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.

Air-to-Air Radar (ATAR) for Traffic Surveillance

1. Purpose.

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers applying for Air-to-Air Radar (ATAR) for Traffic Surveillance equipment CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards(MPS) that Air-to-Air Radar (ATAR) for Traffic Surveillance 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 CTSO will require a new authorization in accordance with section 21.353 of CCAR-21-R4.

3. Requirements

New models of ATAR equipment identified and manufactured on or

after the effective date of this CTSO must meet the MPS qualification and documentation requirements in Section 2 of RTCA/DO-366, Minimum Operational Performance Standards for Air-to-Air Radar for Traffic Surveillance, dated May 31, 2017.

a. Functionality. This CTSO's standards apply to equipment intended to be used in aircraft (unmanned and manned) operating under Instrument Flight Rules (IFR) to detect and generate tracks for all airborne traffic within the radar detection volume. The on-board radar complements other on-board airborne surveillance sensors by providing detection of noncooperative traffic (aircraft without surveillance transponders or Automatic Dependent Surveillance-Broadcast [ADS-B] Out capability, or not operating such equipment due to malfunction or deliberate action). The ATAR equipment can support traffic avoidance systems such as Detect and Avoid (DAA) Systems.

b. Failure Condition Classifications.

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

(2) Failure of the function defined in paragraph 3.a resulting in an un-annunciated loss of traffic detection and tracking capability or erroneous data output is a major failure condition.

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

c. Functional Qualification. Demonstrate the required functional performance under the test conditions specified in RTCA/DO-366, Section 2.4.

d. Environmental Qualification. Demonstrate the required performance under the test conditions specified in RTCA/DO-366, Section 2.3 using standard environmental conditions and test procedures appropriate for airborne equipment. Applicant may use a different standard environmental condition and test procedure than those specified in RTCA/DO-366, section 2.3, which includes use of RTCA/DO-160G 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 RTCA/DO-178C, Software Considerations in Airborne Systems and Equipment Certification, dated December 13, 2011, including referenced supplements as applicable, to at least the software level consistent with the failure condition classification defined in paragraph 3.b of this CTSO. The applicant may also develop the software according to RTCA/DO-178B, dated December 1, 1992.

f. Electronic Hardware Qualification. If the article includes complex

custom airborne electronic hardware, develop the component according to RTCA/DO-254, dated April 19, 2000, Design Assurance Guidance for Airborne Electronic Hardware, to at least the 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.

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.

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. 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.

c. 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 ATAR equipment, when installed according to the installation or operational procedures, still meet 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 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;

(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, Environmental Conditions and Test Procedures for Airborne Equipment, Appendix A.

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

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

b. Instructions covering periodic maintenance, calibration, and repair, for the continued airworthiness of the ATAR 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. 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.

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) 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.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 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.

h. A description of your organization.

i. Material and process specifications list.

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

k. 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. 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 the version of RTCA/DO-178 specified by paragraph 3.e of this CTSO, including all data supporting the applicable objectives in Annex A, Process Objectives and Outputs by Software Level.

h. 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.

i. If the article contains non-CTSO function(s), the applicant must also make available items 6.a through 6.h 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 technical data and information specified in paragraphs 5.a and 5.b of this CTSO. Add any data needed for the proper installation, certification, use, or for continued compliance with the CTSO, of the ATAR equipment.

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

c. If the article contains software, provide one copy of the Open Problem Report (OPR) summary to type certification, supplemental type certification, or amended type certification design approval holders or applicants seeking installation approval of the CTSO.

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 www.rtca.org.