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Approved by: Xu Chaoqun

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.

Minimum Operational Performance Standards for Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) Avionics

1. Purpose.

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers applying for geosynchronous orbit Aeronautical Mobile Satellite Services (AMSS) Aircraft Earth Station (AES) equipment CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards (MPS) that Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) Avionics 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 CTSO will require a

new authorization in accordance with section 21.353 of CCAR-21-R4.

3. Requirements

New models of AMSS AES equipment identified and manufactured on or after the effective date of this CTSO must meet the MPS qualification and documentation requirements in RTCA/DO-210D, *Minimum Operational Performance Standards (MOPS) for Geosynchronous Orbit Aeronautical Mobile Satellite Services Aircraft Earth Station Equipment*, dated April 19, 2000, section 2.0; to include Change 1, dated December 14, 2000; Change 2, dated November 28, 2001; Change 3, dated September 19, 2006; and Change 4, dated March 24, 2015.

a. Functionality.

This CTSO's standards apply to AMSS AES equipment that provides direct worldwide communications between aircraft subnetworks and ground subnetworks using aeronautical mobile satellites in geosynchronous orbit and their ground earth stations. AMSS will support both data and voice communications between aircraft users and ground-based users, such as Air Route Traffic Control Centers (ARTCC) and aircraft operators. Communication services with AMSS functions include four categories: Air Traffic Services (ATS), Aircraft Operational Control (AOC), Aeronautical Administrative Communications (AAC),

and Aeronautical Passenger Communications (APC).

b. Failure Condition Classifications.

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

(2) Loss of the function defined in paragraph 3.a of this CTSO is a *minor* failure condition. Satellite communication is a supplemental service operation, with high frequency (HF) radio required for primary communication. The loss of satellite communication is mitigated by availability of HF communications.

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

(4) AMSS equipment is intended for procedural airspace area operations. CAAC determined the failure condition specified in paragraph **3.b** of this CTSO based on AMSS equipment operating as an approved Long-Range Communication System (LRCS) in oceanic airspace area environments. Use of AMSS equipment in other operating environments (for example, high-density terminal/en-route domestic airspace) may impact equipment performance and safety considerations.

c. Functional Qualification.

Demonstrate the required functional performance under the test conditions specified in RTCA/DO-210D, section 2.4, to include Changes 1 through 4.

d. Environmental Qualification.

Demonstrate the required performance under the test conditions specified in RTCA/DO-210D, section 2.3, to include Changes 1 through 4, using standard environmental conditions and test procedures appropriate for airborne equipment. The applicant may use a different standard environmental condition and test procedure than RTCA/DO-160G, *Environmental Conditions and Test Procedures for Airborne Equipment*, provided the standard is appropriate for the AMSS AES 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.f of this CTSO.

e. Software Qualification.

If the article includes software, develop the software according to 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.b of this CTSO.

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

f. Deviations.

CAAC has provisions for using alternate or equivalent means of

compliance to the criteria in the MPS of this CTSO. If the applicant invoke these provisions, the applicant must show that the equipment maintains an equivalent level of safety. Apply for a deviation under the provisions of section 21.368 (a) CCAR-21-R4.

4. Marking.

a. Mark at least one major component permanently and legibly with all the information in section 21.423 (b) CCAR-21-R4. The mark must contain the serial numbers of the equipment.

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 you determined may be interchangeable.

c. If the equipment contains the deviation in paragraph 3.f this CTSO, the mark should indicate the approval of this deviation.

d. 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 software,

hardware, and airborne electronic hardware.

Note: Similar versions of software approved by different levels must be distinguished by the serial number.

e. The applicant may use electronic part marking 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 give the certification officer who responsible for your facility a statement of conformance, as specified in section 21.353 (a) 1 of CCAR-21-R4 and one copy each of the following technical data to support your design and production approval.

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 AMSS AES equipment, 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 statement:

“This article meets the minimum performance and quality control standards required by a China technical standard order (CTSO). Installation of this article requires separate approval.”

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

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

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

(c) 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, Appendix A.

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

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

b. Instructions of continuous airworthiness, covering periodic maintenance, calibration, and repair, to ensure that the equipment

continues to meet the CTSO approved design. 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. If the article includes a simple or complex electronic hardware: a plan for hardware aspects of certification (PHAC), hardware verification plan, top-level drawing, and hardware accomplishment summary.(or the similar instruction, as appropriate)

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

f. 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) 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.f.(1)**.

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

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

g. The quality system description required by section 21.358 CCRA-21-R4, including functional test specifications. The quality system should ensure that you will detect any change to the approved design that could adversely affect compliance with the CTSO MPS, and reject the article accordingly.

h. Material and process specifications list.

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

j. Manufacturer's CTSO qualification report showing results of testing accomplished according to paragraph **3.c** of this CTSO.

6. Manufacturer Data Requirements.

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

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.d** 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 Annex A, *Process Objectives and Outputs by Software Level*.

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

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 airworthiness with the CTSO, of the AMSS AES equipment.

b. If the article contains functions out of paragraphs 3 and 3.a, include non-CTSO function(s) data in paragraphs **5.f.(1)** through **5.f.(4)**.

8. Availability of Referenced Documents.

Order RTCA documents from:

Radio Technical Commission for Aeronautics, Inc.

1828 L Street NW, Suite 805, Washington D.C. 20036, USA

You may also order them online from the RTCA Internet website at:

www.rtca.org.