

Deviation Request ETSO-C139a#2 for an ETSO approval for CS-ETSO applicable to Audio Systems and Equipment (ETSO-C139a)

Consultation Paper

1 Introductory Note

The hereby presented deviation request shall be subject to public consultation, in accordance with EASA Management Board Decision No 7-2004 as amended by EASA Management Board [Decision No 12-2007](#) products certification procedure dated 11th 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.”

2 ETSO-C139a#2 Audio Systems and Equipment

2.1 Summary of Deviation

Deviates from RTCA DO-214A section 2.8.2.9 a. by using a 3 nF capacitor instead of 0.01 pF, inserted between channel input and output for stability tests.

2.2 Original Requirement

RTCA DO-214A section 2.8.2.9 Stability and Short Circuit

With a 300 Hz tone applied to the input of the channel to be tested, adjust the input level to obtain 3 dB below manufacturer's rated output power. The channel shall remain stable and without parasitic oscillations and shall not fail under the following conditions:

- a. Load the channel with $Z = R$ (R = Manufacturer's recommended load impedance). For interphone channels only, add a 0.01 pF capacitor from the channel input to the output. Cycle power off the amplifier circuits for one second; re-apply the power. Remove any capacitor attached previously.
- b. ...

2.3 Industry

A capacity of 0.01 pF between input and output of an audio system is not realistic. For systems, where installation wiring is not in an appropriate quality, capacitive coupling between microphone input and headphone could be some 100 pF. It can be assumed, that low value inside DO-214A is based on a typo.

In predecessor document (DO-214), a capacity of 0.01 μ F was stated. Such high value is also not realistic. This leads to a closed-loop with a positive feedback, which in turn allows only small amplification factors to stay in a stable condition. High amplification inside an audio system with a high capacitive feedback can produce unwanted oscillations. However, a capacity of higher than 1 nF inside wiring of audio system installations in an aircraft is less probable.

2.4 Equivalent Level of Safety

An equivalent level of safety is established by stating in the installation manual that the capacity of the aircraft installation including headset has to be less than 3 nF, as the likelihood of a larger capacity is very low and problems will be detected during the initial stages of the usage of an improper headset or aircraft installation. In addition, a ground test will be required after any change to the connected components.

2.5 EASA position

The 0.01 pF is indeed a typo. RTCA scanned a paper version of DO-214, where the 10 nF was written as 0.01 μ F, which got turned into 0.01 pF by the optical character recognition software. This error was not detected in the proofreading of the version of DO-214, which was used for tracing the changes for DO-214A. Nor was the error detected during the consultation process of DO-214A, as this change by 6 orders of magnitude of a value was not marked as a change.

We accept the deviation, as the ground test will detect any problems with the lower maximal capacity of the installation and connected components.