EASA Proposed CM-AS-001 Issue 01 – Quality of Recording of Cockpit Voice Recorders - Comment Response Document

Comment				Comment summary	Suggested resolution	Comment is an observation or is a suggestion	Comment is substantive or is an objection	EASA comment disposition	EASA response
NR	Author	Section, table, figure	Page						
1	*Daniel Hawkes*	All	All	As the former Chairman of EUROCAE WG 18 and 21 that developed the CVR and FDR performance specifications in consultation with the accident investigation specialists, I am pleased that the advice given in the original specifications is now being promoted by EASA. It is a pity that it has taken so long.	None	Yes	No	Noted	
2	*Boeing Commercial Airplanes*	1.4 (Definitions) and 2 (Background)	5 and 6	On the Definitions table, the "Meaning" column for the definitions of Channels 1, 2, 3, and 4 is consistent with EUROCAE ED-112, Section I-2.1.9. However, it differs from ARINC 757-4, JAR-25.1457, CS-25.1457, and FAR §25.1457. This creates confusion. We assume that the "Meaning," as appears on the table, is just meant to be an orderly/sequential list of the channels and is not intended to denote specific tracks on a recording tape or hardware input channels on the recorder.	We suggest adding a note that these are not physical channel assignments, but rather a sequential list of audio inputs. If assignments in Section 1.4 are changed, the corresponding changes need to be incorporated in the Section 2 numbered items.		Yes	Accepted	Definition of Channels on section 1.4 is consistent with ED-112 and aims for right interpretation of issues described in section 2. ARINC 757-4 is not referred in the Certification Memorandum. It is noted channel 1, 2, 3 and 4 definitions are not consistent with sequential channels in JAR/FAR/CS-25.1457. The following note is included: *"Definitions of channels are consistent with ED-112 and aims only for right interpretation of issues described in section 2. It should be noted definitions of channels in this Certification Memorandum deviates from sequential allocation of channels in CS XX.1457."*
3	*Boeing Commercial Airplanes*	2 Item 7	6	The use of "superimposed" is not clear where it is used in the phrase: " … microphone signals are superimposed by radio reception signal, …"	We suggest revising the word to provide better clarity – possibilities could be "overridden" or "swamped."	Yes		Accepted	"superimposed" is replaced by "overridden"
4	*Boeing Commercial Airplanes*	2 Item 9	6	The proposed item needs clarification where it states: "A wrong allocation of recording capacity to the various channels, resulting in the CAM channel be recorded with reduced quality (CAM channel is higher specification than a crew channel)."	We suggest expanding the item to state that the high quality CAM audio was connected to a standard quality crew channel.	Yes		Accepted	Item 9 is reworded as follows: "An erroneous allocation of CVR channel to the CAM, resulting in the CAM being recorded with reduced quality (CAM channel is higher specification than a crew channel, and therefore it requires more memory space on the CVR)." Example of higher requirements for the cockpit area microphone in ED-112: I-3.2.3, I-3.3, I-4.2
5	*Boeing Commercial Airplanes*	3.1 (EASA Policy)	7	Part of this Section states: "To ensure CVR systems are properly installed and to verify the audio signal recorded from all audio channels achieve the acceptable level of quality, applicants should conduct a check during flight. The recording obtained should be evaluated to confirm acceptable level of quality during all normal regimes of flight including taxiing, take-off, cruise, approach and landing. For helicopters, hover and autorotation should be included. For existing installations, where an element of the CVR system was modified or the location of an element of the CVR was changed, it is acceptable to check only the CVR channels impacted by this modification." It is not clear what level of change requires a flight test.	We recommend expanding this section to include guidance that explains under what general conditions a flight test is required, and under what general conditions a ground test or analysis is adequate. Alternatively, state that the means of compliance (test, analysis, etc.) will be determined during the certification process.	Yes		Not accepted	The general recommendation in the Certification Memorandum is to perform a flight in order to check quality of recording of CVR during all normal flight phases (including taxiing, take-off, cruise, approach and landing; also hover and autorotation for helicopters). The applicability covers new CVR system installations or modifications. Also applies to cockpit modification that may impact on the location of any element of CVR system. The Certification Memorandum only alleviates the replay analysis effort to those channels impacted by a modification, but still recommends the check during flight.

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6	*Boeing Commercial Airplanes*	Section 3.1 and Appendix, Note	7 (last paragraph) and 9	The proposed text implies that the “replay centre” be a separate entity that is approved by EASA. Airframe manufacturers (and other organizations) with proper download and playback equipment and skilled personnel are fully capable and qualified to do replay and evaluation of CVR recordings. The “replay centre” does not need to be a separate independent company, audio studio, or organization. This would unnecessarily add cost and schedule impacts. Evaluation can be performed by the same organization that is making changes to the airplane or system, such as Boeing, as long as they are qualified. Such evaluations typically happen during development and certification programs conducted by airframe manufacturers, and are agreed to by the authorities via a certification plan.	We request that a statement be added indicating that the replay centre need not be a separate company/organization/entity from the organization making the changes to the airplane or system. The evaluation method should be agreed to during the certification process.	No	Yes	Partially accepted	The Certification Memorandum does not state the “replay centre” has to be approved by EASA. The appendix of the Certification Memorandum only contains recommendations on the criteria for a selection of a proper replay centre. Those recommendations do not preclude the replay centre is in the same company/organization/entity performing the installation. It is noted the appendix of the Certification Memorandum points to accident investigation authorities as well known organisations having the capability to perform such task, but it is not said they are the only ones. In order to clarify that point, the following is included in the Appendix, note: “Nevertheless, it is not required the replay centre is a safety investigation authority. The replay centre need not be a separate organisation from the applicant.”
7	*Eurocopter*	3.1	7	CM AS-001 proposes ED-112 as a general guidance for compliance of CVR. In the past, CVR qualification was performed with demonstrating the audio recording to the authorities. For audio recording acceptance, unlike ED-56A, ED-112 only proposes the STI method, which is more suited to the equipment level than to the aircraft level.	A clear definition of acceptance requirements at aircraft (helicopter) level is needed.		Yes	Not accepted	The Certification Memorandum proposes ED-112 as it is the current MOPS for Crash Protected Airborne Recorder Systems. Please note ED-112 supersedes ED-56A. The Speech Transmission Index is a kind of quality index, but it is not the only check recommended by ED-112 to validate the CVR audio quality: see for instance the electrical test procedures in I-5.2 (STI appears in I-5.2.4). The STI is referred to in I-3.2.4 and I-5.2.4, but not in I-6 (Installed performance), so ED-112 does not recommend the STI to be conducted on the installed CVR.
8	*Eurocopter*	3.1	7	Regarding ED112 section I-6.1.1 d. Usually the flight crew intercom system is used as input for the CVR recording (setting by the flight crew). In such condition, and if the radio audio level is higher than the microphone level, the requirement in ED112 section I-6.1.1 d will not be fulfilled. Notice that, nevertheless, the recording will reflect the actual situation as perceived by the flight crew through the earphones.	Fulfilment of the requirement that the microphone signal exceeds the level of its corresponding sidetone signal should not be a systematic objective.		Yes	Not accepted	The Certification Memorandum proposes ED-112 as it is the current MOPS for Crash Protected Airborne Recorder Systems. The Certification Memorandum recommends the observation of ED-112 with regard to equipment installation and installed performances. ED112 section I-6.1.1 d provides a means of verification for the interface design between hot mic, interphone and radio reception.
9	*Eurocopter*	3.1	7	Regarding ED112 section I-6.1.1 f. Regarding the general ambient noise conditions of a helicopter, attenuation of the “hot mic” may be required, in order to avoid the saturation level.	Fulfilment of the requirement that the “hot mic” microphone signal shall not be attenuated should not be a systematic objective.		Yes	Not accepted	ED 112 section I-6 specifies general installations characteristics and performance when CVR system is installed on aircraft. This Certification Memorandum does not consider deviations to ED 112 criteria. In order to ED 112 considers specific criteria for helicopters, it is suggested addressing such a comment in the scope of WG-90 which is tasked to review ED-112.
10	*Eurocopter*	3.1	7	Regarding ED112 section I-6.3.5 h. The principle of opening the cockpit-cabin door during a cruise test may not be feasible.	Fulfilment of the requirement to open the cockpit-cabin door during a cruise test should not be a systematic objective.		Yes	Not accepted	ED 112 section I-6.3 provides **guidance** for flight testing both aeroplanes and helicopters. It is noted it may need to be adapted to suit the particular installations and aircraft. I-6.3.5 h, “Announce and open the cockpit-cabin door. Announce and close the door after approximately 10 seconds.” Might not be feasible in certain aircrafts, then, there is no need to perform such item of the flight testing.

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11	*Eurocopter*	2 3.1	6 7	Regarding the Cockpit Area Microphone (CAM) recording. In helicopters the environment noise is very loud, main sources being rotor noise and engines noise. Even with filtering methods the voices and alerting signals (normally only at earphones) are not likely to be intelligible.	Clear helicopter specific acceptance criteria for CAM recording shall be defined.		Yes	Not accepted	ED 112 section I-6 specifies general installations characteristics and performance when CVR system is installed on aircraft. This Certification Memorandum does not consider deviations to ED 112 criteria. In order to ED 112 considers specific criteria for helicopters, it is suggested addressing such a comment in the scope of WG-90 which is tasked to review ED-112.
12	*Embraer*			Embraer agrees with the purpose of this Certification Memorandum in order to provide a guidance to show compliance with the requirements related to Cockpit Voice Recorder (CVR). However, Embraer believes that the majority recommendations of this Certification Memorandum related to the replay center is not relevant for certification (privacy/ isolation, access), but more for in-service use of CVR-Recorded data, e.g. accident/ incident investigation.				Noted	
13	*UK CAA*			Please be advised that UK CAA has no comments on the above referenced EASA document.				Noted	
14	*UK CAA*	1.2 (table)	4	This table refers to ED-56 but I believe the reference should be ED-56A Justification: The document that was issued on the quoted publication date was ED-56A	Proposed Text (if applicable): Amend the reference to ED-56 to read ED-56A			Accepted	Text has been amended