Number：CTSO-2C611
Date of approval：August 18, 2025
Approved by：Xu Feng

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.

Airborne Aeronautical Data Processes and Associated Databases

1. Purpose.

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers seeking airborne aeronautical data processes and associated databases CTSO authorization (CTSOA). This CTSO specifies the minimum performance standards that airborne aeronautical data processes and associated databases must meet for approval and identification with the applicable CTSO marking.

2. Applicability.

a. Aeronautical data of this CTSO designate to data used for aeronautical applications such as navigation, flight planning, terrain awareness, and other purposes (e.g., navigation data, terrain and obstacle data, and airport mapping data). Other applications may include new and novel aeronautical applications (e.g., dynamic electronic charts, etc.), for which the data quality requirements and intended functions may require

new policy development, or issue papers. Software programming pins (for selectable software option), configuration files, aircraft personal modules, registries, parameter data items, or lookup tables used by airborne systems and equipment to adapt equipment to the aircraft (i.e., airborne system databases) are not applicable.

b. This CTSO affects new applications submitted after its effective date. It describes the requirements for the applicant's data processing procedure, quality management, and data quality. However, any major change to data processing procedures, quality management systems, or data processing tools must be reported to the authority and may only be implemented after its approval.

c. Data updates under the authorized processing procedure and quality requirements of this CTSO have no needs to go through the change approval process.

d. Databases produced under the approval of this CTSO may be installed in their compatible equipment. When such compatible equipment obtains installation approval, the database may be installed along with the compatible equipment without separate approval from the authority.

3. Management Requirements.

a. CTSOA Categories

The airborne aeronautical data processes and associated databases CTSOAs authorized under this CTSO are classified into two types: Type 1 CTSOA and Type 2 CTSOA.

(i) Type 1 CTSOA

Type 1 CTSOA are based on data requirements agreed upon between a data supplier and their customer (typically an avionics manufacturer), a Type 1 CTSOA provides recognition of the aeronautical databases meeting the objectives of this CTSO with no identified compatibility with an aircraft system or equipment. A Type 1 CTSOA ensures the processes for producing the aeronautical data meets the objectives of this CTSO. This CTSOA applies to data suppliers, operators / end-users, avionics manufacturers, or others. A Type 1 CTSO A is not associated with a specific certification project (such as a TC, STC, or CTSOA) or equipment type. Data quality requirements(DQRs) can be defined by the data supplier and accepted by their customer, or can be agreed upon between them.

(ii)A Type 2 CTSOA

A Type 2 CTSOA provides recognition of the aeronautical databases meeting the objectives of this CTSO and the compatibility of the delivered data with particular avionic systems supporting an intended function. A Type 2 CTSOA recognizes compatibility with the DQRs

necessary to support an intended function by listing the associated equipment. An end-user can utilize a Type 2 CTSOA as evidence of database integrity during the operational approval process or for an approved maintenance program. A Type 2 CTSOA is only applicable for the equipment listed on the CTSOA, and the applicant is responsible for identifying all equipment utilizing the relevant databases.

A Type 2 CTSOA applies to a design approval holder (DAH) (TC/STC/CTSOA) or to a data supplier who can establish its data requirements are identical to those defined by a design approval holder(DAH). Achievement of this identicality can be done by either establishing design equivalency or by a licensing agreement between the DAH and the entity seeking approval. Regardless, identicality requires formal agreement between all participants (e.g., agreement to DQRs, licensing agreements, etc.). When under license or using design equivalence, the DAH remains responsible for demonstrating (e.g., using system verification tests, sampling checks, etc.) the DQRs are consistent with the intended function of the equipment.

Certain aircraft and avionics manufacturers have obtained approval for systems prior to the issuance of RTCA/DO-200B. For such systems, applicants must identify the DQRs for the avionics prior to application for a Type 2 CTSOA.

Many organizations seeking a Type 2 CTSOA as an application integrator may employ other organizations to do certain phases of their aeronautical data processing. A typical model for this arrangement would entail creating a packing tool for the other organizations to use to prepare and distribute data. However, regardless of whether the authority recognizes the other organizations as RTCA/DO-200B compliant for their processes, the processes used for the data processing must be the applicant’s own. Applicant must demonstrate his defined processes are effective and have the appropriate approval, control, and oversight mechanisms to ensure compliance when being performed outside of his organization. For organizations working for the applicant, the processes they use, as well as the records they maintain, must be under the applicant’s control and accessible.

b. Quality Management System (QMS)

Applicants seeking an airborne aeronautical data processes and associated databases CTSOA under this CTSO should comply with RTCA/DO-200B. RTCA/DO-200B provides requirements to develop, assess change, and support implementation of data quality management, it is intended to address the specific issues of the aeronautical data processes by requiring organizations to establish an acceptable aeronautical data processing QMS.

An applicant who establishes and maintains a QMS comply with RTCA/DO-200B is deemed to meet the quality system requirements for both applicants and holders of a CTSOA specified in CCAR-21.

4. Technical Requirements.

Applicants should demonstrate his compliance with RTCA/DO-200B. In addition, where applicable, compliance with the following objective requirements should also be demonstrated:

a. CTSOA post acceptance responsibilities

The requirements for maintaining an CTSOA privileges are as follows, which should be defined within the relevant procedures of the QMS:

(i) Error Reporting

CTSOA holder must report to customers (application provider, end-user, etc.), the CAAC and to source (if applicable) any failure, malfunction, or defect in the distributed data having potential to adversely affect the safety of operational use. The initial reporting of confirmed safety-related errors or defects must be timely and prompt (within 48 hours of detection/knowledge) to ensure swift resolution. CTSOA holder must endeavor, through documented procedure, to ensure receipt of data alerts reporting safety-related errors or defects. Any safety-related data alerts prior to use of the

affected data must be considered.

(ii) Maintain a QMS

The CTSOA holder must maintain a QMS as described in RTCA/DO-200B, section 2.5. All changes made to the QMS affecting the data quality objectives must be reported to the authority before their implementation.

(iii) Changes to data process

Minor design changes for an existing CTSOA must be submitted in accordance with procedures agreed to with the authority. CTSOA holder must substantiate major design changes, and the authority must accept them prior to their implementation. Procedures for reporting of changes to the data process must also address changes to tools used in its data process.

(iv) Auditing

CTSOA holder must perform periodic internal audits of both CTSO 2C612 and RTCA/DO-200B objectives as described in RTCA/DO-200B, section 3, with the maximum time between audits not to exceed one year. Audits may be total or conducted incrementally, as long as they audit all the objectives at least annually. Any major non-conformities as described in RTCA/DO-

200B, section 3.4, must be reported to the authority. Additionally, the authority may perform periodic audits in accordance with procedures agreed to by the CTSOA holder and the authority. Scheduling of periodic authority audits should use a risk-based approach to determine the appropriate intervals considering such factors as the type of CTSOA, maturity of the CAAC/data supplier relationship, and evidence the data supplier's internal audit program is performing adequately.

(v) The CTSOA holder must notify all users and the authority when no longer comply with the conditions of the CTSOA.

(vi) The CTSOA holder must provide a release statement with each database distribution to broadcast the identified CTSOA status, state its compliance, and provide information on known deviations and alterations. The release statement must include:

- CTSOA status (e.g., current, suspended, expired, etc.);
- Any deviations to the agreed DQRs (e.g., deletion of procedures due to source / processing errors (i.e., completeness change), etc.).
- Any data alteration (reference RTCA/DO-200B, section 2.4.2).

The release statement may be in the form of an enclosed document, an electronic posting with the download files, or on the web.

The CTSOA holder must surrender or withdraw the CTSOA if he no longer uphold its terms and conditions. The CTSOA is not transferable and is effective until surrendered or withdrawn by its holder, or terminated by the authority.

(vii) Notification of CTSOA Status Changes to Data customers

The CTSOA holder must notify his data customers of the status of the CTSOA, be aware of and provide any change in status of CTSOAs (or foreign acceptance, including designation of the foreign authority acknowledging the foreign source's compliance to RTCA/DO-200B and the means of approval or acceptance) for previous data chain participant(s) up to, but not including, a Contracting State's Aeronautical Information Publication (AIP). The method of notification must be timely to ensure customers can react to changes in the status of a CTSOA before they accept the next data update.

Note: An example of this notification requirement might consist of posting a copy of the CTSOA on a website for customers, with a procedure to reference the site before updating

data.

b. Requirements for Data suppliers

(i) Data Verification and Validation

Applicants may receive data from any data supplier in the aeronautical data chain. If a data supplier has complied with the requirements of RTCA/DO-200B, or previous version as evidenced by the authority, the responsibility to validate the incoming data meets the DQRs is discharged (reference RTCA/DO-200B, section 1.5 and 2.3.3 (3)). For data published in the AIP, provided via an official government source (as recognized by the authority), or an authoritative source (as recognized by the authority (reference RTCA/DO-200B, appendix A)), the responsibility to validate the incoming data meets the DQRs is discharged. The use of verification or validation techniques whenever possible to catch data errors is recommended.

Applicants must verify and validate data obtained from non-authoritative sources through an approved process prior to delivery.

The level of rigor representing the amount of verification and validation tasks performed during data processing to assure data

quality is known as data process assurance level, or DPAL. The DPAL is determined by the integrity requirement of the data through allocation of risk using a preliminary system safety assessment of the system architecture (reference RTCA/DO-200B, appendix C, section C.2, AC 23.1309-1, AC 25.1309-1, ARP 4754A, and ARP 4761). For data processes with a mixture of DPALs, then the higher DPAL is recommended across a mixed data set. Otherwise, the applicant must employ partitioning and protection to ensure the higher DPAL data set utilizes the higher rigor. Regardless, the DPAL should be consistent with the tightest requirements derived from malfunction or availability effects caused by the data (reference RTCA/DO-200B, appendix C, section C.2.3).

Acceptable techniques for the verification and validation of navigation and other aeronautical data are in RTCA/DO-200B, appendix C and RTCA/DO-201A, sections 2.1.7 and appendix B. Acceptable techniques for the verification and validation of airport mapping data are in RTCA/DO-272D, section 3.10. Acceptable techniques for the verification and validation of terrain and obstacle data are in RTCA/DO-276C, sections 6.1.4 and 6.1.5.

(ii) Data Security

The applicant's data processing procedures must define the means of confirming data he receives is not corrupted, his means to protect stored data from corruption, and what methods he provides the user to verify the data they receive from him is not corrupted.

To protect from the possibility of intentional corruption, the applicant must maintain records showing what data security provisions he implement to accomplish these objectives. His data security provisions must describe both the technical and organizational controls he implements to ensure receive data from known sources and to prevent intentional corruption during processing and exchange of data. Provisions for data security must describe how the applicant identify, assess, and mitigate security threats and prevent unauthorized access to data or tools.

The higher the DPAL the more rigorous controls and protocols are needed to implement. Additionally, to protect data developed with higher item development assurance levels (IDAL), security provisions need to address any mixing of data processed at lesser DPALs and any potential vulnerability affecting the more critical data.

(iii) Changes to DQRs and Identification of Non-Compliant Data

The applicant must identify the process for establishing new configuration baselines in the configuration management plan.

Changes to the DQRs must be coordinated between the data supplier and user receiving the data. The applicant should give sufficient advance notice of changes to allow subsequent participants in the data chain (avionics manufacturer, OEM, and potentially the operator / end-user) ample time to review the effect of the change.

If data elements not compliant with the three assurance levels identified in RTCA/DO-200B is delivered with RTCA/DO-200B compliant data, the agreed-upon DQRs should identify this data as assurance Level 4, indicating it may not satisfy safety objectives. Level 4 data must be distinguishable from any compliant data through means acceptable to the authority. The operator / end-user is ultimately responsible for ensuring Level 4 data meets the quality requirements for its intended application.

(iv) Tailored Data

Tailored data is aeronautical data originated by an operator/ end-user under their sole responsibility and for their exclusive use.

The accountability for this data, and its subsequent update, remains solely with the operator / end-user and thus verification, validation, and corruption detection requirements are applicable to the data originator and not the data supplier. Therefore, both Type 1 and Type 2 CTSOA data suppliers must ensure tailored data is not distributed to entities other than the operator/end-user requesting the data.

The Type 1 CTSOA holder must sufficiently identify tailored data to support the Type 2 CTSOA holder in meeting this distribution constraint.

(v) Tool Qualification

Performance of tool qualification utilizes RTCA/DO-330, Software Tool Qualification Considerations, with adaptations provided in RTCA/DO-200B, appendix D.

The applicant should provide all necessary tool qualification data as part of the CTSOA application and subsequent changes to the tool qualification data should follow the agreed to CTSOA change process. In addition, the applicant must submit the documentation (e.g., a Tool Accomplishment Summary (TAS)) demonstrating tool qualification activities were satisfactorily completed.

5. Deviations.

For using alternative or equivalent means of compliance to the criteria in the minimum performance standards of this CTSO, the applicant must show that the data processing procedures equipment maintains an equivalent level of safety. Apply for a deviation pursuant to Paragraph (1) of Section 21.368 in CCAR-21.

6. Marking.

For delivered aeronautical data, a release statement should be provided in accordance with Section 4.a.(vi) of this CTSO. This release statement is considered as marking compliance.

7. Application Data Requirements.

The Applicant must give the responsible certification personnel a statement of conformance, as specified in section 21.353(a)(1) in CCAR-21 and one copy each of the following technical data to support your design and production approval.Aeronautical Data Description Documentation containing the following:

a. Facility. The name and address of the facility.

b. CTSOA Type: A brief description of the CTSOA Type of CAAC acceptance sought: Type 1 CTSOA or Type 2 CTSOA.

Note: For a Type 2 CTSOA, the application must

identify the compatible systems part/model numbers (hardware, software, and database). Changes to the compatible system may change the DQRs. The applicant should coordinate those changes with the DAH early, to ensure updates to data products meet the new requirements at the same time the product is reviewed.

c. Datasets: A brief description of the type of datasets included in the scope of the application (e.g., navigation, terrain, obstacle, airport mapping, etc.).

d. Data Package: The application data package must include authorized versions of all of the plans and procedures for the processing of aeronautical data and quality management requirements. For a Type 2 CTSOA, substantiation of the DQRs must be included, demonstrating the aeronautical data will support the intended function of the installed equipment and are part of the airworthiness approval documentation. The complexity of the data package will vary depending upon the critical nature of the data as it relates to the product in which it will be loaded. The data package must include, but is not limited to, the following:

(i) Compliance Documentation

One copy of the compliance documentation as described in RTCA/DO-200B Section 2.2, including the Compliance Plan (RTCA/DO-200B, Section 2.2.1), as well as all documentation supporting your compliance as described in RTCA/DO-200B, section 2.2.2. The compliance plan includes a completed RTCA/DO-200B compliance matrix (see RTCA/DO-200B, appendix F), as well as a completed objectives matrix found in the appendix of this CTSO.

(ii) Data Process Description

Provide a high-level description or process diagram of the data process, inspection and test procedures (including process controls and incoming supplier controls) for processing data in the Data Processing Procedures as described in RTCA/DO-200B, appendix E, item 3. This includes means to address any changes to the DQRs, data processing procedures, and implementation into the aeronautical data process. Additionally, illustrate the methods of traceability and configuration control for all delivered aeronautical data.

(iii) Compatibility

For a Type 2 CTSOA, the applicants must include a list of systems for which the applicant will ensure compatibility with intended use including part/model numbers (hardware, software, and database) by demonstrating (e.g., using system verification tests, sampling checks, etc.) that the DQRs are consistent with the intended function of the associated equipment. This is always done through an appropriate arrangement with the original equipment manufacturer (OEM) / DAH at time of first listing on the CTSOA or when proposing additions to the compatible equipment list. The authority recommends performing periodic sampling checks on individual datasets(e.g.,through simulation, test platform environments, etc.) to demonstrate ongoing compatibility.

(iv) Data Error Handling and Reporting

Data errors are considered as an escape from the supplier's quality system and a failure to meet DQRs. The applicant must have procedures to address any unsafe condition or error found in distributed data. The procedures should address the actions the applicant intend

to take to develop and distribute corrective action to all affected parties (e.g., source, database users, the authority). The procedures must describe how to communicate with data suppliers for all suspected and confirmed errors with the source data, and how to inform customers and the authority of confirmed data errors having potential to adversely affect the safety of operational use. The procedures must describe how to communicate without undue delay (within 48 hours of detection/knowledge) change in CTSOA status and any confirmed data errors having potential to adversely affect the safety of operational use. Examples of data errors with potential to adversely affect safety include, but are not limited to final approach segment (FAS) data block changes, path and terminator "leg type" coding, as well as critical and essential data elements.

8. Referenced Documents

DO-200B Standards for processing aeronautical data, June18, 2015.

DO-330 Software Tool Qualification Considerations, Dec.13,2011.

RTCA/DO-201A Standards for aeronautical information，April 19, 2000.

RTCA/DO-201A Standards for aeronautical information，April 19, 2000.

RTCA/DO-272D User requirements for aerodrome mapping information，October 12, 2001.

RTCA/DO-276C User requirements for terrain and obstacle data，March 5, 2002.

RTCA documents may be ordered from:

Radio Technical Commission for Aeronautics, Inc.

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

Copies may also be ordered online at: www.rtca.org

Appendix Objectives Matrix

Objective Number	Objective	CTSO Reference	Applicant's Reference Document or ID	Objective Met Yes, No, Pending or N/A	Notes
A.1 CTSOA post acceptance responsibilities					
1-1	You must report to customers, the authority and to source any failure, malfunction, or defect in the distributed data having potential to adversely affect the safety of operational use.	4.a.(i)			
1-2	The initial reporting of confirmed safety-related errors or defects must be timely and prompt to ensure swift resolution.	4.a.(i)			
1-3	You must endeavor, through documented procedure, to ensure receipt of data alerts reporting safety-related errors or defects.	4.a.(i)			
1-4	You must consider any safety-related data alerts prior to use of the affected data	4.a.(i)			
1-5	You must maintain a QMS as described in RTCA/DO-200B, section 2.5.	4.a.(ii)			
1-6	You must report all changes made to the QMS affecting the data quality objectives to the autority before their implementation.	4.a.(ii)			

Objective Number	Objective	CTSO Reference	Applicant's Reference Document or ID	Objective Met Yes, No, Pending or N/A	Notes
1-7	You must submit minor design changes for an existing CTSOA in accordance with procedures agreed to with the authority.	4.a.(iii)			
1-8	You must substantiate major design changes, and the authority must accept them prior to their implementation.	4.a.(iii)			
1-9	Procedures for reporting of changes to the data process must address changes to tools used in its data process.	4.a.(iii)			
1-10	You must perform periodic internal audits of both this CTSO and RTCA/DO-200B objectives as described in RTCA/DO-200B, Section 3, with the maximum time between audits not to exceed one year.	4.a.(iv)			
1-11	Any major non-conformities as described in RTCA/DO-200B, section 3.4, must be reported to the authority.	4.a.(iv)			
1-12	You must notify all users and the authority, when you no longer comply with the conditions of the CTSOA.	4.a.(v)			
1-13	You must provide a release statement with each database distribution to broadcast the identified CTSOA status, state your compliance, and provide information on known deviations and alterations.	4.a.(vi)			
1-14	The release statement must include CTSOA Status.	4.a.(vi)			

Objective Number	Objective	CTSO Reference	Applicant's Reference Document or ID	Objective Met Yes, No, Pending or N/A	Notes
1-15	The release statement must include any deviations to the agreed DQRs.	4.a.(vi)			
1-16	The release statement must include any data alteration.	4.a.(vi)			
1-17	You must surrender or withdraw your CTSOA if you no longer uphold the terms and conditions.	4.a.(vi)			
1-18	You must notify your data customers of the status of your CTSOA.	4.a.(vii)			
1-19	You must be aware of and provide any change in status of CTSOA for previous data chain participant(s) up to, but not including, a Contracting State's AIP.	4.a.(vii)			
1-20	The method of notification must be timely to ensure customers can react to changes in the status of an CTSOA before they accept the next data update.	4.a.(vii)			
A.2 Compliance of the Data suppliers with this CTSO					
2-1	You must verify and validate data obtained from non-authoritative sources through an approved process prior to delivery.	4.b.(i)			
2-2	Your data processing procedures must define the means of	4.b.(ii)			

Objective Number	Objective	CTSO Reference	Applicant's Reference Document or ID	Objective Met Yes, No, Pending or N/A	Notes
	confirming data you receive is not corrupted, your means to protect stored data from corruption, and what methods you provide the user to verify the data they receive from you is not corrupted.				
2-3	To protect from the possibility of intentional corruption, you must maintain records showing what data security provisions you implement to accomplish these objectives.	4.b.(ii)			
2-4	Your data security provisions must describe both the technical and organizational controls you implement to ensure you receive data from known sources and to prevent intentional corruption during processing and exchange of data.	4.b.(ii)			
2-5	Provisions for data security must describe how you identify, assess, and mitigate security threats and prevent unauthorized access to data or tools.	4.b.(ii)			
2-6	You must identify the process for establishing new configuration baselines in the configuration management plan.	4.b.(iii)			
2-7	Changes to the DQRs must be coordinated between the data supplier and user receiving the data.	4.b.(iii)			

Objective Number	Objective	CTSO Reference	Applicant's Reference Document or ID	Objective Met Yes, No, Pending or N/A	Notes
2-8	DPAL4 data must be distinguishable from any compliant data through means acceptable to the authority.	4.b.(iii)			
2-9	There are currently no established requirements for tailored data. Therefore, data suppliers must ensure tailored data is not distributed to entities other than the operator/end-user requesting the data.	4.b.(iv)			
2-10	In addition, regardless of which framework, you must submit the documentation demonstrating tool qualification activities were satisfactorily completed.	4.b.(v)			

(The English version is for reference only. In case of any discrepancy or ambiguity of meaning between this English translation and the Chinese version, the latter shall prevail.)