English Translation Version for Reference Only

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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.

Ground Based Augmentation System Very High Frequency Data Broadcast Equipment

1. Purpose.

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers applying for Ground Based Augmentation System (GBAS) Very High Frequency Data Broadcast (VDB) Equipment CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards that Ground Based Augmentation System Very High Frequency Data Broadcast Equipment must first meet for approval and identification with the applicable CTSO marking.

2. Applicability.

This CTSO affects new application submitted after its effective date. Major design changes to article approved under this CTSOA will require a new authorization in accordance with section 21.353 of CCAR-21-R4.

3. Requirements

New models of VDB equipment identified and manufactured on or after the effective date of this CTSO must meet the MPS for the VDB receiver equipment in RTCA/DO-253C, Minimum Operational Performance Standards for GPS Local Area Augmentation System Airborne Equipment, dated December 16, 2008, section 2.

NOTE: All RTCA/DO-253C references to RTCA/DO 246() apply to RTCA/DO-246B, GNSS-Based Precision Approach Local Area Augmentation System (LAAS) Signal-In-Space Interface Control Document (ICD), dated November 28, 2001. Modifications to these references are noted in appendix 2 of CTSO-C161a.

a. Functionality. This CTSO's standards apply to equipment intended to receive the GBAS VDB and output the VDB messages to GBAS Positioning and Navigation equipment. The VDB receiver functions are defined in section 2.2 of RTCA/DO-253C.

b. Failure Condition Classifications. Failure of the function defined in paragraph 3.a of this CTSO is a "Minor" failure condition. Loss of the function as defined in paragraph 3a of this CTSO is a "Minor" failure condition. Develop the system to, at least, the design assurance level equal to these failure condition classifications.

c. Functional Qualification. Demonstrate the required functional performance under the test conditions specified in RTCA/DO-253C,

section 2.5.

d. Environmental Qualification. Demonstrate the required performance under the test conditions specified in RTCA/DO-253C, section 2.4 using standard environmental conditions and test procedures appropriate for airborne equipment.

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.

e. Software Qualification. If the article includes software, develop the software according to document RTCA/DO-178B, Software Considerations in Airborne Systems and Equipment Certification, dated December 1, 1992. The software design assurance level should be consistent with the failure condition classification defined in paragraph 3b of this CTSO. All software included in the article definition must be developed in accordance with RTCA/DO-178B.

f. Deviations. We have provisions for using alternate or equivalent means of compliance to the criteria in this CTSO. If you invoke these provisions, you must show that your equipment maintains an equivalent level of safety. Apply for a deviation under section 21.368(a) of CCAR-21-R4.

4. Marking.

a. Mark at least one major component permanently and legibly with all the information in 21.423(b) of CCAR-21-R4. 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), and,

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

c. If the article includes a deviation per paragraph 3f of this CTSO, the marking must include a means to indicate a deviation was granted.

d. If the component includes a software and/or airborne electronic hardware, then the part number must include hardware and software identification. Or, you can use a separate part number for hardware and software. Either way, you must include a means to show the modification status.

NOTE: Similar software versions, developed and tested to different software levels, must be differentiated by part number.

5. Application Data Requirements.

The applicant must furnish the responsible certification personnel with the related data to support design and production approval. The application data include a statement of conformance as specified in section 21.353(a)(1) in CCAR-21R4 and one copy each of the following technical data:

a. Operating instructions and equipment limitations in an installation manual, sufficient to describe the equipment's operational capability. Describe in detail any deviations. If needed, identify equipment by part number, version, revision, and criticality level of software/hardware, classification for use, and environmental categories.

b. Installation procedures and limitations, sufficient to ensure that the equipment, when installed according to the installation 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 statement:

"This article meets the minimum performance and quality control standards required by a technical standard order. If you are installing this article on or in a specific type or class of aircraft, you must obtain separate approval for installation."

c. Schematic drawings of the installation procedures.

d. Wiring diagrams of the installation procedures.

e. List of components, by part number, that makes up the VDB equipment specified in this CTSO standard. Include vendor part number cross-references, when applicable.

f. A component maintenance manual (CMM) or IM, as appropriate, covering periodic maintenance, calibration, and repair, for the continued airworthiness of VDB equipment. Include recommended inspection intervals and service life, as appropriate.

g. Material and process specifications list.

h. The quality system description required by section 21.358 of CCAR-21-R4, 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, and reject the article accordingly.

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

j. Nameplate drawing with the information required by paragraph 4 of this CTSO.

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

l. 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-160F, Environmental Conditions and Test

Procedures for Airborne Equipment, appendix A.

m. If the article includes software: a plan for software aspects of certification (PSAC), software configuration index, and software accomplishment summary. We recommend that you submit the PSAC early in the software development process. Early submittal allows us to quickly resolve issues, such as partitioning and determining software levels.

n. 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 and software, hardware, and environmental qualification levels. Add a statement confirming that the non-CTSO functions do not 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 functions and performance specification(s) described in paragraph 5.n.(1).

(3) Instructions for continued performance applicable to the

non-CTSO function(s) defined in paragraph 5.n.(1).

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

(5) Results of test/analysis, as appropriate, to verify that performance of the hosting CTSO article is not affected by the non-CTSO function(s).

(6) Results of test/analysis, as appropriate, to verify intended function of the declared non-CTSO function(s) as described in paragraph 5.n.(1).

6. Manufacturer Data Requirements.

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

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

b. Equipment calibration procedures.

c. Corrective maintenance procedures (Submitted within 12 months after the issuance of CTSOA).

d. Schematic drawings.

e. Wiring diagrams.

f. Material and process specifications.

g. The results of the environmental qualification tests conducted according to paragraph 3.d of this CTSO.

h. 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.

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

k. If any external equipment was used to validate the article's compliance with the requirements in this CTSO (such as simulators, stimulators or other similar devices), the appropriate documentation showing its accreditation and suitability for the intended purpose.

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 of the data in paragraphs 5.a through 5.f and 5.l of this CTSO. Add any other data needed for the proper installation, certification, use, or for continued compliance.

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

8. Availability of Referenced Documents.

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 the RTCA Internet website at:

www.rtca.org.