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Approved by: Yang Zhenmei

China Civil Aviation Technical Standard Order

This China Civil Aviation Technical Standard Order (CTSO) is issued according to Part 37 of the China Civil Aviation Regulations (CCAR-37). Each CTSO is a criterion which the concerned aeronautical materials, parts or appliances used on civil aircraft must comply with when it is presented for airworthiness certification.

Flight Data Recorder Equipment

1. Purpose.

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers of flight data recorder (FDR) equipments applying for a CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards (MPS) that FDR must first meet for approval and identification with the applicable CTSO marking.

2. Applicability.

This CTSO affects new application submitted after its effective date.

a. The applicant must submit an application according to this CTSO after its effective date. However, up to six months after this CTSO's effective date, if the applicant could show working against the prior MPS before the new change became effective, the application for previous revision could be accepted.

b. The CTSOA article approved under a previous CTSO may still be

manufactured under the provisions of original approval after the effective date of this CTSO.

c. Major design changes to article approved under this CTSO will require a new authorization in accordance with section 21.310 of CCAR-21R3.

3. Requirements.

New models of FDR equipment identified and manufactured on or after the effective date of this CTSO must meet the MPS and documentation requirements in European Organization for Civil Aviation Electronics (EUROCAE) document ED-112A, Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems, dated September 2013. Table 1 lists FDR types and the ED-112A section and part containing MPS for each:

Table 1

FDR Type	ED-112A Reference
Single FDR	Section 2 and Part II
FDR function in a deployable recorder	Section 2, Section 3 and Part II
FDR function in a combined recorder	Section 2, Section 4 and Part II

a. Exceptions to ED-112A.

The following Table 1 chapters and sections are not applicable: Chapters II-1 and II-6, and Sections 2-1.1, 2-1.5, 2-1.6, 2-1.7, 2-1.11, 2-1.12, 2-3.1, 2-5, 3-1.1, 3-1.2, 3-1.3, 3-1.4, 3-1.5, 3-1.7, Annex II-A and Annex II-B.

b. Functionality.

This CTSO's standards apply to equipment intended to collect and record parameters that reflect the state and performance of an aircraft for the purposes of accident or incident investigations or flight analysis.

c. Failure Condition Classifications.

(1) Failure of the function defined in paragraph 3.b is a minor failure condition.

(2) Loss of the function defined in paragraph 3.b is a minor failure condition.

(3) Design the system to at least these failure condition classifications.

d. Functional Qualification.

Demonstrate the required functional performance under the test conditions specified in the applicable sections of ED-112A.

e. Environmental Qualification.

Demonstrate the required performance under the test conditions specified in ED-112A using standard environmental conditions and test procedures appropriate for airborne equipment. ED-112A requires the use of ED-14G or RTCA/DO-160G; however, applicant may use a different standard environmental condition and test procedure than RTCA/DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment, dated December 8, 2010, provided the standard is appropriate for the FDR.

NOTE: The use of RTCA/DO-160D (with Changes 1 and 2 only, incorporated) or earlier versions is generally not considered appropriate and will require substantiation via the deviation process as discussed in paragraph 3.g of this CTSO.

f. Software Qualification.

If the article includes software, develop the software according to RTCA, Inc. document RTCA/DO-178B, Software Considerations in Airborne Systems and Equipment Certification, dated December 1, 1992 to at least the software level consistent with the failure condition classification defined in paragraph 3.c of this CTSO.

Note: The certification liaison process objectives will be considered satisfied after the authorities review of the applicable life cycle data.

g. Deviation.

For using alternative or equivalent means of compliance to the criteria in the MPS of this CTSO, the applicant must show that the equipment maintains an equivalent level of safety. The applicant must apply for a deviation in accordance with section 21.310(b) of CCAR-21R3.

4. Marking.

a. Mark at least one major component permanently and legibly with all the information in section 21.312(d) of CCAR-21R3. The marking must include the serial number.

b. Also, mark the following permanently and legibly, with at least the manufacturer's name, subassembly part number, and the CTSO number:

(1) Each component that is easily removable (without hand tools),

(2) Each subassembly of the article that manufacturer determined may be interchangeable.

c. If the article includes software and/or airborne electronic hardware, then the article part numbering scheme must identify the software and airborne electronic hardware configuration. The part numbering scheme can use separate, unique part numbers for hardware, software, and airborne electronic hardware.

d. Electronic part marking may be used to identify software or airborne electronic hardware components by embedding the identification within the hardware component itself (using software) rather than marking it on the equipment nameplate. If electronic marking is used, it must be readily accessible without the use of special tools or equipment.

5. Application Data Requirements.

The applicant must furnish the responsible certification personnel with technical data to support design and production approval. The data include a statement of conformance as specified in section 21.310(c)(3) of CCAR-21R3 and one copy each of the following:

a. A Manual(s) containing the following:

(1) Operating instructions and equipment limitations sufficient to describe the equipment's operational capability.

(2) Describe in detail any deviations.

(3) Installation procedures and limitations sufficient to ensure that the FDR, when installed according to the installation or operational procedures, still meets this CTSO's requirements. Limitations must identify any unique aspects of the installation. The limitations must include a note with the following statements:

“This article meets the minimum performance and quality control standards required by a CTSO. Installation of this article requires separate approval.”

(4) For each unique configuration of software and airborne electronic hardware, reference the following:

(i) Software part number including revision and design assurance level;

(ii) Airborne electronic hardware part number including revision and design assurance level;

(iii) Functional description.

(5) A summary of the test conditions used for environmental qualifications for each component of the article. For example, a form as described in RTCA/DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment, Appendix A.

(6) Schematic drawings, wiring diagrams, and any other documentation necessary for installation of the FDR equipment.

(7) List of replaceable components, by part number, that makes up the FDR equipment. Include vendor part number cross-references, when applicable.

b. Instructions covering periodic maintenance, calibration, and repair, for the continued airworthiness of the FDR equipment. Include recommended inspection intervals and service life, as appropriate.

c. If the article includes software: a plan for software aspects of certification (PSAC), software configuration index, and software accomplishment summary.

d. A drawing depicting how the article will be marked with the information required by paragraph 4 of this CTSO.

e. Identify functionality or performance contained in the article not evaluated under paragraph 3 of this CTSO (that is, non-CTSO functions). Non-CTSO functions are accepted in parallel with the CTSO authorization. For those non-CTSO functions to be accepted, the applicant must declare these functions and include the following information with CTSO application:

(1) Description of the non-CTSO function(s), such as performance specifications, failure condition classifications, software, hardware, and environmental qualification levels. Include a statement confirming that

the non-CTSO function(s) don't interfere with the article's compliance with the requirements of paragraph 3.

(2) Installation procedures and limitations sufficient to ensure that the non-CTSO function(s) meets the declared function and performance specifications described in paragraph 5.e.(1).

(3) Instructions for continued performance applicable to the non-CTSO function(s) described in paragraph 5.e.(1).

(4) Interface requirements and applicable installation test procedures to ensure compliance with the performance data defined in paragraph 5.e.(1).

(5) Test plans, analysis and results, as appropriate, to verify that performance of the hosting CTSO article is not affected by the non-CTSO function(s).

(6) Test plans, analysis and results, as appropriate, to verify the function and performance of the non-CTSO function(s) as described in paragraph 5.e.(1).

f. The quality system description required by section 21.143 and 21.310(c)(2) of CCAR-21R3, including functional test specifications. The quality system should ensure that it will detect any change to the approved design that could adversely affect compliance with the CTSO MPS, and reject the article accordingly.

g. Material and process specifications list.

h. List of all drawings and processes (including revision level) that define the article's design.

i. Manufacturer's CTSO qualification report showing results of testing accomplished according to paragraph 3.d of this CTSO.

6. Manufacturer Data Requirements.

Besides the data given directly to the authorities, have the following technical data available for review by the authorities:

a. Functional qualification specifications for qualifying each production article to ensure compliance with this CTSO.

b. Equipment calibration procedures.

c. Schematic drawings.

d. Wiring diagrams.

e. Material and process specifications.

f. The results of the environmental qualification tests conducted according to paragraph 3.e of this CTSO.

g. If the article includes software, the appropriate documentation defined in RTCA/DO-178B including all data supporting the applicable objectives in RTCA/DO-178B Annex A, Process Objectives and Outputs by Software Level.

h. If the article contains non-CTSO function(s), the applicant must also make available items 6.a through 6.g as they pertain to each non-CTSO function.

7. Furnished Data Requirements.

a. If furnishing one or more articles manufactured under this CTSO to one entity (such as an operator or repair station), provide one copy or on-line access to the data in paragraphs 5.a and 5.b of this CTSO. Add any other data needed for the proper installation, certification, use, or for continued compliance with the CTSO, of the FDR equipment.

b. If the article contains declared non-CTSO function(s), include one copy of the data in paragraphs 5.e.(1) through 5.e.(4).

8. Availability of Referenced Documents.

a. Order RTCA documents from:

Radio Technical Commission for Aeronautics, Inc.

1150 18th Street NW, Suite 910, Washington D.C. 20036

You may also order them online from www.rtca.org.

b. Order EUROCAE documents from:

European Organisation for Civil Aviation Equipment

102 rue Etienne Dolet, 92240 Malakoff, France

You may also order them online from www.eurocae.net.