English Translation Version for Reference Only

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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.

Circuit Card Assembly Functional Sensors using Aircraft-Based Augmentation for Navigation and Non-Navigation Position/Velocity/Time Output

1. Purpose.

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers applying for Circuit Card Assembly Functional Sensors using Aircraft-Based Augmentation for Navigation and Non-Navigation position/velocity/time Output CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards(MPS) that Circuit Card Assembly Functional Sensors using Aircraft-Based Augmentation for Navigation and Non-Navigation position/velocity/time Output 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-21R4.

3. Requirements

New models of CTSO-C206 GPS CCA functional sensors identified and manufactured on or after the effective date of this CTSO must meet the MPS qualification and documentation requirements in RTCA, Inc. Document No. RTCA/DO-316, “Minimum Operational Performance Standards for Global Positioning System/Aircraft Based Augmentation System Airborne Equipment,” dated April 14, 2009, Section 2.1.

a. Functionality.

(1) This CTSO’s standards apply to equipment intended to provide PVT information for a navigation management unit application that outputs deviation commands keyed to a desired flight path, or a non-navigation application (such as automatic dependent surveillance-broadcast (ADS-B)). In navigation applications, pilots or autopilots will use the deviations output by the navigation management unit to guide the aircraft. In non-navigation applications, the PVT outputs will provide the necessary capability for the end-use equipment.

(2) CTSO-C206 equipment has a limitation requiring the end-use manufacturer to receive a CTSO-C196b CTSOA. To receive a CTSO-C196b CTSOA, the end-use equipment manufacturer is required to repeat selected performance tests in the end-use equipment and

perform the environmental qualification tests in RTCA/DO-316. These limitations must be documented in the installation/instruction manual (see paragraph 5.a).

c. Functional Qualification. Demonstrate the required functional performance under the test conditions specified in RTCA/DO-316, Section 2.2.

d. Environmental Qualification. None. The GPS CCA functional sensor has a limitation requiring environmental qualification by the end-use equipment manufacturer at the end-use equipment level.

e. 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.Develop the software to the design assurance 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 review of the applicable life cycle data.

f. Electronic Hardware Qualification. If the article includes complex custom airborne electronic hardware, develop the component according to RTCA/DO-254, Design Assurance Guidance for Airborne Electronic Hardware to design assurance level consistent with the failure condition classification defined in paragraph 3.b of this CTSO. For custom airborne

electronic hardware determined to be simple, RTCA/DO-254, paragraph 1.6 applies.

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

g. Deviations. For using alternative or equivalent means of compliance to the criteria in this CTSO, the applicant must show that the equipment maintains an equivalent level of safety. Apply for a deviation under the provision of 21.368(a) in CCAR-21-R4.

h. Barometric-aided Fault Detection and Exclusion (FDE). If the equipment uses barometric-aiding to enhance FDE availability, then the equipment must meet the requirements in RTCA/DO-316, appendix G..

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 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.

d. 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 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-21-R4 and one copy each of the following technical data:

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 GPS CCA functional sensor, when installed according to the installation or operational procedures, still meet this CTSO's requirements. Limitations must identify any required equipment, input, any unique aspects of the installation. The following specific limitations must be documented in the installation instructions:

(a) "Equipment manufacturers using the <insert equipment model> GPS CCA functional sensor for navigation or non-navigation end-use applications are required to receive a CTSO-C196<latest revision> CTSOA. The end-use equipment manufacturer is required to perform the testing described in CTSO-C196<latest revision> appendix 1 with the GPS CCA functional sensor installed in the end-use equipment to receive a CTSO-C196<latest revision> authorization."

(b) "End-use equipment manufacturers are required to complete full environmental qualification at the end-use equipment level."

(c) "This article meets the minimum performance and quality control standards required by a China civil aviation technical standard order (CTSO). This article is only intended for installation in other avionics equipment."

Note: CTSO-C196 (all revisions) has an installed limitation for approved and operational alternate means of navigation appropriate to the

route.

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

(6) List of major components, such as an antenna, by part number, that make up the GPS CCA functional sensor complying with the standards prescribed under this CTSO. Include vendor part number cross-references, when applicable.

(a) If the equipment can satisfy the requirements of RTCA/DO-316 only when used with a particular antenna, make the use of that antenna (by part number) a requirement on the installation. Include this requirement in the installation manual (IM) as a limitation.

(b) If the equipment can satisfy the requirements of RTCA/DO-316 with a standard antenna, include maximum tolerable currents and voltages into the antenna port. See CTSO-C144a, Passive Airborne Global Navigation Satellite System (GNSS) Antenna, applicable only to

operational Class 1 equipment, or CTSO-C190, Active Airborne Global Navigation Satellite System (GNSS) Antenna.

b. Instructions covering periodic maintenance, calibration, and repair, for the continued airworthiness of airborne navigation sensors, using GPS. 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 simple or complex custom airborne electronic hardware: a plan for hardware aspects of certification (PHAC), hardware verification plan, top-level drawing, and hardware accomplishment summary (or similar document, as applicable).

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

f. Adequate specifics on the interface between the GPS CCA functional sensor and other systems to ensure proper functioning of the integrated system. This includes information on environmental characteristics necessary for reliable operation after integration such as maximum and minimum operating temperature of the GPS CCA. If the equipment depends on any inputs (like baro-aided FDE) to satisfy the requirements of RTCA/DO-316, make those inputs a requirement in the

installation. Include this requirement in the IM as a limitation.

g. If the equipment has not been demonstrated as compatible with satellite communications (SatCom) state in the limitations that the equipment should not be installed in SatCom equipped aircraft.

h. 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 functions and performance specification(s) described in paragraph 5.h.(1). This includes a limitation that the CCA non-CTSO function(s) shall be declared with the end-use equipment CTSO application.

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

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

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

i. 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 MPS, and reject the article accordingly.

j. Material and process specifications list.

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

l. 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 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. 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.

g. If the article includes complex custom airborne electronic hardware, the appropriate hardware life cycle data in combination with design assurance level, as defined in RTCA/DO-254, Appendix A, Table A-l. For simple custom airborne electronic hardware, the following data: test cases or procedures, test results, test coverage analysis, tool assessment and qualification data, and configuration management records, including problem reports.

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 technical data and information specified in paragraphs 5.a, 5.b, 5.f and 5.g of this CTSO. Add any data needed for the proper installation, certification, use, or for continued compliance with the CTSO, of the GPS

sensor.

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

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.