (if the CVR also records data link data, the power source should simply be coherent with the system that provides this data link capability).



2. Individual comments and responses

In responding to comments, a standard set of terminology has been applied to show EASA's position. This terminology is as follows:

- (a) **Accepted** — EASA agrees with the comment and any proposed amendment is wholly transferred to the revised text.
- (b) **Partially accepted** — EASA either partially agrees with the comment, or agrees with it but the proposed amendment is only partially transferred to the revised text.
- (c) **Noted** — EASA acknowledges the comment, but no change to the existing text is considered to be necessary.
- (d) **Not accepted** — The comment or proposed amendment is not agreed by EASA.

(General Comments)

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comment	40	comment by: <i>Luftfahrt-Bundesamt</i>
	LBA has no comments on NPA 2018-03.	
response	Noted.	

comment	42	comment by: <i>NHF Technical committee</i>
	NHF does not have any comments to this NPA.	
response	Noted.	

comment	50	comment by: <i>EUROCONTROL</i>
	<p>The EUROCONTROL Agency welcomes the publication of EASA Notice of Proposed Amendment 2018-03 concerning 'Recorders installation and maintenance thereof – certification aspects'. It also thanks EASA for the opportunity that has been given to submit comments. However, the subject of the amendment is considered outside the scope of activities of EUROCONTROL. There is therefore no comments to make. Nevertheless the EUROCONTROL Agency would like to confirm that it will read with interest the comments on the NPA received from stakeholders and the responses given to them by EASA in its future comment-response document (CRD). Like for NPA 2018-03, EUROCONTROL staff will be given access to CRD 2018-03, for their information.</p>	
response	Noted.	

comment	60	comment by: <i>European Cockpit Association</i>
	ECA welcomes the proposals of NPA 2018-03 and agrees that the suggested amendments will lead to improvements in the availability and quality of the data	



	<p>recorded by flight recorders. Ultimately this will positively affect the safety of aircraft.</p> <p>With regard to the impact assessment, chapter 4.3, ECA would like to suggest to include the airline pilot community as stakeholder. As mentioned in chapter 4.2 “The unavailability of flight recorder data may delay or hinder the identification of a hazard that led to an accident” which by definition affects flight crews. Also, depending on the technical solution(s) that might be used, the proposals regarding the “Means for flight crew to stop the CVR” may directly influence the work of pilots.</p>
response	<p>Partially accepted.</p> <p>We agree with ECA’s comment on Section 4.3 of NPA 2018-03; the Explanatory Note to the ED Decisions that will result from this rulemaking task will include ‘flight crew members’ in the list of the affected stakeholders.</p>
comment	<p>61 comment by: <i>Federal Office of Civil Aviation (FOCA), Switzerland</i></p> <p>The Federal Office of Civil Aviation (FOCA) would like to thank the Agency for the good work and the opportunity to comment on this draft NPA.</p>
response	<p>Noted.</p>

General comments

p. 1

comment	<p>3 comment by: <i>Europe Air Sports</i></p> <p>Europe Air Sports (EAS) and the organisations' member federations and unions thank the Agency for the preparation of this NPA.</p> <p>Having reviewed the NPA, we have the following comments/questions:</p> <p>GENERAL COMMENTS</p> <p>EAS basically supports the purpose of this NPA, with a few specific comments as described below.</p>
response	<p>Noted.</p>

1. About this NPA

p. 3-4

comment	<p>13 comment by: <i>Airbus-EIAIX-SRg</i></p> <p><u>Airbus Proposal:</u> AIRBUS recommends postponing proposed changes to paragraphs of the CS25 regulation related to the power supply of the CVR and the FDR until the RMT.0249 will be completed with the pending 2nd NPA ref.: “flight data recordings (FDR) power supplies”.</p> <p>Note:</p>
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Notwithstanding that FDR power supply requirements are still owing, AIRBUS will continue to comment the related proposed paragraphs on powering in this NPA, taking assumptions on the not-yet available requirements.

Rationale:

AIRBUS understands that a future amendment is in preparation that will introduce requirements for power supply of flight data recording (FDR).

These new requirements would have potential impacts on the overall power architecture for both recorders (CVR and FDR), especially because of the new NPA proposed CS25.1459(a)(7):

“If the cockpit voice recorder function is also performed by the recorder and no other recorder is installed, any single electrical failure external to the recorder does not disable both the cockpit voice recorder function and the flight data recorder function”,

and due to NPA proposed CS25.1459(a)(8):

“If another recorder is installed to perform the cockpit voice recorder function, any single electrical failure external to the recorder dedicated for the flight data recorder function does not disable both recorders”,

and due to NPA proposed CS25.1457(d)(4):

“Any single electrical failure external to the recorder does not disable both the cockpit voice recorder function and the flight data recorder function.”

response

Noted.

An analysis of the concept of an alternate power source for the FDR was performed with the support of an EASA-led group of flight recorder experts, and this analysis was then submitted by EASA to the ICAO Flight Recorder Specific Working Group (FLIRECSWG), where it was discussed.

The conclusion of this discussion is that the benefit of an FDR alternate power source for the safety investigation is too low to justify a rule mandating it. The ICAO FLIRECSWG concluded that they do not intend to propose any ICAO standard or recommended practice related to FDR alternate power source.

Therefore, unless new information requires a re-assessment, no requirement for an FDR alternate power source will be proposed in the second NPA planned under RMT.0249.

Moreover, CS 25.1459(a)(7) has been deleted; it is considered that the case of an installation of a single combined recorder is not relevant because it is neither allowed by Regulation (EU) No 965/2012 (Air operations rules) nor by ICAO Annex 6.

2.1 Why we need to change the rules — issue/rationale

p. 5-8

comment

4

comment by: *Europe Air Sports*

Comment on 2.1.4 Deployable recorders:

"...a deployable recorder could be collected from the surface of the sea within a few hours after the accident."

Suggestion:

Replace "...within" with "...within, in the best case, ..."



	<p>Rationale:</p> <p>A slightly over-optimistic wording? While the ability to quickly locate the recorder by satellite is surely a major benefit, the above text describes a best case situation where the accident site is either close enough to the coast that a helicopter or patrol boat can reach the site in a few hours, or a ship capable of recovering the recorder passes within a few hours distance. In more remote waters, reaching the site may still take a significant time.</p>
response	<p>Noted.</p> <p>Most of the historical overwater accidents have occurred within a few tens of nautical miles from a coastline, so that search-and-rescue (SAR) mobile assets were in the vicinity of the accident scene within a few hours after the accident. In addition, the operational duration specification for the signals emitted by the ELT integrated in the automatic deployable flight recorder is 48 hours for the 406 MHz signal and 150 hours for the 121.5 MHz homing signal (refer to EUROCAE Document No ED-112A, paragraph 3-1.8.2). These durations are deemed to be sufficient for locating and retrieving the automatic deployable flight recorder under the most adverse conditions.</p>

2.3 How we want to achieve it — overview of the proposals

p. 8-10

comment	<p>62</p> <p>comment by: <i>Federal Office of Civil Aviation (FOCA), Switzerland</i></p> <p><i>Comment: FOCA acknowledges the proposed provisions in implementing new requirements to the AROps Regulation relating to CVR and FDR embodying alternate power sources as well as amendments to the type certification specifications. FOCA believes that only newly manufactured aeroplanes with an MCTOM of over 27'000 kg shall be in the scope of the proposed rules. FOCA suggests that the amendments shall be introduced to the following AIR OPS Regulation:</i></p> <p><i>CAT.IDE.A.185 CVR - AMC1 to CAT.IDE.A.185 - AMC1 to CAT.IDE.A.200 Combination recorder</i></p> <p><i>NCC.IDE.A.160 CVR - AMC1 to NCC.IDE.A.160 - AMC1 to NCC.IDE.A.175 FDR</i></p> <p><i>SPO.IDE.A.140 CVR - AMC1 to SPO.IDE.A.140 - AMC1 to SPO.IDE.A.155 Combination recorder</i></p> <p><i>All proposed certification specifications shall be as well amended to the requirements.</i></p>
response	<p>Partially accepted.</p> <p>The proposed amendment of Commission Regulation (EU) No 965/2012 in NPA 2018-03 restricts the requirement to carry an alternate power source (powering the CVR and the cockpit-mounted area microphone) to 'aeroplanes with an MCTOM of over 27 000 kg and first issued with an individual CofA on or after [date of publication + 3 years]': please refer to the text of draft point (i) of CAT.IDE.A.185 in Section 3.1. This indeed means newly manufactured aeroplanes only.</p> <p>Furthermore, the proposed amendment is limited to Part-CAT, because the target safety level is higher for commercial air transport than for non-commercial operations or specialised operations. It should be noted that this is consistent with ICAO Annex 6 where only Part I (International commercial air transport – aeroplanes) contains a standard requiring aeroplanes to be equipped with alternate power</p>



sources. ICAO Annex 6 Part II (International general aviation – aeroplanes) neither contains a standard nor a recommended practice that addresses alternate power sources for recorders.

2.4 What are the expected benefits and drawbacks of the proposals

p. 10

comment

14

comment by: Airbus-EIAIX-SRg

Chapter 2.4.1 CVR power supply

quote:

The related economic impact is expected to be negligible. Indeed, aircraft designs are already required to have an alternate power source in order in order to comply with the equivalent FAA certification and operating rules. Therefore, the necessary design effort has already been made by most of the manufacturers.

unquote

Airbus comment:

The statement is true conditionally only. In many cases, the FAA agreed on Equivalent Level of Safety agreement (-s) issued for multiple Types of Aircraft. These ELOS (related to FAR§25.1457(d)(5) and §FAR121.359(j)) should be considered by EASA.

Albeit, the NPA-§2.4.1 is not part of the proposed regulation text, AIRBUS requests to change the wording as follows:

“The related economic impact is expected to be negligible. Indeed, aircraft designs are already required to have an alternate power source in order in order to comply with the equivalent FAA certification and operating rules or with their associated Equivalent Level of Safety. Therefore, the necessary design effort has already been made by most of the manufacturers”.

Rationale:

The assumption concerning “negligible economic impact” could only be justified with the recognition of the related FAA ELOS. The necessary design changes were implemented based on the agreed ELOS.

NOTE:

Referred FAA Issue Papers, containing the ELOSs, are available in FAA RGL. à [references [1](#)]

[1] FAA Issue Papers of ELOS:

http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgELOS.nsf/0/8C5B04382A4967F8862576E900511B51?OpenDocument&Highlight=sa-1

http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgELOS.nsf/0/40B84AEFBD3344A98625770B00448F6D?OpenDocument&Highlight=se-26 .

response

Noted.

The ELOS pertaining to ‘independent power source’ (a term used in the FAR for the alternate power source) were reviewed when drafting NPA 2018-03.

The FAA ELOS for Airbus models A330 and A340 and for ATR models ATR 42-500 and ATR 72-500 are mentioned (as examples) in NPA 2018-03, Section 3.4.1, in the rationale for the proposed Section 5 of AMC 25.1457, Power sources. This proposed Section 5 specifies that 'the use of aeroplane batteries or other power sources is



acceptable, provided that electrical power to essential and critical loads is not compromised.' Hence, it is assumed that solutions such as those described in the FAA ELOS Memoranda are valid.

Note: This comment led EASA to identify that in NPA 2018-03, unlike the text of draft point (i) of CAT.IDE.A.185, the text of draft point (d)(6) of CS 25.1457 contains 'in the event that all other power to the recorder is interrupted either by a normal shutdown or by any other loss of power from the electrical power bus'. However, the ELOS approved by the FAA allows applicants to rely only on the essential power bus, i.e. it does not require a power backup in addition to the essential power bus. Therefore, for consistency with the ELOS, the words 'from the electrical power bus' have been removed from the text of point (d)(6) of CS 25.1457 and of point (d)(7) of CS 29.1457. This is also consistent with the ICAO standards related to alternate power sources in Annex 6 Part I, Section 6.3.2.4, where there is no mention of an electrical power bus.

comment

53

comment by: AIRBUS HELICOPTERS

§ 2.4.4:

Comment (Editorial): refer exactly which Part(s) of ICAO Annex 6 is (are) concerned: Part I in this case. Comment is general every time ICAO Annex 6 is mentioned in the document without specifying the Part(s) concerned.

response

Noted.

NPA 2018-03 has been reviewed and it was found that for almost all occurrences where 'Annex 6' is mentioned, the Part of Annex 6 that is involved is also specified. When a Part of Annex 6 is not specified, this is because the statement is applicable to all three Parts of Annex 6. There is one exception, in Section 2.4.4, where the applicable Part of Annex 6 has not been mentioned.

3.1.Draft EASA Opinion — Part-CAT — CAT.IDE.A.185

p. 11

comment

5

comment by: Europe Air Sports

CAT.IDE.A.185 Cockpit voice recorder:
(i) page 10:

Suggestion: Replace "...in the event that all other power..."

with

"in the event that normal power..."

Rationale: The text is slightly confusing - it could be interpreted to imply that there are more than one normal power source.

response

Partially accepted.

A new sentence has been added in AMC 25.1457, Section 5, to state what is meant by 'all other power'.



comment	<p>15 comment by: Airbus-EIAIX-SRg</p> <p>Chapter 3.1. Draft regulation (Draft EASA opinion) CAT.IDE.A.185 Cockpit voice recorder quote: (i) Aeroplanes with an MCTOM of over 27 000 kg and first issued with an individual CofA on or after [date of publication + 3 years] shall be equipped with an alternate power source to which the CVR and cockpit-mounted area microphone are switched automatically in the event that all other power to the recorder is interrupted. unquote</p> <p><u>Airbus comment:</u> 1. Wording: AIRBUS propose: “... in the event that the power used for normal operation of the CVR is interrupted”</p> <p>2. AIRBUS requests to add an AMC to CAT.IDE.A.185(i), which clarifies the acceptance of different means of “an <u>alternate</u> power source”. Please see also AIRBUS comment #17 on NPA §3.2.1.</p> <p><u>Rationale:</u> “... in the event that all other power to the recorder is interrupted” should be clearly and/or detailed defined.</p>
response	<p>Comment n°1: Partially accepted. The text of point (i) of CAT.IDE.A.185 has been modified in order to align it with the text of FAR Part 25, 25.1457 point (d)(5) and with the wording proposed for point (d)(6) of CS 25.1457. However, the text ‘all other power’ has not been changed in order to keep the wording aligned with the wording that is used in FAR Part 25 and CS-25. A sentence has been added in AMC 25.1457, Section 5, to explain what is meant by ‘all other power’, using the proposed wording of this comment.</p> <p>Comment n°2: partially accepted. The concept of alternate power source is already explained in Section 5 of AMC 25.1457 (see NPA 2018-03, Section 3.4.1). Therefore, GM1 CAT.IDE.A.185(i) has been created, entitled ‘alternate power source’, to mention that guidance on alternate power sources can be found in EASA CS-25, AMC 25.1457.</p>

3.2.Draft EASA Decision — AMC/GM to Part-CAT — AMC CAT.IDE.A.185

p. 12

comment	<p>16 comment by: Airbus-EIAIX-SRg</p> <p>Chapter 3.2.1. Draft AMC/GM to Annex IV (Part-CAT) AMC1 // CAT.IDE.A.185 Cockpit voice recorder quote: (c) if required to be installed, the alternate power source should provide electrical power to operate both the CVR and the cockpit area microphone for at least 9 minutes. If the cockpit voice recorder has a recording duration of less than 25 hours,</p>
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the alternate power source should not provide electrical power for more than 30 minutes.
unquote

Airbus comment:

We propose to change the wording as follows:

(c) if required to be installed, the alternate power source:

— (i) provides electrical power without interrupts to operate both the recorder and cockpit-mounted area microphone until the cockpit voice recording has to be stopped in accordance with operational requirements; and

—(ii) to which the recorder and cockpit-mounted area microphone are switched automatically in the event that the power used for normal operation of the recorder is interrupted either by a normal shutdown or by any other loss of power from the electrical power bus.

(See also Airbus comment #15)

Rationale:

The Airbus proposed wording address the existing stop-condition given by CAT.IDE.A.185(f) [“...when the *aeroplane is no longer capable of moving under its own power*”].

NOTE:

The AIRBUS proposal addresses the need of sustained powering the CVR before a normal stop condition becomes effective, or a crash impact will stop the recording. A definition of a duration for which power shall be made available is constraining possible solutions, e.g. using available alternative power sources and backup generations (APU, RAT, aircraft batteries...). The ELOSs, mentioned above (AIRBUS comment #14), provide conclusions, that the usage of dedicated RIPS (Redundant Independent Power Supply) has manifold disadvantages over using aircraft power that is robust enough to the loss of the power used for normal operation.

response

Partially accepted

The reasons for specifying a minimum and a maximum duration for the engagement of the alternate power source are explained in detail in the rationale of AMC1 CAT.IDE.A.185 and AMC1 CAT.IDE.A.200 (see Section 3.2.1 of NPA 2018-03). These duration values do not preclude the use of a particular solution for providing the alternate power source.

In addition, CAT.IDE.A.185 does not contain any requirement regarding the time when the CVR must be stopped: it only contains a requirement regarding the phases during which the CVR must record. Therefore, the text proposed in this comment ‘until the cockpit voice recording has to be stopped in accordance with operational requirements’ is not appropriate.

However, given that, according to point (c) of CAT.IDE.A.185, all aeroplanes with MCTOMs of more than 27 000 kg and first issued with individual CofAs on or after 1 January 2021 shall be equipped with CVRs that are capable of recording the preceding 25 hours, the aeroplanes that will be required to have alternate power sources will de facto all be fitted with CVRs that are capable of a minimum 25-hour recording duration. As a consequence, a maximum engagement duration for the alternate power source is not needed.



Therefore, the text of point (c) of AMC1 CAT.IDE.A.185 has been simplified to state that, if one is required to be installed, the alternate power source should provide electrical power to operate both the CVR and the cockpit-mounted area microphone for at least 10 ± 1 minutes.

comment

17

comment by: Airbus-EIAIX-SRg

Chapter 3.2.1. Draft AMC/GM to Annex IV (Part-CAT)
AMC1 // CAT.IDE.A.185 Cockpit voice recorder

Airbus comment:

We propose to add an explanation for minimum requirements to the alternative power supply.

Airbus proposed AMC 2 to CAT.IDE.A.185:

"Alternate' means separate from the power source that normally provides power to the CVR. The use of aeroplane batteries or other power sources is acceptable provided that the requirements above are met and electrical power to essential and critical loads is not compromised.' In addition, alternative installation designs such as those that use the aircraft emergency battery, which were already accepted to be used for CVRS are considered being compliant."

Rationale:

EIAIX-SRg-2017

Based on Airbus comment #16 please see additionally FAA ELOS referenced in Airbus comment #14.

response

Partially accepted.

GM1 CAT.IDE.A.185(i) has been created to mention that guidance on alternate power sources can be found in EASA CS-25, AMC 25.1457. It is preferable to avoid the duplication of this guidance. Please refer also to the response to comment No 15.

AMC CAT.IDE.A.200

p. 12-13

comment

18

comment by: Airbus-EIAIX-SRg

Chapter AMC1 CAT.IDE.A.200 Flight data and cockpit voice combination recorder
quote:

(b) When two flight data and cockpit voice combination recorders are installed and an alternate power source is required for the CVR function, it is acceptable to provide this alternate power source only to the cockpit area microphone and the recorder located closer to the flight crew compartment.

unquote

Airbus comment:

Insert "Where practicable by given system architecture":

(b) When two flight data and cockpit voice combination recorders are installed and an alternate power source is required for the CVR function, it is acceptable to provide



this alternate power source only to the cockpit area microphone and the recorder located closer to the flight crew compartment **where practicable by given system architecture.**

Rationale:

Existing aircraft electrical power distribution architecture on A320 Family allows to connect the alternate power source only to the recorder located in the aft of the aircraft.

NOTE:

Existing aircraft electrical power distribution architecture allows connecting the alternate power source only to one of two recorders. In some cases it is useful, and more practical, to connect it to the one recorder located in the aft of the aircraft.

For instance, in case of an installation of an automatic deployable recorder (which is a special form of a combination recorders, installed in the aft of the aeroplane) it is useful to connect this recorder with the “alternate power source”, in order to ensure its deployment capability. The deployment capability requires the most reliable electrical power connected to the “alternate power source”.

The other combination recorder, installed in the front of the aircraft, has to be connected to a different electrical power bus (in order to avoid a loss of both recorders simultaneously in case of a single electrical failure). Therefore, it will be connected to electrical power source without backups (e.g. from engine generators only = “normal” power).

response

Partially accepted.

As explained in the rationale of the creation of point (b) of AMC1 CAT.IDE.A.200, ‘it is preferable to power the recorder closer to the flight crew compartment, because the link between this recorder and the cockpit area microphone is shorter than between the cockpit area microphone and the recorder located at the rear of the aircraft, so it is less likely that this link would be cut due to a structural failure or fire’.

FAA Advisory Circular (AC) 20-186, ‘Airworthiness Operational Approval of Cockpit Voice Recorder Systems’, specifies the following:

‘You may install two combination FDR and CVR units in the airplane, with one unit designated as the CVR to support the independent power source requirement, which may be located close to the cockpit.’

Therefore, the text of point (b) of AMC1 CAT.IDE.A.200 has been amended to state that when two flight data and cockpit voice combination recorders are installed and an alternate power source is required for the CVR function, it is acceptable to provide this alternate power source only to the cockpit area microphone and to one recorder. This recorder should be, when practicable, the one that is located closer to the flight crew compartment.

comment

1

comment by: *Barry Lewis*



response	<p>With regard to the automatic deployment of the Flight Recorder. The Circuit breaker (etc) for this system should be out of reach of the flight crew or possible sabotage by unauthorized persons.</p> <p>Partially accepted.</p> <p>‘Flight recorder’ is defined by Regulation (EU) No 996/2010 as ‘any type of recorder installed in the aircraft for the purpose of facilitating accident/incident safety investigations’. This regulation, like the ICAO Annex 6 provisions on recorders, does not contain any requirement regarding acts of unlawful interference that affect recorders.</p> <p>However, in NPA 2018-03, point (e)(2) of draft CS 25.1457 contains the following requirement, which should address the aspects related to the ‘out of reach of the flight crew’:</p> <p>‘The deployment capability cannot be manually disengaged from the cockpit when the aeroplane is capable of moving under its own power.’</p> <p>Note: This provision has been moved to CS 25.1457(d)(7) in the resulting text of this NPA.</p> <p>Nevertheless, CS 25.1357 (on circuit protective devices) remains applicable to the power sources of the deployment mechanism of the flight recorder.</p>
comment	<p>6 comment by: <i>Europe Air Sports</i></p> <p>CS 25.1457 Cockpit voice recorders (6), 2nd para, page 13:</p> <p>Suggestion: Replace "...in the event that all other power..."</p> <p>with</p> <p>"in the event that normal power..."</p> <p>Rationale: The text is slightly confusing - it could be interpreted to imply that there are more than one normal power source.</p>
response	<p>Partially accepted.</p> <p>A new sentence is added in AMC 25.1457, Section 5, to state what is meant by ‘all other power’.</p>
comment	<p>7 comment by: <i>Europe Air Sports</i></p> <p>CS 25.1457 Cockpit voice recorders (7) (i) page 13:</p> <p>"If the recorder is deployable: (i) It is capable of being automatically deployed."</p> <p>Comment:</p> <p>Unnecessary repetitive wording. We suggest a proper definition text of "deployable recorder" to be added instead.</p>
response	<p>Accepted.</p>



Point (d)(7)(i) of CS 25.1457 has been deleted.
 In addition, the following has been added in Section 1 of AMC 25.1457:
 “Deployable recorder” designates a flight recorder installed on the aeroplane which is capable of automatically deploying from the aeroplane.’

Note: the definition introduced in Section 1 of AMC 25.1457 is the same as that of an automatic deployable flight recorder in ICAO Annex 6 Part I, except that the flight recorder does not need to be a combination flight recorder. Refer to ICAO Annex 6 Part I, Chapter I (Definitions):
 ‘Automatic deployable flight recorder (ADFR). A combination flight recorder installed on the aircraft which is capable of automatically deploying from the aircraft.’

comment 8 comment by: *Europe Air Sports*

CS 25.1457 Cockpit voice recorders
 (e)(1), page 16:

"recorder airfoil" presumably should mean recorder container?

response Noted.
 Indeed, the term ‘recorder airfoil’, used in the NPA rationale that explains the proposed CS 25.1457 sub-paragraph (e)(1), refers implicitly to the deployed part of the recorder, which is usually a floatable aerofoil containing the crash-protected memory module, the ELT, its antenna and battery.

comment 11 comment by: *Gulfstream Aerospace Corporation Savannah*

- CS 25.1457(d)(2) Cockpit voice recorders: the current and proposed requirement to cease recording within 10 minutes of crash impact directly conflicts the maximum engagement duration requirement of 10 + 1 = 11 minutes. Consider redefining the maximum engagement duration to be 9 + 1 = 10.
- CS 25.1457(d)(6) Cockpit voice recorders: the proposed requirement prescribes a minimum of 9 minute backup power supply. This can conflict with (d)(2).
- CS 25.1457(d)(7) Cockpit voice recorders: the proposed requirement prescribes 10+1 minutes of electrical power to the CVR/microphone. This can conflict with (d)(2), (d)(6).

response First comment: Partially accepted.
 As explained in the NPA rationale to point (d)(2) of draft CS 25.1457: ‘The means for automatically stopping the CVR after a crash impact shall stop the CVR even if power can still be supplied by the CVR normal power source or the CVR alternate power source’ (refer to NPA 2018-03, Section 3.3.1). In addition, Section 3 of draft AMC 25.1457 states ‘The automatic means to stop the recorder should operate even if a power supply is still available.’ (Refer to NPA 2018-03, Section 3.4.1). There is therefore no conflict between the two specifications.

Second comment: Noted.
 Please refer to the response to the first comment above.

Third comment: Partially accepted.



Point (d)(7) of draft CS 25.1457 addresses the deployable function of the recorder, while point (d)(6) addresses the alternate power source of the CVR. However, this comment raises the issue that NPA 2018-03 does not address the power supply to the automatic deployment capability, i.e. to the deployment mechanism and to the deployment condition detection mechanism (detection of severe structural damage or of aircraft immersion in water). Data from historical accidents shows that after a loss of all engines at cruise altitude, a large aeroplane may glide for up to or slightly more than 20 minutes: refer to NPA 2018-03, Chapter 7, Annex 1, Table 1 presenting cases of premature ending of CVR recording due to loss of power on all engines (including the APU). This means that without a backup power supply to the automatic deployment capability, the deployment may not happen if power is lost from all engines and the APU.

Therefore, in order to address this issue, the bullet (ii) of point (d)(7) of draft CS 25.1457 (becoming bullet (i) in the final resulting text) has been amended to state that the automatic deployment capability is engaged no later than when the aeroplane is airborne and that it remains engaged as long as the aeroplane is airborne. In AMC 25.1457, Section 7, guidance is provided to explain how this should be interpreted.

In addition, this comment indicates that it may not be clear that point (d)(2) of CS 25.1457 only deals with the stopping of the recording function of the recorder, and that in the case of a deployable recorder, the automatic means designated in (d)(2) is not expected to change the status of its deployment capability. Therefore, point (d)(2) has been amended to use the term 'recording'.

The text of Section 3. of AMC 25.1457 has also been amended to use the term 'recording' instead of 'recorder'.

Similarly the phrases 'stop the recorder' and 'recorder start-and-stop logic' have been replaced respectively by 'stop the recording' and 'recording start-and-stop logic' in CS 25.1459, CS 29.1457, CS 29.1459, AMC 25.1459, AMC 29.1457, and AMC 29.1459.

comment 19

comment by: Airbus-EIAIX-SRg

Chapter 3.3.1. Draft Certification Specifications for Large Aeroplanes (Draft EASA decision amending CS-25), CS25.1457(d)(2)

quote:

There is an automatic means to ~~simultaneously~~ stop the recorder and prevent each erasure feature from functioning, within 10 minutes after crash impact.;and unquote

Airbus comment:

AIRBUS request to add Guidance Material in order to explain the applicability of the CS25.1457(d)(2) to clarify the "automatic means [...] after crash impact."

Rationale:

This requirement creates a conflict in demonstration because it requires a function available after an accident. A correct functioning of the requested "automatic



response	<p>means" could only be demonstrated when an airplane is still intact (not being exposed by crash impacts). After a real crash impact the manufacturer would not be able to demonstrate that any of "automatic means" are still working, unless there is a crash-protected design of such "automatic means" (but ED-112A requires just the recorder memory unit being crash-protected). It is dependent on the crash event and its severity whether it works during/after a crash. Usually the power sources and the power network breaks down during crash impact, and so the recording stops immediately (0 minutes = "within ten Minutes"). If there is a light accident or an incident, the stop logic will become effective. During such cases, AIRBUS design will enable an automatic stopping of the recorders at 5 minutes after the last engine has been switched-off. This correlates with the point in time, when the aeroplane is no longer capable of moving under its own power.</p> <p>Noted.</p> <p>Section 3 of AMC 25.1457 already allows applicants to rely on the start-and-stop logic of the recording under certain conditions.</p>
comment	<p>20 comment by: Airbus-EIAIX-SRg</p> <p>Chapter 3.3.1. Draft Certification Specifications for Large Aeroplanes (Draft EASA decision amending CS-25), CS25.1457(d)(5) quote: There is a means for the flight crew to stop the cockpit voice recorder function upon completion of the flight in a way such that re-enabling the cockpit voice recorder function is only possible by dedicated manual action. unquote:</p> <p><u>Airbus comment:</u> This subject is covered by CAT.GEN.MPA.105(10)(iii) (in Part-CAT). Any additional means within the flight crew area should not be requested.</p> <p><u>Rationale:</u> To preserve the recording of flight recorders after event of an accident/intendent procedures shall be made available to disengage powering by using the circuit brake, which considered as a maintenance procedure.</p> <p>In addition, the proposed new requirement would create a "non-harmonized" requirement with FAR Part25.</p>
response	<p>Not accepted.</p> <p>Point (a)(10) of CAT.GEN.MPA.105 addresses the responsibility of the commander with regard to the preservation of the recordings, and in particular bullet (iii)(B) of that point requires that 'flight recorders are deactivated immediately after the flight is completed' in case of a serious incident or an accident. However, in order to meet the intent of point (a)(10) of CAT.GEN.MPA.105, the flight crew should be offered a means to stop the recording upon completion of the flight. See also the NPA 2018-03 rationale of point (d)(5) of draft CS 25.1457. In addition, Section 4 of draft AMC 25.1457 (refer to NPA 2018-03, Section 3.4.1) states:</p>

'In fulfilling this requirement, it is acceptable to use circuit breakers to remove the power to the equipment.'

Hence, point (d)(5) of CS 25.1457 does not require an additional capability of the recorder. Point (d)(5) can be met by simply locating the circuit breakers of the recorder in a place that is easily accessible by the flight crew after completion of the flight.

comment

21

comment by: Embraer S.A.

The automatic deployment capability should be engaged only when the aircraft is over water or is over a remote area.

The Automatic Deployable Flight Recorder (ADFR) is an equipment that is quite useful for accidents that occur over water or over remote areas. That is why it is floatable, self-oriented and it has an Emergency Locator Transmitter (ELT). If an accident occurs over land or in a non-remote area, history has demonstrated that there is no need to have an installed ADFR – for such cases, both the aircraft and its recorders are found in a timely manner.

Therefore, it should be expected to have an ADFR deployment only when the aircraft is operating over water (e.g.: oceanic operation) or in remote areas (e.g.: polar region).

Thus, for the safety of third parties and also to avoid undue damage to property, it is best to limit the scenarios in which the ADFR may be automatic deployed.

To change the text from:

[...]

(d) Each cockpit voice recorder must be installed so that –

[...]

(7) If the recorder is deployable:

(i) It is capable of being automatically deployed.

(ii) The automatic deployment capability is engaged at least while the aeroplane is airborne and it may also be engaged while the aeroplane is moving on the ground at high speed;

[...]

To:

[...]

(d) Each cockpit voice recorder must be installed so that –

[...]

(7) If the recorder is deployable:

(i) It is capable of being automatically deployed;

(ii) The automatic deployment capability is engaged ~~at least~~ while the aeroplane is airborne and is operating over water or in a remote area; ~~it may also be engaged while the aeroplane is moving on the ground at high speed~~;

[...]

response

Partially accepted.

Flight recorders are expected to be designed and installed in order to preserve the recorded data in spite of the accident conditions. Both the FDR and the CVR must



meet the crash testing specifications defined in EUROCAE ED-112A. ETSO-C123c (cockpit voice recorder) and C124c (flight data recorder) refer to ED-112A for the minimum performance standard.

However, the crash testing specifications defined in ED-112A for a deployable recorder are less demanding than those applicable to a fixed recorder. This is because a deployable recorder is expected to be deployed and to be exposed to less severe crash conditions than a fixed recorder.

Hence, permitting deployment to be disabled during some portions of the flight would implicitly mean accepting that during those portions of the flight, the deployable recorder could preserve the recorded data in case of an accident. In other terms, the recorder would not meet its intended purpose, which contradicts CS 25.1301.

Therefore, it is not acceptable to lock the deployable recorder when the aeroplane is airborne or moving on the ground at high speed.

The effects of an unintended deployment must be assessed in accordance with the specifications of CS 25.1309, as required by bullet (v) of point (d)(7) of draft CS 25.1457 in NPA 2018-03.

However, in order to better frame this assessment, the content of point (h) of Section 7 of AMC 25.1457 has been amended (please refer to response to comment No 10) and further guidance has been added into Section 7 of AMC 25.1457 (please refer to the response to comment No 24).

comment

22

comment by: *Embraer S.A.*

The failure condition severity classification of an unintended deployment is, at least, a hazardous failure condition.

EASA, on the rationale for this requirement, has indicated that given the failure condition effects of an unintended deployment that the severity classification of such a failure condition would be hazardous. Embraer agrees with this analysis for operation over water or over remote areas, where the risk to third parties on the ground is almost negligible. However, for operation over other areas, Embraer understands that the failure condition severity classification would be at least hazardous. Depending of where the recorder is unintended deployed, more damage could be accomplished than in a remote / over water area.

It is important that CS 25.1457(d)(7)(v) specifies the associated failure condition severity classification, otherwise, some manufacturers may believe that they could develop items with a lower development assurance level.

To change the text from:

[...]

(d) Each cockpit voice recorder must be installed so that –

[...]

(7) If the recorder is deployable:

[...]

(v) An assessment of the effects of unintended deployment is made in accordance with the specifications of CS 25.1309 and it includes effects on third parties;

[...]

To:



	<p>[...] (d) Each cockpit voice recorder must be installed so that – [...] (7) If the recorder is deployable: [...] (v) An assessment of the effects of unintended deployment is made in accordance with the specifications of CS 25.1309 and it includes effects on third parties, <u>considering the failure condition severity classification of an unintended deployment, at least, as a hazardous failure condition;</u> [...]</p>
response	<p>Partially accepted.</p> <p>The rationale of NPA 2018-03 regarding bullet (v) of point (d)(7) of CS 25.1457 implicitly considers the current models of deployable recorders, which are designed to deploy one piece with a weight of a few pounds. With this assumption, it is unlikely that it could seriously injure more than a small number of persons on the ground or cause extensive damage to ground property, and therefore the rationale states that ‘the severity associated is not expected to exceed a level that corresponds to ‘hazardous’ in AMC 25.1309’.</p> <p>However, depending on the design of the installation, the severity might be higher or lower.</p> <p>This comment and comment No 24 indicate that too little guidance is provided in NPA 2018-03 about assessing the potential impact of deployment on people on the ground. Therefore, guidance has been added into Section 7 of AMC 25.1457 (see also the reply to comment No 24)</p>
comment	<p>25 comment by: Airbus-EIAIX-SRg</p> <p>Chapter 3.3.1. Draft Certification Specifications for Large Aeroplanes (Draft EASA decision amending CS-25) CS25.1457(d)(6) quote: It has an alternate power source: — that provides at least 9 minutes of electrical power to operate both the recorder and cockpit-mounted area microphone; and — to which the recorder and cockpit-mounted area microphone are switched automatically in the event that all other power to the recorder is interrupted either by a normal shutdown or by any other loss of power from the electrical power bus. unquote</p> <p><u>Airbus comment:</u> We would propose a revised wording for the first part of CS25.1457(d)(6) as shown below:"It has an alternate power source: — that provides at least 9 minutes of electrical power without interrupts to operate both the recorder and cockpit-mounted area microphone until the cockpit voice recording has to be stopped in accordance with operational requirements; and"</p>

(note: This is the point in time, when the aeroplane is no longer capable of moving under its own power)

- [second part unchanged]

Rationale:

The request for “9 minutes” is confusing. It is not in line with the agreed ELOS (FAA, see Airbus CRT comment #14).

And the alternate power source provides power as long as capable.

(alternate power sources could be: e.g. the RAT does work as long as airspeed is driving it; the APU provides power as long as it is on speed; the aircraft batteries provide power until they are discharged).

Electrical power shall be available, independent from the power source, until the normal or crash stop conditions have been reached.

response

Partially accepted.

The reasons for specifying a minimum duration of 9 minutes for the engagement of the alternate power source is explained in detail in the rationale of draft AMC1 CAT.IDE.A.185 and draft AMC1 CAT.IDE.A.200 (see Section 3.2.1 of NPA 2018-03). This minimum duration value does not preclude the use of a particular solution for providing the alternate power source. This minimum duration value does not contradict ELOS TD0774IB-T (for the A330 and A340 families), because the compensating design features consist of relying on the aircraft batteries when the aircraft main generators and the Ram Air Turbine (RAT) have all failed. As stated in the ELOS Memorandum, this solution ‘provides more than required 10 ± 1 minutes of recording after switching to the aircraft batteries.’ This minimum duration value does also not contradict ELOS TD07811B- T (A320 family) for the same reason.

However, in point (d)(6) of draft CS 25.1457, ‘at least 9 minutes’ is replaced by ‘at least 10 minutes’ for better harmonisation with other regulations (see also the reply to comment No 44); in AMC 25.1457, it is also indicated that a 1 minute tolerance is acceptable.

The addition to the text ‘until the cockpit voice recording has to be stopped in accordance with operational requirements’ that is proposed in this comment is not appropriate: please refer to the response to comment No 16.

With this amendment of CS-25.1457(d)(6), there should not be any need for an ESF/ELOS.

comment

26

comment by: Airbus-EIAIX-SRg

Chapter 3.3.1. Draft Certification Specifications for Large Aeroplanes (Draft EASA decision amending CS-25)

CS25.1457(d)(7)(ii)

quote:

If the recorder is deployable:

(ii) The automatic deployment capability is engaged at least while the aeroplane is airborne and it may also be engaged while the aeroplane is moving on the ground at high speed;



	<p>unquote</p> <p><u>Airbus comment:</u> We propose to limit CS25.1457(d)(7)(ii) to the first part of the sentence as follows: CS25.1457(d)(7)(ii) "If the recorder is deployable: (ii) The automatic deployment capability is engaged at least while the aeroplane is airborne.;"</p> <p><u>Rationale:</u> AIRBUS proposes to keep only this part because all other conditions for "engagement on ground" are also covered.</p>
response	<p>Partially accepted.</p> <p>Indeed, the part of bullet (ii) of point (d)(7) of the draft CS 25.1457 starting with 'may also be engaged' does not contain any requirements; therefore, it is not appropriate in a CS paragraph. However, the period of engagement of the deployable recorder may be extended beyond the time of landing. Therefore, bullet (ii) of point (d)(7) of draft CS 25.1457 has been amended. Please refer to the response to comment No 11. Note: bullet (ii) became bullet (i) in the final resulting text.</p>
comment	<p>43 comment by: FAA</p> <p>Reword CS 25.1457 to align with US Rule. Add (ii) clause</p> <p>(d) Each cockpit voice recorder must be installed so that – (1)(i) It receives its electric power from the bus that provides the maximum reliability for operation of the cockpit voice recorder without jeopardizing service to essential or emergency loads and (ii) It remains powered as long as possible without jeopardizing emergency operations of the aeroplane.</p>
response	<p>Accepted.</p> <p>The text of point (d)(1) of draft CS 25.1457 has been amended to fully align this text with that of point (d)(1) of FAR Part 25, 25.1457. This also includes replacing 'electric power' by 'electrical power'. The same text correction is performed in CS 25.1459, CS 29.1457 and CS 29.1459.</p>
comment	<p>44 comment by: FAA</p> <p>CS 25.1457</p> <p>Change (d)(6) – to read "that provides at least 10 +- 1 minutes of electrical power to operate both the recorder and cockpit-mounted area microphone"</p> <p>Reword (e) as follows</p>



(e)(1) The record container of fixed recorders must be located and mounted to minimize the probability of rupture of the container as a result of crash impact and consequent heat damage to the record from fire. In meeting this requirement, the record container must be as far aft as practicable, but may not be where aft mounted engines may crush the container during impact. However, it need not be outside of the pressurized compartment.

(2) Deployable recorders are mounted to minimize the risks of rupture or damage during deployment and of compromising a continued safe flight and landing after deployment.

Renumber remainder of text for deployables

Rationale: Maintains existing requirements for fixed recorders while adding requirements needed for deployable recorders. As proposed, the existing best practice for fixed recorders would no longer be required.

response

First comment (on point (d)(6) of draft CS 25.1457): Accepted
 'at least 9 minutes' has been replaced by 'at least 10 minutes' for better harmonisation with FAR Part 25, 25.1457 and with ICAO Annex 6 Part I, Section 6.3.2.4. In AMC 25.1457, it is also stated that a 1 minute tolerance is acceptable. However, the so-modified text still allows the alternate power source to operate for longer than 10 minutes, while bullet (i) of point (d)(5) of FAR Part-25, 25.1457, requires the engagement duration of the independent power source to be 10 ± 1 minutes.

The same text correction has been made in point (c) of AMC1 CAT.IDE.A.185.

Second comment (about point (e) of draft CS 25.1457): Partially accepted.

As explained in the rationale of Section 6 of draft AMC 25.1457 (refer to Section 3.4.1 of NPA 2018-03), the current wording of point (e) of CS 25.1457 does not address the case of combination recorders.

On the other hand, AMC1 CAT.IDE.A.200 to point CAT.IDE.A.200 of Commission Regulation (EU) No 965/2012 (air operations) on combination recorders recommends that when two flight data and cockpit voice combination recorders are installed, one should be located near the flight crew compartment and the other one should be located in the rear section of the aeroplane.

It should also be noted that ICAO Annex 6 Part I, standard 6.3.5.5.2, prescribes that certain categories of large aeroplanes should be equipped with two combination recorders, and that 'One recorder shall be located as close to the cockpit as practicable and the other recorder located as far aft as practicable.' Furthermore, Section 2.6.1 of FAA Advisory Circular 20-186 (Airworthiness and operational approval of cockpit voice recorder systems) states: 'You may install two combination FDR and CVR units in the airplane, with one unit designated as the CVR to support the independent power source requirement, which may be located close to the cockpit.'

Therefore, it was considered that the text of point (e) of CS 25.1457 should be less prescriptive, and that the location of combination recorders on the aeroplane should be addressed in an AMC.

However, this comment also raised questions about the text of points (e)(1) and (e)(2) of draft CS 25.1457, which are specific to deployable recorders. This is not consistent with making the content of point (e) of CS 25.1457 less prescriptive.



Further to that, the ‘risk of compromising a safe flight and landing’ is only relevant to the case of a deployable recorder, but this is already addressed in bullet (v) of point (d)(7) of CS 25.1457.

Therefore, the following changes have been made:

1/ Point (e) of CS 25.1457 has been reworded to state that the container of the cockpit voice recorder must be located and mounted so as to minimise the probability of the recorder container rupturing, the recording being destroyed, or the recorder locating device failing as a result of the deployment (when applicable) or of the impact with the Earth’s surface or of the heat damage caused by a post-impact fire.

(Note: the ‘locating device’ is the underwater locating device in the case of a non-deployable recorder and the emergency locator transmitter in the case of a deployable flight recorder).

2/ Point (d)(7) of CS 25.1457 has been amended to add a new bullet stating that the deployment capability and the emergency locator transmitter integrated in the deployable recorder cannot be manually disengaged from the cockpit when the aeroplane is capable of moving under its own power.

3/ Point (b) of draft CS 25.1459 has been reworded using the same text as in point 1/, except that ‘cockpit voice recorder’ has been replaced by ‘flight data recorder’.

comment

45

comment by: FAA

CS 25.1457

Reword (f) to say If the cockpit voice recorder has an erasure device or function, the installation is designed to minimize the probabilities of inadvertent operation and of actuation of the device or function during crash impact.

Rationale: With software driven designs, erasure may be accomplished with other than a “device” and these words more fully capture the intent that no data is lost.

Reword (g)(3) Change to read: Has and underwater locating device on or adjacent to the container secured in such a manner that they are not likely to be separated during crash impact for non- deployable or deployment, descent and landing for deployable recorders.

Rationale: Although the deployable is required to float, it may not if damaged prior to deployment or the ELT may fail to function. The ULD can help localize the deployed recorder in those conditions.

response

First comment: Accepted.

The same text correction has been made in CS 29.1457.

Second comment: Not accepted.

CS 25.1457(e) has been amended to require that the container of the cockpit voice recorder must be located and mounted so as to minimise the probability of the container rupturing, the recording being destroyed, or the recorder locating device failing as a result of the deployment (when applicable) or the impact with the Earth’s surface.



Regarding the crashworthiness of the ELT, it is intended to require (in the next revision of the ETSO C126) that the integrated ELT should comply with the crash resistance capability defined in EUROCAE ED-62B. In addition, point (d) of Section 7 of draft AMC 25.1457 has been reworded to ensure that there is an assessment of the probability of the ELT failing as a consequence of the deployment: please refer to the response to comment No 36.

Therefore, it is not considered necessary to require the installation of a ULD in addition to the ELT.

CS 25.1459

p. 18-19

comment

12

comment by: *Gulfstream Aerospace Corporation Savannah*

- Recommend making clear how the requirement for the start/stop logic to cease recording is not overruled by the requirement for RIPS.
- It is GAC's position that requiring an alternate method, as suggested with reprogramming the CVR/FDR to trigger off parametric data, will a) require recorder redesign and potentially aircraft wiring changes, b) be less robust as some parametric data will be unavailable during routine flight-test system checks (green card production checks that induce system failures), c) be intermittent as systems begin to cease working prior to crash impact.

response

First comment: Not accepted.
Please refer to response to comment No 11.

Second comment: Noted.
NPA 2018-03 does not contain any proposal regarding the recovery of flight recorder data through aircraft transmissions.

comment

27

comment by: *Airbus-EIAIX-SRg*

Chapter 3.3.1. Draft Certification Specifications for Large Aeroplanes (Draft EASA decision amending CS-25)

CS25.1459(a)(5)

quote:

Except for recorders powered solely by the engine-driven electrical generator system, there is an automatic means to ~~simultaneously~~ stop a the recorder ~~that has a data erasure feature and prevent each erasure feature from functioning~~, within 10 minutes after crash impact

unquote

Airbus comment: (refer also to Airbus CRT comment #19)

AIRBUS request to add Guidance Material in order to explain the applicability of the CS25.1459(a)(5) to clarify the "automatic means [...] after crash impact"

Rationale:

See Airbus CRT comment #19

response

Noted.



Please refer to the response to comment No 19.

comment	<p>28 comment by: <i>Airbus-EIAIX-SRg</i></p> <p>Chapter 3.3.1. Draft Certification Specifications for Large Aeroplanes (Draft EASA decision amending CS-25) CS25.1459(a)(9) quote: If the recorder is deployable, it complies with CS 25.1457(d)(7). unquote</p> <p><u>Airbus comment:</u> Please see Airbus CRT comment #26</p> <p><u>Rationale:</u> Please see Airbus CRT rationale #26</p>
response	<p>Noted.</p> <p>Please see the reply to comment No 26.</p>

comment	<p>29 comment by: <i>Airbus-EIAIX-SRg</i></p> <p>Chapter 3.3.1. Draft Certification Specifications for Large Aeroplanes (Draft EASA decision amending CS-25) CS25.1459(b) quote: When a deployable recorder is installed, the installation must comply with CS 25.1457(e)(3). unquote</p> <p><u>Airbus comment:</u> CS 25.1457(e)(3) does not exist.</p> <p><u>Rationale:</u> Typing error</p>
response	<p>Accepted.</p> <p>This is an error, the intent was to refer to CS 25.1457(e)(2). However, the content of CS 25.1457(e)(2) has been moved to the new CS 25.1457(d)(7)(ii) (please refer to the response to comment No 44). As CS 25.1459(a)(9) already requires deployable flight data recorders to comply with CS 25.1457(d)(7), the commented requirement is not needed any more and has been deleted.</p>

comment	<p>30 comment by: <i>Airbus-EIAIX-SRg</i></p> <p>Chapter 3.3.1. Draft Certification Specifications for Large Aeroplanes (Draft EASA decision amending CS-25) CS25.1459(d)</p>
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	<p>quote: The container of the flight data recorder must comply with CS 25.1457(g). unquote</p> <p><u>Airbus comment:</u> AIRBUS proposes to copy-paste the text instead of cross-referencing to CS25.1457 to avoid misunderstandings.</p> <p><u>Airbus Rationale:</u> The NPA proposed wording CS 25.1457(g) starts with “The container of the cockpit voice recorder...”, which could lead to misunderstanding for the reference in 25.1459(d).</p>
response	<p>Partially accepted.</p> <p>In order to prevent any misunderstanding, point (d) of CS 25.1459 has been amended to state that the container of the flight data recorder must comply with the specifications that are applicable to the container of the cockpit voice recorder in CS 25.1457(g).</p>
comment	<p>31 comment by: Airbus-EIAIX-SRg</p> <p>Chapter 3.3.1. Draft Certification Specifications for Large Aeroplanes (Draft EASA decision amending CS-25) CS25.1459(f)</p> <p>quote: If the flight data recorder has an erasure device, the installation must be designed to minimise the probability of the inadvertent operation or actuation of the erasure device during a crash impact. unquote</p> <p><u>Airbus comment:</u> Removal of proposed 25.1459(f)</p> <p><u>Rationale:</u> The proposed sub para 25.1459(f) creates a difference to FAA requirements. And the CVR erasure function is dedicated to pilots privacy protection which is not applicable for the FDR.</p>
response	<p>Accepted.</p> <p>CS 25.1459(f) has been deleted. This sub-paragraph was written for consistency with the CVR specifications. However, ED-112A Chapter II-2.1.7 states that no means for the erasure of the records shall be provided. Therefore, there is no need to define conditions for the erasure function of an FDR.</p>
comment	<p>41 comment by: UK CAA</p> <p>Page No: 18</p> <p>Paragraph No: (b)</p>

	<p>Comment: We believe the reference to ‘CS 25.1457(e)(3)’ is incorrect as it does not appear to exist in the text of this NPA. We believe the correct reference should be as proposed below.</p> <p>Justification: Incorrect reference.</p> <p>Proposed Text: Amend text to read as follows:</p> <p>“When a deployable recorder is installed, the installation must comply with CS 25.1457(e)(3)(2)”</p>
response	<p>Partially accepted.</p> <p>This is an error, the intent was indeed to refer to CS 25.1457(e)(2). However, the content of CS 25.1457(e)(2) has been moved to the new CS 25.1457(d)(7)(ii) (please refer to the response to comment No 44).</p> <p>As CS 25.1459(a)(9) already requires deployable flight data recorders to comply with CS 25.1457(d)(7), the commented requirement is not needed any more and has been deleted.</p>
comment	<p>46 comment by: FAA</p> <p>CS 25.1459</p> <p>Reword (3) as follows</p> <p>(3)(i) “It receives its electrical power from the bus that provides the maximum reliability for operation of the flight recorder without jeopardizing service to essential or emergency loads and</p> <p>(ii) It remains powered as long as possible without jeopardizing the emergency operation of the aeroplane;</p> <p>Rationale: Maintains existing requirements for fixed flight data recorders while adding requirements needed for deployable recorders. As proposed, the existing best practice for fixed recorders would no longer be required.</p>
response	<p>Accepted.</p> <p>Please see also the response to comment No 43.</p>
comment	<p>47 comment by: FAA</p> <p>CS 25.1459</p> <p>Reword (b) as follows</p> <p>(b)(1) The record container of fixed flight data recorders must be located and mounted to minimize the probability of rupture of the container as a result of crash impact and consequent heat damage to the record from fire. In meeting this requirement, the record container must be as far aft as practicable, but may not be</p>

where aft mounted engines may crush the container during impact. However, it need not be outside of the pressurized compartment.

(2) Deployable flight data recorders are mounted to minimize the risks of rupture or damage during deployment and of compromising a continued safe flight and landing after deployment.

Rationale: Maintains existing requirements for fixed flight data recorders while adding requirements needed for deployable recorders. As proposed, the existing best practice for fixed recorders would no longer be required.

25.1459 (c) Add a second sentence to better align with US standards.

(c) A correlation must be established between the flight recorder readings of airspeed, altitude, and heading and the corresponding readings (taking into account correction factors) of the first pilot's instruments. **The correlation must cover the airspeed range over which the airplane is to be operated, the range of altitude to which the airplane is limited, and 360 degrees of heading. Correlation may be established on the ground as appropriate.**

response First comment: Partially accepted.
Please refer to the response to comment No 44.

Second comment: Noted.
The proposed additional sentence to point (c) of CS 25.1459 is already included in point (c) of the current version of CS 25.1459 but it was not shown in the NPA (marked with '[...]').

comment 49 comment by: FAA

CS 25.1459 Add the word function after the word device in 2 instances

(f) If the flight data recorder has an erasure device, the installation must be designed to minimise the probability of the inadvertent operation or actuation of the erasure device during a crash impact.

response Noted.

CS 25.1459(f) has been deleted. This sub-paragraph was written for consistency with the CVR specifications. However, ED-112A Chapter II-2.1.7 states that no means for the erasure of the records shall be provided. Therefore, there is no need to define conditions for the erasure function of an FDR.

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p. 20-21

comment 51 comment by: AIRBUS HELICOPTERS

Comment: Editorial

Acceptability criteria imposed for CVR and FDR erasure device are different, in paragraph (f) and (e):
(f) If the cockpit voice recorder has an erasure device, the installation is designed to



	<p>minimise the probabilities of inadvertent operation AND of actuation of the device during crash impact. (e) If the flight data recorder has an erasure device, the installation is designed to minimise the probability of the inadvertent operation OR actuation of the erasure device during crash impact.</p> <p>Proposal: use 'and' or 'or' consistently</p>
response	<p>Accepted.</p> <p>In point (f) of draft CS 29.1457, 'probabilities' is used (plural) while in point (e) of draft CS 29.1459, 'probability' is used (singular). As a result, the two points have the same meaning. However, CS 29.1459(e) has been deleted. This sub-paragraph was written for consistency with the CVR specifications. However, ED-112A Chapter II-2.1.7 states that no means for the erasure of the records shall be provided. Therefore, there is no need to define conditions for the erasure function of an FDR</p>
comment	<p>54 comment by: FAA</p> <p>CS 29.1457 (d) Reword as,</p> <p>Reword as follows</p> <p>d) Each cockpit voice recorder must be installed so that: (1)(i) It receives its electric power from the bus that provides the maximum reliability for operation of the cockpit voice recorder without jeopardizing service to essential or emergency loads and (ii) It remains powered as long as possible without jeopardizing the emergency operation of the rotorcraft.;</p> <p>Rational: Align with US rule keep device powered as long as practical before switching to alt power supply</p>
response	<p>Accepted.</p> <p>See also the reply to comment No 43.</p>
comment	<p>55 comment by: FAA</p> <p>CS 29.1457 (f) Add or function after the word device in 2 places</p> <p>(f) If the cockpit voice recorder has a bulk <u>an</u> erasure device <u>function</u>, the installation is designed to minimise the probabilities of inadvertent operation and of actuation of the device <u>function</u> during crash impact.</p>
response	<p>Accepted.</p> <p>See also the reply to comment No 45.</p>

CS 29.1459

p. 22-23

comment	56	comment by: FAA
	<p>CS 29.1459 (a) (3) add text.</p> <p>(a) (3) (i) It receives its electrical power from the bus that provides the maximum reliability for operation of the flight data recorder without jeopardizing service to essential or emergency loads <u>and</u> <u>(ii) It remains powered as long as possible without jeopardizing the emergency operation of the rotorcraft:</u></p> <p>Rational aligns rule with US and maximizes power use before using alt power source</p>	
response	<p>Accepted.</p> <p>See the reply to comment No 43.</p>	

comment	57	comment by: FAA
	<p>CS 29.1459 add text</p> <p>(c) A correlation must be established between the flight recorder readings of airspeed, altitude, and heading and the corresponding readings (taking into account correction factors) of the first pilot's instruments. This correlation must cover the airspeed range over which the aircraft is to be operated, the range of altitude to which the aircraft is limited, and 360 degrees of heading. Correlation may be established on the ground as appropriate.</p>	
response	<p>Noted.</p> <p>The proposed additional sentence to point (c) of CS 29.1459 is already included in the current version of CS-29.1459, but it was not shown in the NPA (use of '[...]').</p>	

comment	58	comment by: FAA
	<p>CS 29.1459 (e) Add or function after the word device in 2 places</p> <p>(e) If the flight data recorder has an erasure device <u>function</u>, the installation is designed to minimise the probability of the inadvertent operation or actuation of the erasure device <u>function</u> during crash impact.</p>	
response	<p>Noted.</p> <p>CS 29.1459(e) has been deleted. This sub-paragraph was written for consistency with the CVR specifications. However, ED-112A Chapter II-2.1.7 states that no means for the erasure of the records shall be provided. Therefore, there is no need to define conditions for the erasure function of an FDR</p>	

Draft AMC/GM to CS-25 — AMC 25.1457

p. 24-29



comment	<p>9 comment by: <i>Europe Air Sports</i></p> <p>AMC 25.1457 Cockpit Voice Recorders</p> <p>(5) (b) (ii) page 25:</p> <p>"...(such as a recorder independent power supply)"</p> <p>Suggestion:</p> <p>Would "... such as an independent recorder power supply" be a preferable wording?"</p>
response	<p>Not accepted.</p> <p>'Recorder independent power supply' is a dedicated term used in EUROCAE Document 112A, FAA TSO-C155b and ETSO-C155b. For consistency across the industry standards and aviation regulatory material, it is preferable to use the same term in AMC 25.1457.</p>
comment	<p>10 comment by: <i>Europe Air Sports</i></p> <p>AMC 25.1457 Cockpit Voice Recorders</p> <p>(7) (h) page 27:</p> <p>"The risk of injuries..."</p> <p>Comment:</p> <p>Replace "... taxiing or ground handling" with "taxiing, ground handling or rescue operations ...".</p> <p>Rationale:</p> <p>Rescue services and first responders who need to work on or around a crashed aircraft need to be aware of any hazards posed by undeployed recorders still attached to the airframe. For example the deployment trajectory (line-of-firing) of the recorder and the means to disarm the deployment mechanism to make it safe for persons on the ground. Instructions should cater also for these personnel groups.</p> <p>This issue has also surfaced regarding ballistic recovery parachutes on small aircraft, which may become a hazard to rescue personnel if undeployed in an accident.</p>
response	<p>Accepted.</p> <p>Indeed, a deployable recorder may also cause injuries to first responders after an accident, and this risk needs to be addressed. Based on the experience with ballistic parachutes, the content of point (h) (re-numbered in the final text) of Section 7 of AMC 25.1457 has been modified in order to recommend that a placard or label should be placed to indicate the location of the deployable recorder and that the applicant should make that specific information publicly available.</p> <p>In addition, point (h) did not encompass the effects on other aircraft and safety facilities, which might be damaged due to the unintentional deployment, or the risk</p>

of leaving a foreign object on the runway or a taxiway (refer also to comment No 38). Therefore, some text has been added to address the first actions to be taken by the flight crew when they receive an indication that the recorder is no longer attached to the aeroplane. (Such an indication should be presented as early as possible, taking into account the guidelines provided in AMC 25.1322: refer to point (e) of Section 7 of draft AMC 25.1457).

Taking into account all these considerations, the content of point (h) has been reworded to state that the risk of injuries caused to persons on the ground due to an unintended deployment of the recorder should be addressed. This should include aeroplane maintenance, ground handling, taxiing or rescue operations, or emergency evacuation, and the effects of unintended deployment of the recorder on other aircraft and facilities should be addressed. In particular:

- a conspicuous placard or label that is visible from the outside of the aircraft should be placed adjacent to the recorder deployment point;
- ICA and/or operational procedures should be provided to prevent injuries during maintenance and ground handling;
- Operational procedures should define the first actions to be taken by the flight crew when the recorder is no longer attached to the aeroplane, in order to address any risk to continued safe flight and landing, and possible effects on other aircraft and facilities;
- Procedures should address the precautions that should be taken to avoid injuries which could be caused by an unintended deployment during emergency evacuation;
- Information that addresses the precautions to be taken by search-and-rescue services after an accident should be publicly available; and
- The deployment mechanism should only release the recorder in one piece.

Furthermore, a point (j) has been created to address how to limit the impact of an unintended ELT activation on search and rescue (SAR) services as a result of the deployment, or due to other failure modes. Indeed, the operational capacity of SAR services is limited, and every ELT activation requires resources from SAR services.

comment 23

comment by: Embraer S.A.

A single failure condition cannot lead to an unintended deployment. The unintended deployment of a recorder should not be caused by a single failure. The objective of such a design concept is to reduce the number of unintended deployments during the aircraft operational life and permit it to continue safe flight and landing, while also avoiding unsafe conditions, damage and / or casualties to third parties.

To change the text from:

7. Deployable recorder

When the recorder is deployable:

[...]

(h) The risk of injuries caused to persons on the ground due to unintended deployment of the recorder during aircraft maintenance, taxiing or ground handling should be addressed by:



	<p>— detailed instructions; and — the fact that the deployment mechanism can only release the recorder in one piece. [...]</p> <p>To:</p> <p>7. Deployable recorder When the recorder is deployable: [...] (h) The risk of injuries caused to persons on the ground due to unintended deployment of the recorder during aircraft maintenance, <u>taxiing</u> taxying or ground handling should be <u>addressed</u> addressed by: — detailed instructions; and — the fact that the deployment mechanism can only release the recorder in one piece; <u>and</u> — <u>a single failure condition cannot lead to an unintended deployment.</u> [...]</p>
response	<p>Partially accepted.</p> <p>The effects of an unintended deployment on safely conducting the flight or on third parties are addressed in bullet (v) of point (d)(7) of CS 25.1457. However, the content point (h) (re-numbered) of Section 7 of AMC 25.1457 has been re-worded and a new paragraph has been added into Section 7 of AMC 25.1457 in order to better address the effects on third parties, other aircraft and facilities. Please refer to the responses to comments No 10 and No 24.</p>
comment	<p>24 comment by: Embraer S.A.</p> <p>To add AMC 25.1457(7)(i) to address the risk of injuries caused to persons on the ground due to unintended deployment of the recorder during aircraft operation in the air.</p> <p>AMC 25.1457(7)(i) contemplated the risk of injuries caused to persons on the ground due to unintended deployment of the recorder during aircraft maintenance, taxiing or ground handling, but it did not contemplate this risk when the aircraft is in operation in the air. That is why it is suggested to add a new item "i" to address such a condition.</p> <p>This new item addresses the risk of injuries caused to persons on the ground due to unintended deployment of the recorder during aircraft operation in the air by asking for:</p> <ul style="list-style-type: none"> - a safety assessment in line with AMC 25.1309, considering casualties/damages to third parties (as in CS 25.1457(d)(7)(v)); - that the deployment mechanism can only release the recorder in one piece (as in AMC 25.1457(7)(h)); - that a single failure condition cannot lead to an unintended deployment (as in the Embraer comment # 3, above); - that operation over water or remote areas must consider the failure classification as a hazardous condition (the unintended deployment could cause some injuries / casualties / damages, but it is unlikely, since this occurs over water or over a remote area);

- that operation over other areas other than over water or remote (e.g. "urban" areas) must consider the failure classification as a hazardous condition, at least (the unintended deployment could cause some injuries / casualties / damages, and it is more likely for it to happen than in remote / over water area).

To add the following text:

7. Deployable recorder

When the recorder is deployable:

[...]

(i) The risk of injuries caused to persons on the ground due to unintended deployment of the recorder during aircraft operation in the air should be addressed by:

— the assessment required by CS 25.1457 (d)(7)(v), following AMC 25.1309 (System Design and Analysis) guidance material;

— the fact that the deployment mechanism can only release the recorder in one piece;

— a single failure condition cannot lead to an unintended deployment.

— Operation over water or over remote areas, must consider the failure condition severity classification of an unintended deployment as a hazardous failure condition;
and

— Operation over other areas – other than over water or remote areas –, must consider the failure condition severity classification of an unintended deployment, at least, as a hazardous failure condition.

[...]

response Partially accepted.

Indeed, the risk of injuries to persons on the ground caused by unintended deployment while the aeroplane is airborne is not specifically addressed in the draft AMC 25.1457. Therefore, Section 7 of AMC 25.1457 has been updated to add provisions on this topic.

However, this new provision has a content different from what is proposed in this comment. It provides guidelines to be used by the applicant to determine the probability of causing fatal injuries after an unintended deployment. The outcome will be one element among others to be considered for the classification of the failure condition. The guidelines are consistent with the content of EASA Certification Memorandum No CM-21.A-A-001 (parts detached from aeroplanes (PDA)) scenario number 2.

comment 32

comment by: Airbus-EIAIX-SRg

Chapter 3.4.1. Draft AMC/GM to CS-25 Large Aeroplanes, 3. Automatic means to stop the recorder after a crash impact:

quote:

(b) the recorder start-and-stop logic, provided that this start-and-stop logic stops the recorder between 9 and 10 minutes after power is lost on all engines (and, when applicable, the APU) when the aircraft is on the ground.

unquote

Airbus comment

We propose a revised wording as follows:



	<p>"(b) the recorder start-and-stop logic, provided that this logic is capable to stop the recording 10(+/-1) Minutes after all engines have been stopped, and when the aircraft is on the ground."</p> <p><u>Rationale:</u> The current AIRBUS design is to record all data (voice and flight data) until 5 Minutes after the main Engines (not the APU) are powering the aircraft. AIRBUS has investigated a possible extension of the shutdown cycle from currently 5 Minutes to 9 to 10 Minutes, as proposed by EASA: "9 minutes" is technical not feasible, because approved types of time-delay-on-operate relays (ASNE0217) are available only for 300 seconds (5 Min) or for 600 seconds (both with a +/- 10% tolerance). AIRBUS considers that the usage of the 600 sec relay instead of using the current 300 sec relay would be feasible.</p>
response	<p>Partially accepted.</p> <p>A difference of one minute in stopping the recorder after the loss of power on all engines is likely to make little difference regarding the preservation of the recording after an accident or a serious incident. Indeed, this might help in recording a little more of the sequence of events following the loss of power on all engines, and, if applicable, the APU. On the other hand, according to Commission Regulation (EU) No 965/2012 on air operations, all aeroplanes operated for commercial air transport and with MCTOMs of over 5 700 kg shall be equipped with CVRs that have minimum recording durations of 2 hours.</p> <p>Therefore, point (b) of Section 3 of AMC 25.1457 has been amended. Please see also the reply to comment No 11.</p>
comment	<p>33 comment by: <i>Airbus-EIAIX-SRg</i></p> <p>Chapter 3.4.1. Draft AMC/GM to CS-25 Large Aeroplanes, 4. Means for the flight crew to stop the recorder: quote: The means required for the flight crew to be able to stop the cockpit voice recorder function after completion of the flight is needed in order to preserve the CVR recording for the purpose of investigating accidents and serious incidents. In fulfilling this requirement, it is acceptable to use circuit breakers to remove the power to the equipment. Such a means to stop the cockpit voice recorder function is not in contradiction to 25.1357(f), because its use would not be under normal operating conditions, but after an accident or a serious incident has occurred. unquote</p> <p><u>Airbus comment</u> Regulation 25.1457(d)(5) is requested to be deleted (by Airbus). Thus no AMC is necessary.</p> <p><u>Rationale:</u> Same as in Airbus CRT comment #20</p>
response	<p>Not accepted.</p>

Please refer to the response to comment No 20.

comment	<p>34 comment by: Airbus-EIAIX-SRg</p> <p>Chapter 3.4.1. Draft AMC/GM to CS-25 Large Aeroplanes, 5. Power Sources (c): quote: If the cockpit voice recorder function has a recording duration of less than 25 hours, electrical power should not be supplied for more than 30 minutes after power is lost on all engines. unquote</p> <p><u>Airbus comment:</u> We request to remove the proposed sub-para 5(c) to AMC 251457.</p> <p><u>Rationale:</u> The stop-condition of the CVR is defined in a different way., ref. sub-para 3 of the AMC to 25.147.</p>
response	<p>Partially accepted.</p> <p>Section 3 of AMC 25.1457 only addresses the automatic means to stop the CVR after a crash impact. Section 5 of AMC 25.1457 also covers the normal depowering of the recording function due to an engine shutdown after completion of the flight. However, this comment highlights that there is an inconsistency between Section 3 and Section 5 regarding the time limits for providing electrical power.</p> <p>Therefore, point (c) of Section 5 of AMC 25.1457 has been amended to state that if the cockpit voice recorder function has a recording duration of less than 25 hours, the electrical power to this function should not be supplied for more than 10 minutes after power is lost on all engines (and, when applicable, the APU) when the aeroplane is on the ground.</p>
comment	<p>35 comment by: Airbus-EIAIX-SRg</p> <p>Chapter 3.4.1. Draft AMC/GM to CS-25 Large Aeroplanes, 6. Recorder container</p> <p><u>Airbus comment:</u> We request to precise the headline of this sub-para 6 as follows:</p> <p>6. Recorder container - <i>fixed installed</i></p> <p><u>Rationale:</u> Clear identification of subject.</p>
response	<p>Partially accepted.</p> <p>The text of the second paragraph of Section 6 of the draft AMC 25.1457 is specific to the installation of a non-deployable recorder, therefore this paragraph will be modified to start with '<u>The container of a non-deployable recorder should be installed in the rear section of the aeroplane...</u>'.</p>

The condition ‘and meets crashworthiness specification applicable to fixed flight recorders’ at the end of the third paragraph of Section 6 of the draft AMC 25.1457 is not applicable to a deployable recorder. In addition, crash-testing conditions are defined in the applicable ETSO. Therefore, this condition has been removed from the text of the third paragraph of Section 6.

This comment also highlights the need to ensure that the recorder can be deployed before the deployment mechanism is damaged in case of an explosion or collision. The applicant should take into account the time between the positive indication of a crash and the initiation of deployment, and also the location of the elements that support the deployment capability (such as airframe deformation sensors or the deployment mechanism).

Hence, the content point (c) (re-numbered) of Section 7 of AMC 25.1457 has been amended to state that the installation of the deployable recorder should be such as to guarantee the highest probability of the deployment of the recorder in the event of an explosion or a collision. In particular, the installation and the performance of the deployment capability should be such that, in most cases of collision, the deployment of the recorder can take place before the deployment mechanism is damaged.

comment

36

comment by: Airbus-EIAIX-SRg

Chapter 3.4.1. Draft AMC/GM to CS-25 Large Aeroplanes, 7. Deployable recorder (d) quote:

Deployment should take place without the deployed recorder striking any part of the airframe when the aircraft is airborne or when the aeroplane is moving on the ground at high speed. This should be achieved for the whole flight envelope, including a margin outside the normal flight envelope which might be expected during the initial stages of an accident sequence. Similarly, deployment from an aircraft in an unusual attitude should not make the survival of the recorder less likely

unquote

Airbus proposal:

The item (d) of the “Draft AMC/GM to CS-25 Large Aeroplanes, 7. Deployable recorder” shall be removed. Current item (e) will become (d) subsequently.

Rationale:

The requirements of “deployment” , proposed by paragraph CS25.1457(d)(7)(iii) and (iv), are explicitly clear. The proposed AMC does not provide more clarity but mixes unnecessarily the issue with cases of unintended deployments.

Deployment of the recorder is an intended function during crash events, when an aircraft is significantly damaged. Examples are unintended flight into terrain, in-air-collisions or onboard explosions. In such events, the deployable recorder shall be separated from the crashed plane immediately and will not be deployed at any stages prior to the crash event, e.g. during initial stages of an accident sequence. An assessment about the way of separation, and its trajectory etc does not provide any useful information.

It is only important that the deployed unit will endure this event. Therefore, this unit, containing the recording data storage and the ELT, shall be protected as specified in ED112A (recording storage) and ED62A (deployable ELT). This specification considers



	<p>also deployment cases in unusual attitude in order to make the survival of the recorder more likely.</p> <p>Cases, when the unit will be detached from aircraft, but unrelated to an accident event, will be considered as “unintended deployments”. An assessment of potential effects (including effects external to the aircraft) should determine appropriate safety objectives and mitigations associated with the failure case of unintended deployment of the recorder unit. (see AIRBUS comments CRT#38).</p>
response	<p>Partially accepted.</p> <p>The intent of point (d) of Section 7 of the draft AMC 25.1457 is to ensure that the recorded data would not be lost due to damage to the ELT or to the recording medium inside the crash-protected memory module due to deployment. This may not be obvious when considering the text of this point in NPA 2018-03. While point (e) of draft CS 25.1457 already requires the recorder to be located and mounted in a manner that minimises the probability of losing the recording (see also the reply to comment No 44), it does not specify that in the case of a deployable recorder, this should be ensured in the whole flight envelope of the aeroplane. Therefore, the content of point (d) (re-numbered) of Section 7 of AMC 25.1457 has been amended to state that the demonstration of compliance with CS 25.1457(e) should cover the whole flight envelope of the aeroplane, and additional trajectories that might be expected during the initial stages of an accident sequence. Parameter ranges are also provided to support the applicant in determining these trajectories. These parameter ranges are based on the analysis of occurrences of loss of control of large aeroplanes.</p>
comment	<p>37 comment by: <i>Airbus-EIAIX-SRg</i></p> <p>Chapter 3.4.1. Draft AMC/GM to CS-25 Large Aeroplanes, 7 Deployable recorder (a) quote: The deployable recorder installation should comply with CS 25.1457(e)(3). unquote</p> <p><u>Airbus comment:</u> Requirement CS 25.1457(e)(3) does not exist (neither in this NPA).</p> <p><u>Rational:</u> Typing error.</p>
response	<p>Accepted.</p> <p>This was an error, as the intended correct reference was CS 25.1457(e)(2). However, it has been decided to delete point (a) of Section 7 of AMC 25.1457. Indeed, all the provisions of CS 25.1457 are applicable to the installation of a cockpit voice recorder; therefore, it is not necessary to refer to a specific provision.</p>
comment	<p>38 comment by: <i>Airbus-EIAIX-SRg</i></p> <p>Chapter 3.4.1. Draft AMC/GM to CS-25 Large Aeroplanes, 7. Deployable recorder (h) quote:</p>



The risk of injuries caused to persons on the ground due to unintended deployment of the recorder during aircraft maintenance, taxiing or ground handling should be addressed by:

- detailed instructions; and
- the fact that the deployment mechanism can only release the recorder in one piece.

unquote

Airbus comment:

Airbus request to apply a new wording as follows:

(h) Any risks should be addressed by an assessment, which should cover failure conditions that have potential adverse effects on the aeroplane, effects to occupants and the flight crew and of injuries caused to persons on the ground due to unintended deployment of the recorder.

Particular attention should be given to:

- Impact on structure and control surfaces in the vicinity of the Deployable recorder installation and its anticipated trajectory after ejection. Such effects may degrade the aircraft performances or reduce safety margins.
- Aerodynamic effect due to the cavity in structure after a Deployable recorder was ejected. An assessment of possible effects to flight performance will be done.
- Potential impacts to any aloof persons on ground during flying over.

In addition, possible effects on ground, caused by an unintended deployment or loss should be evaluated as well. It is essential to ensure a satisfactory level of safety for humans, those on-board, but also those on the ground, e.g. for maintenance and servicing purposes:

- Effects near to aircraft (gate, taxiway, runway).
- Effects on other aircraft and facilities on ground, ground servicing and other personnel.

To avoid multiple scattered effects, it shall be shown that the deployment mechanism can only release the recorder in one piece.

Rationale:

Airbus proposes to implement a text derived from a CRI related to installation of Automatic Deployable Flight Recorder on AIRBUS A350 aircraft. The text, derived from the CRI, addresses all potential effects (including external to the aircraft) that should be assessed in order to determine appropriate safety objectives and mitigations associated with the failure case of unintended deployments.

response

Partially accepted.

The risk of injuries being caused to persons on the ground during aircraft maintenance, taxiing or ground handling is already covered by the text of point (h) of Section 7 of the draft AMC 25.1457 as presented in NPA 2018-03, as well as the principle that the deployment mechanism should release the recorder in one piece.

The effects on other aircraft and airport infrastructure is addressed by a change to the content of point (h) of Section 7 (please refer to response to comment No 10).



Indeed, point (e) (re-numbered) of Section 7 recommends that an alert should be presented as early as permitted by the principles of AMC 25.1322 when the recorder is no longer attached to the aeroplane. This permits, among other aspects, the flight crew to be made aware of the deployment and, on ground, to transmit the information to the competent air traffic services unit without any delay. This will help to more quickly identify possible hazards caused by the deployment of the recorder, such as causing damage to another aircraft or a ground vehicle.

The risk of injuries being caused to persons on the ground during the flight is addressed by adding a new paragraph in Section 7 of AMC 25.1457 (please see the response to comment No 24).

Also, this comment does not mention the risk during rescue operations and emergency evacuations, which have been added (refer to comment No 10).

Concerning the effects of an unintended deployment in flight, guidance has been added to Section 7 of AMC 25.1457, which addresses the points mentioned in this comment.

AMC 25.1459

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comment 39

comment by: Airbus-EIAIX-SRg

Chapter 3.4.1. Draft AMC/GM to CS-25 Large Aeroplanes, AMC 25.1459

3. Means for pre-flight checking of the recorder

Airbus comment:

Instead to repeat existing wording, please refer to AirOps, “GM2 CAT.GEN.MPA.195(b)”, sub-chapter (d).

Additionally, to improve the understanding of the intention, AIRBUS propose to change the headline as follows:

“3.Means for continuous monitoring for proper operation of the recorder”

Rationale:

Use cross references to avoid unintended differences.

response

First comment: Not accepted.

GM2 CAT.GEN.MPA.195 provides guidance material to facilitate the understanding of point CAT.GEN.MPA.195. AMC 25.1459 provides acceptable means of compliance, and it is addressed to applicants for (supplemental) type certificates. The two provisions are not of the same nature (GM versus AMC) and they are addressed to different stakeholders. Therefore, making a cross-reference is not considered to be appropriate.

Second comment: Not accepted.

The title of Section 3 of AMC 25.1459 has been kept consistent with the content of the associated point (a)(4) of CS 25.1459.

comment 59

comment by: FAA



AMC 25.1459 3 d

d. failure of the recorder to store the data in the recording medium as shown by checks of the recorded data including, as reasonably practicable for the storage medium concerned, its correct correspondence with the input data.

I am unclear what this means. Is it saying a Built in test (BIT) should check and verify the storage memory is working AND that the data it records is correct? Is this a simple process of writing data to the memory and then reading it back or does it need to verify 102 parameters to ensure the values look reasonable? I hate to not provide suggested text here but am unclear what this is asking for. Feel free to call or email me if my comment is unclear, John.d.fisher@faa.gov, +1 202.267.8879

response

Noted.

Point (d) does not require a recorder function to check the correctness of recorded data, but only the correct correspondence between the input data to the recorder and the recorded data, as far as is reasonably practicable.

Please note that the text of point (d) of Section 3 of AMC 25.1459 is the same as the text of point (d) of AMC 25.1459(a)(4) (to be now deleted) in the current CS-25, and that this text has remained unchanged since the first issue of CS-25 in October 2003.

Draft AMC/GM to CS-29 — New AMC.29.1457

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comment

2

comment by: AIRBUS HELICOPTERS

AMC 29.1457 Cockpit Voice Recorders

2. Automatic means to stop the recorder after a crash impact

The automatic means to stop the recorder within 10 minutes after a crash impact may rely on:

(b) the recorder start-and-stop logic, provided that this start-and-stop logic stops the recorder between **9 and 10 minutes** after the loss of power on all engines.

Rationale

It should be ensured that if the start-and-stop logic is used to comply with CS 29.1457(d)(2), then this logic does not stop the recorder before the APS has fulfilled its purpose of delivering backup electrical power to the recorder for its minimum engagement duration (9 minutes) after engine power is lost, in order to record autorotation and emergency evacuations (e.g if there is a fire on board). Therefore, the condition is that the recorder should be stopped not earlier than 9 minutes after power is lost on all engines. On the other hand, CS 29.1457(d)(2) requires the automatic means to stop the recorder within 10 minutes of a crash impact. As a result, the start-and-stop logic must stop the recorder between 9 and 10 minutes after a loss of power on all engines.

Comment:

The proposed interval of “9 to 10 minutes after the loss of power on all engines” should be enlarged to “9 to 11 minutes after the loss of power on all engines”.



	<p>Rationale of the comment: the interval after the loss of power on all engines is directly influenced by interval covered by the alternate power source. In point §3.3.2 for CS29.1457-d(7) on page 19 of this document, the interval for alternate power source is described as follows: “it has an alternate power source: — That provides 10 ± 1 minutes of electrical power to operate both the recorder and cockpit-mounted area microphone”.</p> <p>As recorders are requested to provide 10 ± 1 minutes of electrical power, it is technically very difficult to ensure that the interval to stop the recorder after the loss of power on all engines is not 10 ± 1 minutes but only 9 to 10 minutes. The recording performances difference between stopping the recorder in 9 to 10 minutes or 9 to 11 minutes is insignificant.</p>
response	<p>Accepted.</p> <p>A difference of one minute in stopping the recorder after the loss of power on all engines is likely to make little difference regarding the preservation of the recording after an accident or a serious incident.</p> <p>Indeed, this might help by recording a little more of the sequence of events following the loss of power on all engines. On the other hand, according to Commission Regulation (EU) No 965/2012 on air operations, all helicopters that were first issued with an individual CofA on or after 1 January 2016 and with MCTOMs of over 3 175 kg shall be equipped with CVRs that have minimum recording durations of 2 hours. Therefore, point (b) of Section 2 of AMC29.1457 has been amended. Similarly, point (b) of Section 3 of AMC 25.1457 has been modified. Please see also the response to comment No 11.</p>
comment	<p>52 comment by: AIRBUS HELICOPTERS</p> <p>§ 3 'Means for the flight crew to stop the CVR':</p> <p>Comment (Editorial): It is assumed that the intended wording was 'accidents and serious incidents'</p> <p>I</p>
response	<p>Accepted.</p> <p>The text has been corrected.</p>