

## **Special Condition Automatic Speech Recognition (ASR)**

### **Introductory note:**

The following Special Condition has been classified as an important Special Condition and as such has been subject to public consultation, in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) of which states:

*"2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency."*

The public consultation has not resulted in a change to the Special Condition as it has been proposed initially. The Comment Response Document (CRD) is published accordingly.

### **Statement of Issue**

Automatic Speech Recognition (ASR) in aircraft is a new technology. CS 27 addresses "cockpit controls" (e.g. in CS 27.777) with an implication that those controls are hardware controls with a concrete and tangible interface. The control of the aircraft or of its equipment by means of the voice is not envisaged in the Certification Specifications. This renders a number of requirements inapplicable, for example when addressing controls location, motion, visibility, or marking.

It is therefore necessary to provide appropriate requirements regarding the acceptability of the ASR function, and to complement the general CS-27 requirements.

### **Discussion**

The ASR should be designed and installed in a way that ensures a proper functioning and that prevents the hazards to the rotorcraft.

For this purpose the Special Condition presented hereafter applies.

#### **1/ Applicability**

This Special Condition is only applicable to systems which feature ASR controls that duplicate actions achievable through existing hardware (including touchscreens) controls.

This material does not cover Text-to-Speech (TTS) functionalities.

#### **2/ System Characteristics**

##### **2.1/ ASR activation**

The ASR shall be activated only while selected by the crew upon use of a dedicated hardware control (such as a Push-to-Command (PTC) button).

Means to prevent or mitigate an erroneous continuous ASR activation shall be provided.

PTC controls shall be designed to mitigate the risks of selection error with respect to the Push to talk (PTT) controls.

##### **2.2/ ASR Audio Inputs**

The ASR shall only be able to receive commands from flight deck crew microphones. In case of multi-pilot aircraft, the system shall only take commands from the microphone on the same side where the PTC was activated.

### 2.3/ ASR feedback to the crew

A clear and unambiguous confirmation cue shall be provided to the crew after each spoken command interpretation and execution of the corresponding action. The confirmation cue shall allow the crew to readily confirm that the correct (i.e. the intended) command was performed.

The confirmation cue should be effective under all operational circumstances while minimizing disruption and/or distraction to the crew.

If the ASR is active, a distinct cue shall be provided if it could not interpret a spoken command.

Audio cues shall not mask or delay any audio warning or caution signals, or create potential confusion. A priority scheme of ASR audio cues signals shall be provided.

ASR audio cues shall not be used to provide alerting functions.

### 2.4/ Commands

Spoken commands accepted by the ASR functions shall be consistent with the corresponding aircraft instruments and controls markings and be in the same language.

### 2.5/ Commands latency and queuing

The latency is the time between the release of the PTC control and the actual start of execution of the command or indication that the command was not recognized. The ASR latency shall be acceptable.

If an ASR command is spoken while the target system is busy or unable to process it, the command shall be dismissed and not be queued for later execution. The system shall provide a feedback that the command execution was unsuccessful.

### 3/ ASR Performance

The ASR shall comply with the provisions of CS 27.1301 and 1309. In particular, the system shall be able to consistently and accurately recognize a sufficiently wide variety of speech characteristics under all expected flight and ambient noise conditions.

### 4/ Cockpit Voice Recorder

If the aircraft is equipped with a Cockpit Voice Recorder (CVR), the CVR shall record spoken commands and ASR audio feedback.

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