U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: ACCEPTANCE OF DATA PROCESSES AND ASSOCIATED NAVIGATION DATABASES

Date: 7/8/05 **AC No:** AC 20-153
Initiated by: AIR-130 **Change:**

1. PURPOSE.

a. This advisory circular (AC) provides guidance material on:

(1) How to evaluate whether data processes comply with the requirements of RTCA/DO-200A, Standards for Processing Aeronautical Data.

(2) How to obtain a Letter of Acceptance (LOA) from the Federal Aviation Administration (FAA) that acknowledges compliance with this AC regarding aeronautical data processing.

(3) How to define the aeronautical data quality requirements when obtaining airworthiness approval of new equipment or installations where the function of the equipment is dependent on an updateable database.

b. This AC provides guidance for organizations within the aeronautical data chain to follow when showing that they have met the above standard. This AC does not change, create any additional, authorize changes in, or permit deviations from, any regulatory requirement.

2. RELATED FEDERAL AVIATION REGULATIONS.

a. Title 14 of the Code of Federal Regulations (14 CFR) parts 21, 23, 25, 27, 29, 43, 91, 121, 125, and 135.

b. Some U.S. operations (e.g., certain Required Navigation Performance approach procedures) will require the operator to validate their data or obtain data from an accepted data supplier (reference 14 CFR part 91.503 requirement for the operator to have aeronautical data in current and appropriate form).

c. For foreign operations where the foreign authority requires approved data suppliers (e.g., Precision Area Navigation (P-RNAV) operations in Europe), an LOA for the relevant supplier provides one means of complying with 14 CFR § 91.703.

NOTE: Paragraph 10 of this AC addresses the definition of data quality requirements applicable to ensuring compliance with the airworthiness regulations for intended function and failure effects of equipment, systems and installations.

3. RELATED DOCUMENTS.

a. FAA Advisory Circulars (AC). Copies of the AC's listed below may be obtained from the Department of Transportation, Subsequent Distribution Office, M-30, Ardmore East Business Center, 3341 Q 75th Ave, Landover, MD 20785. An additional source to obtain FAA Advisory Circulars is the Regulatory and Guidance Library (RGL) available at http://www.airweb.faa.gov/rgl.

(1) AC 20-115B, RTCA, Inc. Document DO-178B.

(2) AC 25.1309-1A, Systems Analysis and Design.

(3) AC 23.1309-1C, Equipment, Systems, and Installations in Part 23 Airplanes.

b. RTCA, Inc. Documents. Copies of the RTCA documents listed below may be purchased from RTCA, Inc., 1828 L Street, NW, Suite 805, Washington, D.C. 20036. Copies may be purchased on-line at http://www.rtca.org/.

(1) RTCA/DO-178B, Software Considerations in Airborne Systems and Equipment Certification;

NOTE: EUROCAE document ED-12B is equivalent to RTCA/DO-178B.

(2) RTCA/DO-200A, Standards for Processing Aeronautical Data;

NOTE: EUROCAE document ED-76 is equivalent to RTCA/DO-200A.

(3) RTCA/DO-201A, Standards for Aeronautical Information;

NOTE: EUROCAE document ED-77 is equivalent to RTCA/DO-201A.

c. Society of Automotive Engineers (SAE) documents. Copies of the SAE documents listed below may be obtained from the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001. Copies may be purchased on-line at http://www.sae.org/.

(1) ARP 4754, Certification Considerations for Highly Integrated or Complex Aircraft Systems.

(2) ARP 4761, Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment.

d. Airlines Electronic Engineering Committee (AEEC), Aeronautical Radio, Incorporated (ARINC) documents. Copies of ARINC 424 Standard, Navigation System Data Base, may be obtained from ARINC Incorporated, Document Section, 2551 Riva Road, Annapolis, MD 21401-7465. Copies may be purchased on-line at http://www.arinc.com/.

4. BACKGROUND.

a. The aeronautical applications and functions that depend on databases are widespread. Since the 1970s installed systems have relied on databases to support their intended functions, such as navigation data used to facilitate the presentation of flight information to the flight crew to understand and better visualize the governing charts. Prior to issuance of this AC, the FAA had not developed a process for acceptance or oversight of navigation databases and their compatibility with aeronautical applications. Consequently, data suppliers had no guidance on how to obtain FAA acceptance of their aeronautical data processes.

b. With new performance-based operations requiring database integrity, guidance on how to obtain FAA acceptance is necessary. Due to the advancement of required navigation performance (RNP) and its dependence on data quality, RTCA developed standards to achieve the higher levels of assurance necessary for these data and data processes. In operations, such as those for RNP, where the operating margins are based upon specific levels of system performance, reducing and mitigating errors is a key safety factor. While data quality is often essential for primary functions, it is also beneficial to all other similar functions and applications, such as basic RNAV, terrain situational awareness, etc. Consequently, we provide this guidance material to address database processes and quality.

c. Aviation safety can be significantly degraded by aeronautical information errors related to the content of navigation databases, such as:

- Errors Generated by the State, Each Sovereign Nation or International Civil Aviation Organization (ICAO) Contracting State (State) publishes data in support of navigation. This data frequently contains source origination errors, caused by factors such as survey errors, incorrect association of latitude/longitude with a fix, or invalid magnetic variation. Errors related to data entry or processing prior to release into the public domain also occur.

- Errors Generated by the Data Service Provider, Companies that process and integrate data from multiple States can also introduce errors. These errors typically result from the translation process, errors related to data entry or processing, misinterpretation of the State data, modifying the State data to achieve compatibility with the end application, or changing the data format in a manner incompatible with the end application.

- Errors Generated by the Avionics Manufacturer, Errors have occurred due to the processing or use of the data by the avionics manufacturer. Conversion

of the data into the final data format has created errors by rendering the data incompatible with implementation assumptions (e.g. incompatible path/terminator combinations, etc).

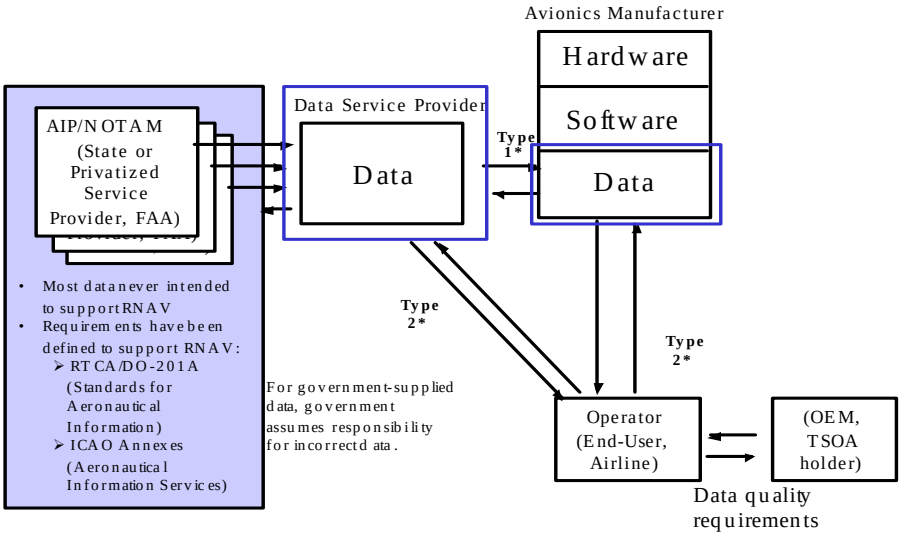
d. RTCA/DO-200A is the standard used to develop, assess change, and support implementation of data processing quality assurance and data quality management. Implementing a process that complies with the requirements of RTCA/DO-200A provides a level of assurance that the data quality is maintained throughout all phases of the data handling process within an organization. Data quality is defined by several characteristics including accuracy, resolution, integrity (referred to as assurance level), traceability and format. This includes the interface to a data supplier, receipt of the data, processing of the data, database distribution and the interface to a customer. RTCA/DO-200A does not ensure the quality of State-originated data that is being addressed through other means such as an ICAO standard.

NOTE: The ultimate responsibility of ensuring that the data meets the quality for its intended application rests with the end-user of that data. This responsibility can be met by obtaining data from a supplier accredited against this standard by an appropriate organization. This does not alter the supplier's responsibility for any functions performed on the data.

e. The intent of RTCA/DO-200A is to address the specific issues of the aeronautical data process by assuming organizations have in place an acceptable quality management system limited to the requirements associated with the aeronautical data process. RTCA/DO-200A, Paragraph 1.5.4 defines the basic concepts associated with the aeronautical data process, including the concepts used by suppliers, users, and the requirements for an aeronautical data chain. RTCA/DO-200A, Section 1, Figures 1-1 and 1-2, depict two examples of data flow in an aeronautical data chain for navigation and terrain applications. This information is not intended to limit the potential application of this standard to other types of aeronautical data in the future. RTCA/DO-200A, Section 2, contains the requirements for the aeronautical data process. RTCA/DO-200A, Appendix B provides guidance on defining the data quality requirements; Appendix C demonstrates compliance with the requirements contained in Section 2. RTCA/DO-200A, Section 3 details the specific objectives, procedures, and reports associated with auditing an aeronautical data process to demonstrate compliance with Section 2.

f. Aeronautical Data Distribution for Navigation Information. Figure 1 below depicts an example data flow for the distribution of aeronautical information for navigation databases. Aeronautical data are comprised of many pieces of information that are related to the function of navigation. Airport definition, airways, navigational facilities, and defined arrival and departure routes are typical examples of some of the information included in the navigation database.

FIGURE 1. FLOW OF AERONAUTICAL DATA



***For definition of Type 1 and Type 2, see Paragraph 8 of this AC.**

g. The process of collecting this data begins at the governmental body level, where state governments around the world are responsible for compiling and transmitting the aeronautical data through their aeronautical information publication (AIP) in accordance with ICAO Annex 15 requirements.

h. The data service provider is an organization that collects the aeronautical data from the State or other source and inputs the data into an electronic file as specified by the avionics manufacturer. For navigation data, this file has typically been processed into a standard format, defined by the Airlines Electronic Engineering Committee (AEEC), Aeronautical Radio, Incorporated (ARINC) 424 specification, Navigation System Data Base.

i. The avionics manufacturer receives the aeronautical data file from the data service provider and loads that data into their ground based processing software. This software is designed to run automated checks on the data, to customize the geographic area coverage and data content, and then compress or "pack" the data by changing the format into that specified for the target avionics. Once these steps have been accomplished, a navigation data file, or set of files, is created for each application unique customer. The data is then sent to the customer, either electronically or on loadable media, such as a 3.5-inch floppy disk. If the data is sent electronically, the customer will have the means to transfer the data to loadable media or directly into the avionics system. The last activity of this process is the loading of the aeronautical data into the aircraft's avionics system.

j. Navigation systems are designed to use navigation databases that are updated in accordance with the ICAO 28-day Aeronautical Information Regulation and Control (AIRAC) cycle. Once loaded, the database information typically will not be changed until the beginning of the next AIRAC effective date. If a major change occurs or an error is detected within the 28-day cycle, the updated information may not be available to the automated system until the next cycle.

5. SCOPE.

a. This AC addresses navigation databases only. This guidance is provided for all organizations within the aeronautical data chain except for an ICAO Contracting State (see paragraph 12 of this AC). This includes operators, data service providers, original equipment manufacturers, and avionics manufacturers that process navigation data. Organizations that comply with this AC may apply for a Letter Of Acceptance (LOA) for their aeronautical data process. The LOA identifies organizations within the aeronautical data chain that demonstrate acceptable data processes.

b. The LOA formally documents that a supplier's databases are being produced pursuant to RTCA/DO-200A. For those applications requiring database integrity (e.g. Precision-RNAV, RNP), the LOA may be used as evidence of compliance with RTCA/DO-200A in support of application for operational approval. RTCA/DO-200A defines standards for processing and distributing data for aeronautical applications, such as navigation and flight planning.

c. This AC does not apply to States, or entities acting on behalf of States, publishing data as addressed in ICAO Annex 15. This AC does not apply to software programming pins (for option selectable software), configuration files, aircraft personality modules, registries, or other lookup tables used by airborne systems and equipment.

> **NOTE:** The guidance in this AC does not address other types of aeronautical databases, e.g. terrain and obstacle data, engine power settings (takeoff, climb, Maximum Continuous Thrust (MCT), Cruise), airfield performance data (takeoff distance, V speeds).

6. DEFINITIONS.

a. Aeronautical Database - An Aeronautical Database is any data that is stored electronically in a system that supports airborne aeronautical applications. An Aeronautical Database may be updated at regular intervals.

> **NOTE:** In this AC, Aeronautical Databases will refer to Aeronautical Data only as defined below.

b. Aeronautical Data - Data used for aeronautical applications such as navigation, flight planning, flight simulators, terrain awareness and other purposes, which comprises navigation data and terrain and obstacle data.

> **NOTE:** This AC does not address terrain and obstacle data.

c. Data Supplier - Organizations, not including the States, or entities acting on behalf of the State, that collect, process, or originate aeronautical data. Data Service Providers, Avionics Manufacturers and End Operators may all act as data suppliers in the aeronautical data chain.

d. Navigation Database - Any navigation data stored electronically in a system supporting navigation applications. Navigation data is information intended to be used to assist the pilot to

identify the aircraft's position with respect to flight plans, ground reference points and navaid fixes (such as VORs, NDBs, etc.) as well as items on the airport surface.

7. HOW TO USE THIS ADVISORY CIRCULAR.

a. RTCA/DO-200A, Section 1.5.4 describes the aeronautical data chain as a conceptual representation of the path that aeronautical data takes from its creation to its end use. The aeronautical data chain is a series of interrelated links where each link provides a function that facilitates the origination, transmission and use of aeronautical data for a specific purpose. This AC gives guidance on how an organization adheres to the data preparation and data transmission criteria applicable to the functions performed by that chain link or participant. Because an organization may perform one or all of the functions that comprise the aeronautical data chain, that organization may be responsible for data preparation and data transmission for more than one chain link. The organizations within the Aeronautical Data Chain and the applicable paragraphs of this AC are the:

(1) Operator (RTCA/DO-200A: End-User) (paragraphs 9 and 11);

(2) Original Equipment Manufacturer (RTCA/DO-200A: Application Provider) (paragraph 10);

(3) Avionics Manufacturer (RTCA/DO-200A: Application Provider) (paragraph 10 and 11);

(4) Data Service Provider (RTCA/DO-200A: Data Service Provider) (paragraph 11); and,

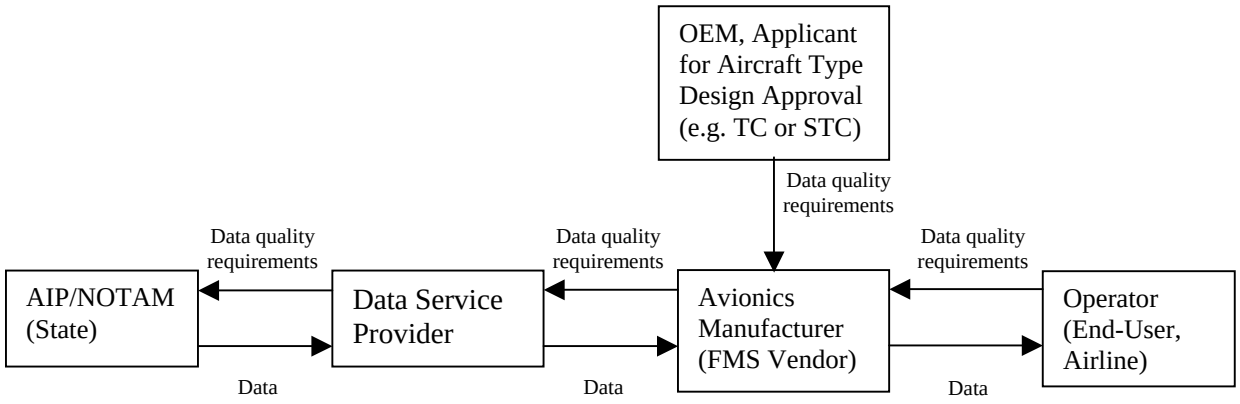
(5) State Aeronautical Information Service (paragraph 12).

b. With the exception of those organizations that operate data selection and packing tools covered under their data supplier's LOA, all other organizations that process data should comply with paragraph 11 of this AC and obtain an LOA.

c. Database production procedures of non-U.S. data suppliers should comply with RTCA/DO-200A (or EUROCAE ED-76) to the satisfaction of the supplier's national authority. The supplier's approval may be considered acceptable and equivalent to the LOAs defined in this AC. The relevant foreign authority and their approval method (e.g., EASA/JAA Letter of Acceptance or Production Organization Approval) must be identified to customers of the data. The suitability of the supplier will then be evaluated as part of the operational approval (see appendix 2).

d. This AC is structured to accommodate the FAA acceptance of a link (organization) as compliant with RTCA/DO-200A. To separate the links in a chain and grant an LOA to an organization requires mutually agreed upon data requirements between a data supplier and a customer (represented by a pair of interlocking chain links). Data requirements provide the basis for the processes that are performed on the data.

FIGURE 2. TYPICAL AERONAUTICAL DATA CHAIN



8. PROCESS FOR OBTAINING A FAA LETTER OF ACCEPTACE (LOA).

a. Types of Data Suppliers. There are two types of data supplier acceptance letters. Type 1 acceptance letters are based on generic data requirements agreed upon between the data supplier and the customer. Type 2 acceptance letters are based on requirements that ensure compatibility between particular systems or equipment. Type 2 acceptance letters are intended to facilitate the operational approval process, and eliminate the operator's need to re-evaluate compatibility if the data supplier has already assured compatibility. While RTCA/DO-200A applies to both types of acceptance letters, the Type 2 data suppliers have additional requirements to ensure that the delivered database is compatible with the data quality requirements necessary to support the intended function approved for the target application.

(1) Type 1 LOA. Provides recognition of a data supplier's compliance with RTCA/DO-200A with no identified compatibility with an aircraft system. A Type 1 LOA ensures that the processes for producing the aeronautical data comply with this AC and the documented data quality requirements. This acceptance letter may be issued to data suppliers, operators, avionics manufacturers, or others. Guidance material regarding the application of RTCA/DO-200A to these organizations is provided in paragraph 11 of this AC. A Type 1 LOA does not address compatibility with intended functions or with particular avionic systems. A Type 1 LOA does not have to be associated with a specific certification project (such as a type certificate (TC), supplemental TC (STC) or technical standard order (TSO) or equipment type.

(2) Type 2 LOA.

(a) Provides recognition of a data supplier's compliance with RTCA/DO-200A and the compatibility of their delivered data with particular avionic systems. A Type 2 LOA may be issued to a navigation system design approval holder (TC/STC/TSOA) or to a data supplier who can establish that their data requirements are identical to those defined by a design approval holder. Identicality is typically achieved by either establishing design equivalency (e.g., a data supplier to an Original Equipment Manufacturer (OEM) may not hold the design approval for the avionics but the data supplier is able to determine equipment compatibility), or

by a licensing agreement between the design approval holder and the entity seeking approval. Guidance material for the application of RTCA/DO-200A to these entities is provided in paragraphs 10 and 11 of this AC.

(b) Because a Type 2 LOA recognizes compatibility with the data quality requirements necessary to support the intended function, the acceptance of a Type 2 data supplier must be associated with specific equipment. It may or may not coincide with the design approval of the equipment (such as a TC, STC or TSO). Type 2 LOA letters identify the compatible equipment. Also, if an avionics company provides a data-packing tool to other participants in the data chain, the letter identifies that the process complies with RTCA/DO-200A subject to the use of the packing tool and any associated instructions.

b. Application. A data supplier should submit an application for an LOA to the Aircraft Certification Office (ACO) in the geographical area in which the data processing facility of the applicant is located (See appendix 1, Sample application for an FAA Letter of Acceptance for the aeronautical data process). The application should include the following information:

(1) The name and address of the data supplier facility that will be covered by the LOA.

(2) A brief description of the method by which FAA acceptance will be sought:

(a) Type 1 LOA. A Type 1 LOA does not ensure the compatibility of the aeronautical data with the intended function of the installed equipment. FAA acceptance can only be sought through the definition of the data quality requirements for which the aeronautical data process approval will be based.

(b) Type 2 LOA.

1. The data supplier should ensure their aeronautical data products meet the specific data quality requirements defined by the avionics manufacturer as necessary to support the intended function of the avionics. The acceptance of a Type 2 data supplier is based upon compatibility with specific equipment. Acceptance of the Type 2 data supplier does not determine that the design approval of the equipment (such as a TC, STC or TSO) is maintained.

> **NOTE:** The design approval holder of the avionics is responsible for ensuring that the aeronautical data products support the intended function of the avionics.

2. The application must identify the compatible systems (make, model, series, part number). Since minor changes to the compatible system can result in a change to the data quality requirements, the design approval holder should coordinate any changes in advance to ensure that data suppliers update their data products to the new requirements in the same timeframe that the product is fielded.

3. When the compatibility information is not documented directly by the data supplier and the systems/equipment manufacturer, the data supplier must show that the product

is of the same format, general data content and data structure as an existing acceptable data product and system/equipment.

(3) A statement that certifies the applicant has established a quality management system, as described in RTCA/DO-200A, Section 2.5.

c. Data Package. Regardless of the basis upon which acceptance is sought; the data package must include information that defines the data quality requirements. For a Type 2 LOA, this includes substantiation that the data quality requirements for the aeronautical data will support the intended function and continued airworthiness of the installed equipment. 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 may include, but is not limited to, the following:

(1) One copy of the applicant's compliance plan as described in RTCA/DO-200A, Section 2.2. A compliance matrix may be submitted to the FAA to simplify the review process. If a compliance matrix is submitted it should reference the documentation explaining how each objective of this AC (and RTCA/DO-200A) is accomplished (See appendix 3 of this AC).

(2) Initial Inspection and Test Procedures. Define the data process, inspection and test procedures (including process controls, and incoming supplier controls) for processing data.

(3) Design Change Control. Describe the methods and controls for addressing any changes to the data quality requirements, and for implementation into the aeronautical data process.

(4) Traceability. Describe the methods and configuration control for all delivered aeronautical data. Additionally, for a Type 2 LOA, the documentation must show traceability between the identification of the installed aeronautical data and the version of the data quality requirements.

(5) Compatibility. For a Type 2 LOA only, include a list of systems for which compatibility has been established.

(6) Tool Summary. Summarize the use of tools in their data process, which tools are qualified, the means to qualify such tools, and the procedures for maintaining the tools.

(7) Quality Control Manual for the Quality Management System.

(8) Describe the procedure to be used in the event that an unsafe condition is found in the product. The procedure should address the actions that the applicant intends to take to develop and distribute corrective action (to be taken by customers and users of the database) after the FAA has notified the applicant that the unsafe condition exists.

d. Post Acceptance Responsibilities. Data suppliers may hold a LOA from the FAA provided the following activities are performed:

(1) Reporting Errors and Defects. The holder of an LOA for their aeronautical data process must establish a procedure to report to the FAA (ACO/Manufacturing Inspection District Office (MIDO) from which the LOA was obtained) all errors or defects of the aeronautical data produced under the LOA, that may have a safety effect on the operational use of that data.

(2) Maintain a Quality Management System (QMS). The holder of an LOA for their aeronautical data process must maintain a quality management system as described in RTCA/DO-200A, Section 2.5. Changes to the QMS that may affect the data quality objectives must be reported to the issuing ACO/MIDO before implementation.

(3) Changes to Data Process.

(a) The holder of an LOA for their aeronautical data process must submit minor design changes for an existing LOA in accordance with procedures agreed to by the applicant and the issuing ACO/MIDO. Major design changes must be substantiated and approved prior to implementation in the same manner as that for the original LOA.

(b) If a change to the data quality requirements results in a major design change to a TSO article, the TSO authorization (TSOA) holder must obtain a new TSOA.

(4) The holder of an LOA for their aeronautical data process must perform periodic internal audits as described in RTCA/DO-200A, Section 3, with the maximum time between audits (whether total or incremental) of not more than one year. Any major non-conformities as described in RTCA/DO-200A, Section 3.4 must be reported to the FAA office that issued the LOA. Additionally, the FAA may perform periodic audits in accordance with procedures agreed to by the applicant and the ACO/MIDO.

(5) A LOA holder must notify the FAA (FAA office from which the LOA was obtained) when they no longer comply with the conditions of the LOA.

(6) The LOA is not transferable and is effective until surrendered or withdrawn by the holder, or terminated by the FAA.

(7) Notification of LOA Status Changes to Data Customers. The holder of an LOA must notify their customers of the status of their LOA and the status of LOAs (or foreign acceptance, including designation of the foreign authority that acknowledges the foreign source's compliance to RTCA/DO-200A and the means of approval or acceptance) for all previous chain participants up to, but not including, a State's AIP. The method of notification must be timely to ensure that customers can react to changes in the status of an LOA before they accept the next data update.

> **NOTE:** An example that meets this requirement is posting a copy of the LOA on a web site for customers that have a procedure to reference that site before updating data to ensure timely notification of any changes in the LOA status.

9. APPLICATION OF RTCA/DO-200A TO OPERATORS.

a. Operator's Responsibilities. This AC does not alter or affect the responsibility or authority of the operator (aircraft owner or pilot) in updating aeronautical data. The end user (operator) is ultimately responsible for ensuring that data meets the quality requirements for its intended application. (14 CFR § 91.503) Updating data in an aeronautical database under this AC is considered to be maintenance. The following guidelines apply to operators seeking compliance with RTCA/DO-200A:

(1) Part 91 operators may update databases in accordance with 14 CFR 43.3(g).

(2) Parts 121, 125, and 135 operators must update databases in accordance with their approved maintenance program. For Part 135 rotorcraft operators, this includes maintenance by the pilot in accordance with 14 CFR Part 43.3(h).

(3) Updating aeronautical data addressed by this AC is considered preventative maintenance if (ref. 14 CFR Part 43, Appendix A (c)(32)):

(a) No disassembly of the unit is required (disassembly does not include removal and replacement of a database memory module or card that is accessible from the front of an installed panel-mounted system and requires no tools (e.g., screwdrivers or wrenches)), and

(b) Pertinent instructions are provided.

(4) The data must comply with the data quality requirements, as required by a Type 2 LOA.

(5) The operator defines the completeness and timeliness requirements for the data, or accepts the requirements defined by their data supplier.

(a) The operator must validate that the completeness and timeliness requirements for the data are appropriate for the operations authorized.

> **NOTE:** This validation could include simple assurance of data completeness and timeliness by the operator via a database identification page within the airborne equipment. Crew procedures for checking the reasonableness of displayed navigation data remain necessary.

(b) If the operator chooses to define the completeness and timeliness requirements, he must document the steps for the receipt, storage or archiving, configuration management, configuration control, installation/loading and data supplier coordination;

> **NOTE:** This should include procedures for corrective action in the event of discovery of an error or inconsistency in the data, and procedures to obtain notification of errors and anomalies from their data supplier.

(6) The data supplier must inform the operator of the status of their LOA as well as the status of LOAs (or foreign acceptance, including designation of the foreign authority that acknowledges the foreign source's compliance to RTCA/DO-200A and the means of approval or acceptance) for all previous chain participants up to, but not including, a State's AIP. The operator must review this information to confirm the validity of RTCA/DO-200A compliance for their supplier. For non-U.S. companies that have obtained an approval or acceptance from their respective Civil Aviation Authority (CAA), the FAA recognizes approvals by the CAA or JAA/EASA Letter of Acceptance (LOA).

b. Operators that Format and Alter Data. If the operator is performing data preparation and data transmission (e.g. formatting or altering information within an aeronautical database), then in order to demonstrate RTCA/DO-200A compliance they must comply with paragraphs 10 and 11 of this AC, as appropriate, and obtain an LOA. RTCA/DO-200A compliance can also be achieved if the operator uses a data selection and packing tool from an accepted data source, and that tool is referenced in the data supplier's LOA as producing data compatible with the operator's equipment. Alternatively, data preparation and transmission procedures for Parts 121, 125, and 135 operators may be accepted or approved by the POI.

> **NOTE:** Data preparation and data transmission in this context pertains to altering or re-formatting of the database provided by the Type 2 LOA holder. Data originators need not hold an LOA, unless utilized outside the originating organization. .

10. RELATIONSHIP BETWEEN RTCA/DO-200A AND AIRWORTHINESS APPROVAL. This section provides guidance on the definition of data quality requirements for systems that use aeronautical data. Manufacturers should define these requirements upon obtaining a Type 2 LOA for existing systems, or at the time of airworthiness approval of a new system.

a. Requirements for Existing Systems (prior TSOA, TC, or STC approval). The manufacturer should identify the data quality requirements. Many aircraft and avionics manufacturers have obtained approval for systems prior to the issuance of this AC, and may not have identified their data quality requirements. For such systems, the data quality requirements for the avionics must be identified prior to a data supplier obtaining a Type 2 LOA (See paragraph 8 of this AC). These requirements may be established by the design approval holder or by a data supplier covered under a Production Certificate provided the data supplier has access to the original documentation for the avionics. For example, Flight Management System (FMS) suppliers to an original equipment manufacturer (OEM) may document compatibility with their own FMS without the direct involvement of the OEM. The requirements should be based upon the original design documentation, supplemented as necessary to address the data quality characteristics. Typically, the data format accuracy and resolution is specified in the original RTCA/DO-178B documentation, and the corresponding assurance level requirements are specified in RTCA/DO-201A. The data accuracy, resolution and assurance level may need to be re-examined for small RNP values or other operations not addressed in RTCA/DO-201A.

NOTE: Data quality requirements reviewed and approved in accordance with AC 20-115B, RTCA, Inc. Document RTCA/DO-178B, do not need to be re-approved by the FAA to comply with this AC. Any additional documentation for data quality, e.g. assurance level, that does not affect the TC or STC approved design, but is developed in support of this criteria, is supplementary information in support of the data supplier Type 2 LOA. This means that no other certification activity is required for the airborne systems or equipment. Supplementary documentation changes may be reflected in documents separate from the TC or STC design documentation, but should provide the necessary references to such documentation. The TC or STC design holder may incorporate supplementary documentation into the certification basis at the next opportunity.

b. Requirements for New Systems. For new systems that support precision RNAV or RNP operations, the manufacturer should identify the data quality requirements as part of the airworthiness approval documentation.

c. Defining Data Quality Requirements. An OEM for aircraft and avionics may use the requirements defined in Section 2 of RTCA/DO-200A as a means to implement a "Quality Management" process and to define the data quality requirements for the aeronautical database. The data quality requirements must be under configuration control. RTCA/DO-200A, Section 2.3 and Appendix B, provides an acceptable means to define the data quality requirements. As described in RTCA/DO-200A, aeronautical data is characterized by its accuracy, resolution, assurance level, traceability, timeliness, completeness and format. However, timeliness and completeness are subsequently defined by the operator and need not be addressed by the design approval holder.

(1) Intended Function. The data quality requirements must be consistent with the intended function of the equipment identified as part of the normal design approval. One or more of the data qualities can affect the equipment. The system certification documentation defines the system functions and any dependencies on the data (i.e. data quality requirements). For navigation systems, this includes all uses of the system, such as navigating on published airways or routes, standard arrivals, departures, and specific types of approach operations. RTCA/DO-201A provides guidance on requirements supporting area navigation and the RNP operations described in RTCA/DO-236B.

(a) Many aspects of the data quality requirements are addressed to support compliance with AC 20-115B. Data quality requirements reviewed and approved in accordance with AC 20-115B do not need to be re-approved by the FAA to determine compliance with this AC. The applicant should however ensure that the data quality requirements developed under the RTCA/DO-178B process are correctly established for the data's intended use (See RTCA/DO-200A, Section 2.3), and may develop supplementary documentation to address some data quality requirements.

(b) Navigation data changes frequently. In order to retain data currency, this AC provides an acceptable means for associating the data quality requirements for the aeronautical data with the aircraft type design without requiring that the data (e.g. loadable media) become part of the RTCA/DO-178B software life cycle.

> **NOTE:** When RTCA/DO-201A or other comparable criteria do not address the source data for the data product, the data quality may only reflect the data supplier's processes and assurances specified by their data quality requirements.

(2) Failure Condition Classification. The required assurance level for the data process must be identified and consistent with the intended use of the equipment. Because integrity of a process usually cannot be numerically quantified, the integrity requirement may be defined by an assurance level. RTCA/DO-200A, Appendix B provides guidance on the assignment of an assurance level, based on the system safety assessment for the intended function. For RNAV operations and basic RNP operations, all supporting data should comply with RTCA/DO-201A.

(3) Identification and Configuration Control. Configuration control processes should include traceability between the data quality requirements and a database specification. The data quality requirements can also be referenced in the instructions for continuing airworthiness.

(a) Changes to the data quality requirements must be evaluated per the change control process of the TSO authorization and/or STC/TC approval. This does not preclude changes to the data itself that is expected to change, remain current, or to support operations in different geographic regions. Changes to the data quality requirements must be evaluated to determine whether they have a major, minor, or no effect on the system's intended function. The LOA holder must demonstrate that his processes ensure that this evaluation occurs.

> **NOTE:** The aircraft manufacturer, avionics manufacturer or systems integrator may incorporate any additional configuration management and control requirements found in other existing standards. Database configuration management should address identification/part number, version control, data quality assurance/management, coordination processes (e.g. reporting of errors), change management.

(b) Instructions for Continuing Airworthiness (ICA) (14 CFR § 21.50(b)). For new projects, if the database is not identified as part of the type design, the instructions for continuing airworthiness should require that the data comply with the data quality requirements for the target hardware. For general aviation, if the database is loaded into the avionics through pilot action, the operator's manual should contain the procedures for ensuring that the database complies with the data quality requirements. An LOA held by the avionics manufacturer and available to the equipment user will be necessary to determine that the database is compliant with RTCA/DO-200A and compatible with their avionics.

NOTE: If the OEM or TSOA holder is involved in the delivery of aeronautical data to operators, the OEM or TSOA holder should obtain FAA acceptance of their aeronautical data process in accordance with paragraph 11 of this AC.

11. APPLICATION OF RTCA/DO-200A TO DATA SUPPLIERS.

a. The data supplier may obtain FAA acceptance of their aeronautical data process in accordance with RTCA/DO-200A and this AC. Paragraph 8 of this AC establishes procedures for Aeronautical Data Suppliers to obtain an FAA LOA.

b. A data supplier may follow the requirements contained in RTCA/DO-200A, Section 2, as a means for obtaining FAA acceptance of the aeronautical data process.

(1) Compliance Plan. The data supplier must develop a compliance plan as described in RTCA/DO-200A, Section 2.2.

(2) Documentation of Data Quality Requirements. The data supplier must meet the requirements of RTCA/DO-200A, Section 2.3, and document the data quality requirements for all delivered data. Either the data supplier or the recipient can document the data quality requirements but both must mutually agree them upon. Evidence of the mutual agreement between a Type 2 LOA holder and its data supplier must be available. The only exceptions to this requirement are publishing the data in the Aeronautical Information Publication (AIP) or providing the data through an official government source. The data quality requirements must be under configuration control and both parties must approve all modifications.

NOTE: The assurance levels identified in RTCA/DO-201A are applicable to RNAV and may not be applicable to other applications.

(3) Data Processing Requirements. The data supplier must comply with RTCA/DO-200A, Sections 2.4 and 2.5. The following paragraphs clarify certain aspects of those requirements.

(a) Data Alteration. The data supplier must not alter the data from any supplier without informing the data originator of the change and endeavoring to receive concurrence in a timely manner (See RTCA/DO-200A, Section 2.4.2 and paragraph 11b(3)(a)2 below).

1. Any change is considered an alteration of data when the resultant operation of the aircraft does not comply with the air traffic procedure instructions published by the State, such as changing a heading to a track. This requirement to notify the data supplier only applies to the alteration of the data or procedure, and does not apply to assembling, translating, selecting, or formatting the data.

2. Changes that do not alter the results of the published air traffic procedures and navigation fixes are not considered alteration of data. For example, a procedure published as "Direct to ABC" can be coded as a DF path terminator under ARINC 424. The data quality requirements are used as the basis for evaluating changes.

NOTE: For changes of this type, it is the data supplier's responsibility to ensure that the changes do not modify the original intended flight track.

3. If concurrence with the data originator cannot be obtained, the data supplier who alters the data assumes the role of the data originator and the associated responsibilities (See paragraph 11b(3)(b)). Data suppliers who alter source data must document the criteria for informing the data originator of data alteration and consider all potential conflicts with other supplied data.

4. Operations may reveal problems or conditions that could result in undesirable or potentially unsafe operations. In such instances where quality control processes, procedures, and records exist for correcting deficiencies or preventing potentially unsafe operations, then those alterations may be acceptable.

NOTE: The requirement to inform the data originator does not apply to recurring data alterations, that are documented as part of the data origination process (see paragraph 11b(3)(b).

(b) Data Origination. Criteria for originated data must be clearly defined, including documenting the validation process for the data origination. This requirement applies to altered data where concurrence with the originator could not be obtained (See paragraph 11b(3)(a) above). The quality management requirements (RTCA/DO-200A, Section 2.5) must define data elements that can be originated or can be altered. The quality management requirements must also define the level of review and approval required for each originated data element. Originated data must be distinguishable from State-provided data such that an originated approach procedure would not have the same title as a State-published approach, or the supplier could provide a separate list of originated data.

(c) Verification and Validation of Data. In an Aeronautical Data Chain, data may be received from any data supplier. If a data supplier has complied with the requirements of RTCA/DO-200A, evidenced by a FAA LOA or other equivalent verification and validation means, the responsibility to ensure that stated data quality requirements are attained is discharged (Reference RTCA/DO-200A, Section 1.4 and 2.3.3-1). Likewise, data published in the Aeronautical Information Publication (AIP), or provided via an official government source, the responsibility to assure that stated data quality requirements are attained is discharged. Such data does not require verification or validation. Data obtained from other suppliers must be verified and validated appropriately prior to delivery and managed under an approved process. Refer to the RTCA/DO-200A, Appendix A, Glossary, for the definitions of verification and validation as the terms apply to this AC.

(d) The process for establishing new configuration baselines should be identified in the configuration management plan.

(4) Changes within the data quality requirements may impact the intended function of the installed equipment. Changes to the data quality requirements must be coordinated between the data supplier and receiver. Sufficient advance notice of changes should be given to allow

subsequent participants in the data chain (avionics manufacturer, OEM and potentially the operator) sufficient time to review the effect of the change as described in paragraph 10c(3)(i) of this AC.

(5) A data supplier may have certain data elements that do not comply with the three assurance levels identified in RTCA/DO-200A, Appendix B, Paragraph B.1.3. The data quality requirements for the non-compliant data should be assigned an assurance Level 4 (See Note below), indicating that it may not satisfy safety objectives. If this data is delivered as RTCA/DO-200A compliant, than the agreed-upon data quality requirements should identify this data and the fact that the assurance level is Level 4. The Level 4 data must be distinguishable from any compliant data through configuration management process, and not necessarily embedded in the database itself.

> **NOTE:** Level 4 data is defined as those elements that may not comply with the requirements of RTCA/DO-200A.

c. Exceptions to RTCA/DO-200A. Digital Error Detection Techniques. Table 1 of this AC replaces Table C-1 of RTCA/DO-200A. This change reconciles the RTCA/DO-200A guidance with aircraft design assurance guidelines (AC 25.1309, AC 23.1309, etc.). This change does not impact the acceptability of data in State AIPs, where table C-1 (RTCA/DO-200A, Appendix C, Paragraph C.2.2.1, Table C-1) may still be used.

Table 1: Relationship Between Assurance Levels and Digital Error Detection Performance

Assurance Level	Probability of Undetected corruption
1	$\leq 10^{-9}$
2	$\leq 10^{-5}$
3	Not applicable

12. APPLICATION OF RTCA/DO-200A AND RTCA/DO-201A TO STATE AERONAUTICAL INFORMATION SERVICE.

a. RTCA/DO-200A, Section 1.5.4.2 describes aeronautical data origination, however, oversight of State data is outside the scope of this AC.

> **NOTE:** For navigation data, ICAO Annex 15 states that each contracting State must take all necessary measures to ensure that the aeronautical information/data it provides is adequate, of required quality (accuracy, resolution and integrity) and provided in a timely manner for the general conditions under which the service or facilities are available for international use.

b. States are encouraged to follow RTCA/DO-200A and RTCA/DO-201A and apply the standards to the origination of the data. The International Civil Aviation Organization (ICAO) defines the standards for State data.

> **NOTE:** Any non-compliance with ICAO standards may impact safety. The State should first attempt to comply with ICAO requirements. If the State is unable to comply, it should communicate all non-compliance through the Aeronautical Information Publication (AIP).

c. If any participant in the aeronautical data chain supplements State originated data or originates data that is independent of the State, that participant must meet the requirements in paragraph 11 of this AC regarding the origination of the aeronautical data.

David W. Hempe
Manager, Aircraft Engineering Division

APPENDIX 1. APPLICATION FOR A LETTER OF ACCEPTANCE (LOA)
FIGURE 1. SAMPLE OF A TYPE 1 LOA

The ACME Data Company
PO Box 1
Nowhere, Arkansas 71953

FAA – Southwest Region
2601 Meacham Blvd
Fort Worth, Texas, 76193

Manager, Aircraft Certification Office, ASW-150

Subject: Request for New Type 1 Letter of Acceptance for ACME Company's Aeronautical data process

To Whom it May Concern:

ACME Data Company is applying for a new Type 1 letter of acceptance for our aeronautical data process. We comply with AC 20-153 and RTCA/DO-200A and request your review of the enclosed data being submitted in support of this application. The ACME Data Company develops navigation information per the data quality requirements specified in ACME Document xxx.xx. Acceptance of our aeronautical data process is requested based on the specification and control of these data quality requirements, compliance with AC 20-153 and the documented procedures for processing data**.** This navigation information is not intended to be directly loaded in any aircraft system.

The information will be developed at the ACME Data Company, 3000 Hill Street, Nowhere, Arkansas 71953. The ACME Data Company hereby certifies that the Data Quality Requirements, Data Processing Procedures, and Quality Management system, which are in accordance with RTCA/DO-200A, section 2 has been established and the navigation information is produced in accordance with this system.

Your efforts in support of this request are most appreciated.

Sincerely,

Administrator,
ACME Data Company

Enclosures:
1 copy ACME drawings, quality control manual, specifications and processes.

APPENDIX 1. APPLICATION FOR A LETTER OF ACCEPTANCE (LOA), CONTINUED

FIGURE 2. SAMPLE OF A TYPE 2 LOA

The ACME Avionics Manufacturer
PO Box 1
Nowhere, Arkansas 71953

FAA – Southwest Region
2601 Meacham Blvd
Fort Worth, Texas, 76193

Manager, Aircraft Certification Office, ASW-150
Subject: Request for New Type 2 Letter of Acceptance for ACME Company's Aeronautical data process

To Whom it May Concern:

The ACME Avionics Manufacturer is applying for a new Type 2 letter of acceptance for our aeronautical data process. We comply with AC 20-153 and RTCA/DO-200A and request your review of the enclosed data being submitted in support of this application. The ACME Avionics Manufacturer receives data from other sources, and develops navigation information per the data quality requirements specified in ACME Documents XXX.XX and YYY.YY, respectively. Acceptance of our aeronautical data process is requested based on the specification and control of these data quality requirements, compliance with AC 20-153 and the compatibility of the delivered data with the following products:

ACME FMS Model XY, P/N 12345-23a
ACME FMS Model Z, P/Ns 56789-1 through 56789-8

ACME has established compatibility with these systems based on the original software design documentation approved under the original TSO authorization. Compilation of data to the compatible format is accomplished using ACME Tool 123.

The information will be developed at the ACME Avionics Manufacturer, 3000 Hill Street, Nowhere, Arkansas 71953. The ACME Avionics Manufacturer hereby certifies that the Data Quality Requirements, Data Processing Procedures, and Quality Management system, which are in accordance with RTCA/DO-200A, section 2 has been established and the navigation information is produced in accordance with this system.

Your efforts in support of this request are most appreciated.

Sincerely,

Administrator,
ACME Avionics Manufacturer

Enclosures:
1 copy ACME drawings, quality control manual, specifications and processes.

APPENDIX 2. LETTER OF ACCEPTANCE (LOA)
FIGURE 1. SAMPLE OF A TYPE 1 LOA

ACME Data Company
Box 1
Nowhere, Arkansas 71953

December 25, 2005

TYPE 1 FAA LETTER OF ACCEPTANCE

The FAA has determined that the ACME Data Company complies with AC 20-153 and RTCA/DO-200A with regards to their processing of navigation data. The Type 1 LOA does not authorize the ACME Data Company to supply navigation data directly to an operator (e.g. end-user, airlines) for loading into the installed equipment.

The following terms and conditions are applicable to this letter of acceptance:

1. The ACME Data Company data quality requirements for the receipt of data from other sources, and for the delivery of data to their customers, are defined in ACME document XXX.XX.

2. The ACME Data Company procedures for processing data are defined in 'XXX Data Processing Standards'.

3. Reporting of Failures, Malfunctions, and Defects. The ACME Data Company must report to the FAA <insert local FAA ACO/MIDO office> any failure, malfunction, or defect of the aeronautical data produced under this LOA that may have a safety effect on operational use of the data.

4. Maintain a Quality Management System (QMS). The ACME Data Company must maintain a quality management system as described in RTCA/DO-200A, section 2.5. Changes to the QMS that may affect the data quality objectives must be reported to the <insert local MIDO/MISO> before implementation.

5. Design Changes.

   a. The ACME Data Company must submit minor changes to the data quality requirements, the data processing standards, or the quality management system to the <insert local FAA ACO> in accordance with procedures described within ACME document XXX.XX. All other changes are considered major, and must be substantiated and accepted prior to implementation in the same manner as that for the original LOA.

   b. Upon receipt of notification by the <insert local FAA ACO/MIDO office> that an unsafe condition exists in database product supplied under this LOA, the ACME Data Company shall develop corrective action and submit it to the <insert local

FAA ACO/MIDO office> for approval. The ACME Data Company shall expedite distribution of the approved corrective action to customers and users.

6. The ACME Data Company must perform periodic internal audits as described in RTCA/DO-200A, section 3, with a maximum time between audits (whether total or incremental) of not more than one year. Any major non-conformities as described in RTCA/DO-200A, section 3.4 must be reported to the <insert local ACO/MIDO office>. Additionally, the FAA may perform periodic audits in accordance with procedures described within ACME document XXX.XX.

7. ACME Data Company must advise their customers of the status of their LOA as well as the status of LOAs (or foreign acceptance, including designation of the foreign authority that acknowledges the foreign source's compliance to RTCA/DO-200A and the means of approval or acceptance) for all previous chain participants (up to, but not including, a State's AIP). The method must be timely to ensure that customers can react to changes in the status of their LOA.

Manager, *{regional}* Aircraft Certification Office,

APPENDIX 2. LETTER OF ACCEPTANCE (LOA), CONTINUED
FIGURE 1. SAMPLE OF A TYPE 2 LETTER OF ACCEPTANCE (LOA)

ACME Avionics Manufacturer
PO Box 1
Nowhere, Arkansas 71953

December 25, 2005

TYPE 2 FAA LETTER OF ACCEPTANCE

The FAA has determined that the ACME Avionics Manufacturer complies with AC 20-153 and RTCA/DO-200A with regards to their processing of navigation data. Compatibility has been established with the following systems:

ACME FMS Model XY, P/N 12345-23a
ACME FMS Model Z, P/Ns 56789-1 through 56789-8

The following terms and conditions are applicable to this letter of acceptance:

1. The ACME Avionics Manufacturer data quality requirements for the receipt of data from other sources, and for the delivery of data to their customers, are defined in ACME Documents XXX.XX and YYY.YY, respectively.

2. The ACME Avionics Manufacturer procedures for processing data are defined in 'XXX Data Processing Standards'.

3. Reporting of Failures, Malfunctions, and Defects. The ACME Avionics Manufacturer must report to the FAA <*insert local FAA ACO/MIDO office*> any failure, malfunction, or defect of the aeronautical data produced under this LOA that may have a safety effect on operational use of the data.

4. Maintain a Quality Management System (QMS). The ACME Avionics Manufacturer must maintain a quality management system as described in RTCA/DO-200A, section 2.5. Changes to the QMS that may affect the data quality objectives must be reported to the <*insert local MIDO/MISO*> before implementation.

5. Design Changes.

   a. The ACME Avionics Manufacturer must submit minor changes to the data quality requirements, the data processing standards, or the quality management system to the <*insert local FAA ACO*> in accordance with procedures described within ACME document XXX.XX. All other changes are considered major, and must be substantiated and accepted prior to implementation in the same manner as that for the original LOA.

b. Upon receipt of notification by the <insert local FAA ACO/MIDO office> that an unsafe condition exists in database product supplied under this LOA, the ACME Avionics Manufacturer shall develop corrective action and submit it to the <insert local FAA ACO/MIDO office> for approval. The ACME Avionics Manufacturer shall expedite distribution of the approved corrective action to customers and users.

6. The ACME Avionics Manufacturer must perform periodic internal audits as described in RTCA/DO-200A, section 3, with a maximum time between audits (whether total or incremental) of not more than one year. Any major non-conformities as described in RTCA/DO-200A, section 3.4 must be reported to the *<insert local ACO/MIDO office>*. Additionally, the FAA may perform periodic audits in accordance with procedures described within ACME document XXX.XX.

7. ACME Avionics Manufacturer must advise their customers of the status of their LOA as well as the status of LOAs (or foreign acceptance, including designation of the foreign authority that acknowledges the foreign source's compliance to RTCA/DO-200A and the means of approval or acceptance) for all previous chain participants (up to, but not including, a State's AIP). The method must be timely to ensure that customers can react to changes in the status of their LOA.

Manager, *{regional}* Aircraft Certification Office,

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
Application of RTCA/DO-200A to Operators							
1-1	Before loading, the operator must ensure that the data complies with data quality requirements (DQRs).	AC 9a					
1-2	The operator must document steps, if they have defined the requirements for completeness and timeliness.	AC 9a(5)					
1-3	Before loading, the operator must review status of all LOAs (or equivalent) within the data chain.	AC 9a(6)					
1-4	If performing data preparation or transmission, operator must comply with AC para. 10 and 11.	AC 9b					
Relationship between RTCA/DO-200A, Airworthiness Approval and TSOA							
2-1	For existing systems, the DQRs should be identified.	AC 10a					
2-2	The DQRs must be under configuration control.	AC 10c					
2-3	The DQRs must be consistent with intended function.	AC 10c(1)					
2-4	Required assurance level for the data process must be identified and consistent with intended use.	AC 10c(2)					
2-5	Changes to DQRs must be evaluated (major, minor, or no effect). Ensure processes are in place.	AC 10c(3)(a)					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
Application of RTCA/DO-200A to Data Suppliers							
3-1	Foreign Suppliers must be identified.	AC 9a(6)					
3-2	Type 2 LOA must be associated with specific equipment.	AC 8a(2)					
Compliance Plan							
4-1	Compliance plan must be developed per RTCA/DO-200A, sect.2.2.	AC 11b(1)					
4-2	Compliance Plan shall be prepared to address all aspects of data process. It shall identify the 5 items in RTCA/DO-200A, sect 2.2.	RTCA/DO-200A 2.2					
Data Quality Requirements (DQRs)							
5-1	Documentation of DQRs per RTCA/DO-200A, sect. 2.3.	AC 11b(2)					
5-2	Mutual agreement of DQRs between Type 2 LOA holder and its data suppliers.	AC 11b(2)					
5-3	Changes to DQRs must be coordinated between Type 2 LOA holder and its data suppliers.	AC 11b(4)					
5-4	Changes to DQRs that result in a major change to a TSOA article must obtain a new TSOA.	AC 8d(3)(b)					
5-5	DQRs must be under configuration control.	AC 10c					
5-6	The data shall have the agreed data accuracy.	RTCA/DO-200A 2.3.2 Item 1					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
5-7	The data shall have the agreed data resolution.	RTCA/DO-200A 2.3.2 Item 2					
5-8	The data shall have the agreed data assurance level.	RTCA/DO-200A 2.3.2 Item 3					
5-9	Level 4 data must be distinguishable from any RTCA/DO-200A compliant data.	AC 11b(5)					
5-10	Documentation must show traceability between identification of installed data with version of DQRs.	AC 8c(4)					
5-11	The data shall have the agreed data traceability.	RTCA/DO-200A 2.3.2 Item 4					
5-12	The data shall have the agreed data timeliness.	RTCA/DO-200A 2.3.2 Item 5					
5-13	The data shall have the agreed data completeness.	RTCA/DO-200A 2.3.2 Item 6					
5-14	The data shall have the agreed data format.	RTCA/DO-200A 2.3.2 Item 7					

NOTE: Per RTCA/DO-200A, the User is defined as any group or organization in the data chain that receives data. The User shall determine the DQRs. For example, an Applicant for a Type. 2 LOA is considered to be the 'User' of the data received by any Type 1 data supplier.

5-15	The User shall base the data quality upon the most restrictive requirement.	RTCA/DO-200A 2.3.3 Item 2					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
5-16	The User shall assure the quality requirements are attained.	RTCA/DO-200A 2.3.3 Item 3					
5-17	The User shall determine the nature of action to be taken in the event of an error or inconsistency.	RTCA/DO-200A 2.3.3 Item 4					
5-18	The User shall be responsible for establishing their requirement for being notified of any data alteration.	RTCA/DO-200A 2.3.3 Item 5					
5-19	The data supplier shall provide data that meets the agreed user DQRs.	RTCA/DO-200A 2.3.4 Item 1					
5-20	The data supplier shall have a system for handling problems reported during data processing and those reported by the user after delivery.	RTCA/DO-200A 2.3.4 Item 2					
5-21	All problems reported with the data shall be analyzed and any errors or anomalies resolved and documented.	RTCA/DO-200A 2.3.4 Item 3					
5-22	All errors or anomalies detected in the data shall be resolved prior to delivery.	RTCA/DO-200A 2.3.4 Item 4					
5-23	Information concerning any errors or anomalies found after delivery shall be made available to all affected users.	RTCA/DO-200A 2.3.4 Item 5					
5-24	Data Supplier must establish a procedure to report to FAA any safety related error or defect.	AC 8d(1)					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
5-25	The means by which errors or anomalies are resolved shall be reported to all affected users.	RTCA/DO-200A 2.3.4 Item 6					
5-26	The delivery format requirements shall be documented.	RTCA/DO-200A 2.3.5 Item 2					
5-27	Documentation shall be maintained that identifies all of the suppliers of data and the approval status of each.	RTCA/DO-200A 2.3.5 Item 3					

Data Processing Requirements

6-1	Data supplier must comply with RTCA/DO-200A, sect 2.4.	AC 11b(3)					
6-2	The data processing procedures shall define the means to confirm that the data has been received without corruption.	RTCA/DO-200A 2.4.1 Item 1					
6-3	The data processing procedures shall define the means by which data is assembled.	RTCA/DO-200A 2.4.1 Item 2					
6-4	The data processing procedures shall define the means to ensure stored data is protected from corruption.	RTCA/DO-200A 2.4.1 Item 3					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
6-5	The data processing procedures shall define the method of origination for locally originated data.	RTCA/DO-200A 2.4.1 Item 4					
6-6	Documentation of criteria for originated data.	AC 11b(3)(b)					
6-7	Originated Data must be distinguishable from State provided data.	AC 11b(3)(b)					
6-8	The data processing procedures shall define the means to ensure locally originated data is not corrupted.	RTCA/DO-200A 2.4.1 Item 5					
6-9	Documentation of process for validating any originated data.	AC 11b(3)(b)					
6-10	The data processing procedures shall define the means by which validation is performed.	RTCA/DO-200A 2.4.1 Item 6 (a-c)					
6-11	The data processing procedures shall define the action to be taken when data fails verification/validation.	RTCA/DO-200A 2.4.1 Item 7					
6-12	The data processing procedures shall define the method used to evaluate degradation of accuracy.	RTCA/DO-200A 2.4.1 Item 8					
6-13	The data processing procedures shall define the requisite skills and competencies.	RTCA/DO-200A 2.4.1 Item 9					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
6-14	The data processing procedures shall define the tools required.	RTCA/DO-200A 2.4.1 Item 10					
6-15	The data processing procedures shall define the method used to verify received data.	RTCA/DO-200A 2.4.1 Item 11					
6-16	Data obtained from non-RTCA/DO-200A suppliers (excluding state data) must be verified and validated.	AC 11b(3)(iii)					
6-17	The data processing procedures shall define the method by which data quality is preserved.	RTCA/DO-200A 2.4.1 Item 12					
6-18	The data processing procedures shall define the method for ensuring that any changed data meets resolution and accuracy requirements.	RTCA/DO-200A 2.4.1 Item 13					
6-19	The data processing procedures shall define the method to be used to provide the user with the ability to verify data.	RTCA/DO-200A 2.4.1 Item 14					
6-20	LOA holder submission of minor changes to the data process to the ACO as agreed to.	AC 8d(3)(a)					
6-21	Major changes to the data process must be substantiated.	AC 8d(3)(a)					

Data Alteration

7-1	Documentation of criteria for informing the data originator of any data alteration.	AC 11b(3)(a)3					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
7-2	Altered data shall not be transmitted if the originator rejects the change.	RTCA/DO-200A 2.4.2					
7-3	Records shall be kept of all alterations and shall be made available to any user upon request.	RTCA/DO-200A 2.4.2					

Configuration Management

8-1	CM plan shall define the data configuration requirements and shall identify all data to be placed under CM.	RTCA/DO-200A 2.4.3.1					
8-2	CM plan shall include all delivered data products.	RTCA/DO-200A 2.4.3.1 Item 1					
8-3	CM plan shall include all data that are identified in planning process as required to be stored in order to recover from data loss or corruption.	RTCA/DO-200A 2.4.3.1 Item 2					
8-4	Data elements placed under CM shall be assigned a unique identification contained within the data element as well as being used as a physical label.	RTCA/DO-200A 2.4.3.2					
8-5	The CM procedures shall ensure that the data element cannot be changed without changing the identification.	RTCA/DO-200A 2.4.3.2					
8-6	Records shall be maintained that identify the data content of all data elements and shall be sufficient to allow items 1-5.	RTCA/DO-200A 2.4.3.2					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
8-7	A copy of each data element shall be retained for a period determined by the CM plan. The method of storage and number of copies shall be such that items 1-2 are achieved.	RTCA/DO-200A 2.4.3.2					

Skills and Competencies

9-1	Procedures shall be established that define the means that personnel may acquire or maintain the required skills and competencies.	RTCA/DO-200A 2.4.4.1					
9-2	Appropriate records of skills and competencies shall be maintained.	RTCA/DO-200A 2.4.4.1					
9-3	Short falls in skills and competencies shall be identified and corrective actions taken.	RTCA/DO-200A 2.4.4.1					

Tool Qualification

10-1	Each tool (new or modified) shall be reviewed to determine need for qualification.	RTCA/DO-200A 2.4.5.1 Item 1					
10-2	Justification for not qualifying a tool shall be documented.	RTCA/DO-200A 2.4.5.1 Item 2					
10-3	Tool Qual plan shall describe the tool qualification process.	RTCA/DO-200A 2.4.5.2					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
10-4	Tool qual plan shall identify: Tool requirements, qualification procedures, CM procedures, documentation requirements, QM procedures, and those responsible for qualification process including their authority.	RTCA/DO-200A 2.4.5.2					
10-5	Tool requirements shall be defined and include the functionality and performance of the tool, a description of the operational environment and user information.	RTCA/DO-200A 2.4.5.3					
10-6	Tool Qualification procedures shall specify the means to ensure the required data quality for the data output and the means by which the tool satisfies the tool requirements.	RTCA/DO-200A 2.4.5.4					
10-7	The tool CM process shall provide a unique identification for each distinct version of the tool, the convenient visibility of the tool version, the ability to consistently replicate a particular version of the tool, a change control process and a secure environment for physical archiving, recovery and control.	RTCA/DO-200A 2.4.5.5					
10-8	Documents and reports shall be maintained to show that tool qualification activities have been completed satisfactorily.	RTCA/DO-200A 2.4.5.6					

Quality Management

11-1	LOA holder must maintain QMS.	AC 8d(2)					
11-2	LOA holder must report changes to QMS that affect objectives.	AC 8d(2)					
11-3	Quality Management requirements must define data elements that can be originated or altered.	11b(3)(b)					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
11-4	Quality Management requirements must define level of review and approval required for any originated data.	11b(3)(b)					
11-5	LOA holder must perform periodic internal audits.	AC 8d(4)					
11-6	Any major non-conformities must be reported to FAA.	AC 8d(4)					
11-7	LOA holder must notify FAA when they no longer comply with conditions of LOA.	AC 8d(5)					
11-8	LOA holder must notify customers of LOA status and must be timely.	AC 8d(7)					
11-9	The QM procedures shall define the criteria used for the review of plans and procedures, review of personnel skills records and review of qualified tools.	RTCA/DO-200A 2.5.1 Items 1-3					
11-10	The QM procedures shall identify who will have approval authority.	RTCA/DO-200A 2.5.1 Items 4-6					
11-11	All plans and procedures shall be reviewed and approved prior to their application.	RTCA/DO-200A 2.5.2					
11-12	Review of any new data requirements from suppliers shall be evaluated prior to their application.	RTCA/DO-200A 2.5.2					
11-13	Any unauthorized deviations from procedures shall be corrected.	RTCA/DO-200A 2.5.2					
11-14	All personnel shall be qualified to carry out designated procedures.	RTCA/DO-200A 2.5.2					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
11-15	Personnel shall have access to authorized version of the procedures.	RTCA/DO-200A 2.5.2					
11-16	Personnel shall be notified of any approved changes to the procedures.	RTCA/DO-200A 2.5.2					
11-17	Obsolete versions of documents shall not be used.	RTCA/DO-200A 2.5.2					
11-18	All tools including any updates shall be reviewed and approved prior to their application.	RTCA/DO-200A 2.5.2					
11-19	Records of procedures, personnel and tools shall be kept.	RTCA/DO-200A 2.5.2					
11-20	Records of all reviews shall be maintained.	RTCA/DO-200A 2.5.3					

Quality Management Event Driven Changes

11-21	Plans and procedures shall be reviewed when there are event driven changes (proposal to provide new data that may result in changes to procedures or tools).	RTCA/DO-200A 2.5.3.1					
11-22	Event driven changes shall be implemented prior to delivery of the affected data.	RTCA/DO-200A 2.5.3.1					
11-23	Event driven changes shall include an evaluation of data supplier's ability to meet required data quality.	RTCA/DO-200A 2.5.3.1					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
11-24	Records of skill shall be reviewed for new tasks.	RTCA/DO-200A 2.5.3.1					
11-25	Personnel shall be authorized as having the necessary skills.	RTCA/DO-200A 2.5.3.1					
11-26	When an error is reported, action shall be taken to correct the procedures, skills or tools.	RTCA/DO-200A 2.5.3.1					

Quality Management Periodic Reviews

11-27	Plans and procedures shall be reviewed periodically.	RTCA/DO-200A 2.5.3.2					
11-28	Records of skill for personnel shall be reviewed periodically to confirm personnel have required skills.	RTCA/DO-200A 2.5.3.2					
11-29	Tools shall be reviewed periodically to confirm ability of tool to meet DQRs.	RTCA/DO-200A 2.5.3.2					
11-30	The accreditation of suppliers (to the RTCA/DO-200A standard) shall periodically be confirmed.	RTCA/DO-200A 2.5.3.2					
11-31	All records of detected data errors shall be reviewed periodically. Any actions shall be recorded.	RTCA/DO-200A 2.5.3.2					
11-32	All periodic reviews shall include a review of all problems reported. Any deficiencies or limitations shall be assessed and corrective action taken if necessary to meet DQRs.	RTCA/DO-200A 2.5.3.2					

DATA PROCESSING OBJECTIVES

	Objective	Ref.	Verification Method (e.g. Inspection, Observation)	Applicant's Ref. Document or ID	Config. Control on Ref. Document	Objective Met Yes, No or Pending	Notes Numerical reference
Quality Management Records and Management Reviews							
11-33	Retention of records shall be established and recorded.	RTCA/DO-200A 2.5.4 Item 1					
11-34	Records shall be legible.	RTCA/DO-200A 2.5.4 Item 2					
11-35	Records shall be retrievable.	RTCA/DO-200A 2.5.4 Item 3					
11-36	Management reviews shall confirm that data plans and procedures will meet required data quality and will evaluate the need for corrective/preventive action.	RTCA/DO-200A 2.5.5					
11-37	Results of the Management reviews shall be recorded	RTCA/DO-200A 2.5.5					