Trinidad and Tobago
Civil Aviation Authority

TTCAA Advisory Circular

Subject: USE OF AN ELECTRONIC MANUAL SYSTEM
TTCAA Advisory Circular TAC-038
Date: 06/04/06

PURPOSE

1. (1) The purpose of this TTCAA Advisory Circular (TAC) is to provide guidance on the acceptance and use of electronic manual system to satisfy certain operational and maintenance requirements.

(2) Upon acceptance of an electronic manual system by the TTCAA, that system may be used to generate and upkeep operations and maintenance manuals.

(3) This TAC describes an acceptable means, but not the only means, of complying with the TTCAA's operational and maintenance manual requirements. Specifically, hard copies of manuals continue to be acceptable. However, if the electronic manual system described in this TAC is used, the guidance must be complied with in all important respects.

APPLICABILITY

2. This TAC applies to –

(a) Air operators under TTCAR No.2, No3 and No.10;

(b) Operators under TTCAR No.11;

(c) Approved Maintenance Organizations under TTCAR No.6.

DEFINITIONS

3. For purposes of this TAC, the following definitions apply:

(a) **Computer Hardware.** A computer and the associated physical equipment directly involved in the performance of communications or data processing functions;

(b) **Computer Software.** Written or printed data, such as programs, routines, and symbolic languages, essential to the operation of computers;

(c) **Electronic Recordkeeping System or Manual.** A system of record processing in which records or manuals are entered, stored, and retrieved electronically by a computer system rather than in the traditional hard copy form;

ELECTRONIC MANUALS

General

4. (1) Use of the electronic medium for information handling has become commonplace and has significantly improved efficiency. Electronic information storage and retrieval systems have enhanced significantly the aviation industry's ability not only to meet civil aviation record-retention requirements, but also to manufacture, operate, and maintain today's highly complex aircraft and aircraft systems in a demanding operational environment.

(2) Electronic formats for the construction of manuals offer improved data accessibility, quality control, and speed distribution over paper or microfilm-based information storage systems that result in enhanced safety. In addition, the industry should experience a reduced economic burden because users will have rapid access to information at reduced cost as well as improving the presentation of technical data contained in a certificate holder's or operator's manual(s).

(3) Many operators prepare their operations and certain maintenance manuals using an electronic medium, but have had to present a hard copy to the TTCAA for acceptance or approval. In the acceptance and approval process, the TTCAA is not concerned with the computer technology used to accomplish the manual preparation tasks, but instead is concerned with the accuracy and integrity of the recorded information.

(4) Taking these attributes into consideration, and assuming their contents have been TTCAA approved, electronic manuals on CD-ROM, Internet-based systems, or other electronic media are acceptable where they satisfy the acceptance process of this TAC. Electronic manual computer hardware and software systems must deliver the same, or better, accuracy and integrity maintained by paper/microfilm-based systems. In addition, electronic manuals must still comply with requirements about the currency, completeness, use, or availability of the technical data.

Electronic Manual Construction

5. (1) When constructing an electronic manual to meet the operational and maintenance requirements addressed in this TAC, the following elements must be considered and addressed:

(a) **Storage and Retrieval.** Computer hardware and software system must store and retrieve the manual's technical data under conditions of normal operation and use. The system must not permit unauthorized modification of the data it contains;

(b) **Maintenance and Support.** Maintenance and support for the system, including provisions for power outages and necessary alternative retrieval services, may be provided by sources independent of the certificate holder or operator. However, the certificate holder or operator is still responsible for compliance with all regulatory requirements and cannot be delegated;

(c) **Access to Manual.** Appropriate certificate holder or operator personnel must be able to access the manuals. Procedures for distributing the manuals/technical data may be similar to procedures for distributing information contained in paper or microfilm manuals. Certificate holders or operators may use their current manual distribution system to distribute electronic manuals;

(d) **Revisions to Manual.** Procedures will be established to verify that revisions (i.e., incremental, temporary or scheduled revisions) to the technical data contained in the maintenance portion of its manual are current and complete. In addition, revisions must be approved by the appropriate authority before distribution. TTCAA approval may be accomplished in accordance with subparagraph (3) below, **Revision Control Procedures**;

(e) **TTCAA Access.** Any TTCAA authorized representative must be able to retrieve, print, or view the information in any electronic manual. If a certificate holder or operator is required to provide information to the TTCAA, he should provide the record in a format usable by the TTCAA;

(f) **User Instructions.** Users will be provided information describing the electronic system's use and operation. Such information will include instructions for using publications, reference information, and system administration information. These instructions need not be in paper form. They will consist of the following:

(i) Electronic, context-sensitive help;

(ii) Online or system responses to specific operator queries;

(iii) Telephonic or electronic access to a designated assistance line;

(iv) Other information included in the electronic system.

(g) **Training.** A training programme will be provided to employees or contractors who use the electronic manual. The subject matter and objectives of the training will vary depending on the employee's or contractor's job responsibilities and functional level within the organization. Customer training will include security awareness and policy and procedures for the system. Acceptable methods of providing this training may include, but are not limited to, classroom instruction, online or system tutorials, user guides, and simulated problem-solving exercises. Any training programme will define minimum competency criteria and the method for users to demonstrate competence;

(h) **Enhancements.** Additional features (such as text searching, hypertext links, or other enhancements) that facilitate access to the information are generally not required for a system to be approved.

(2) **Functional Considerations.**

(a) The electronic system should allow users to retrieve the technical data from any electronic manual stored in the system. The electronic manual should be able to access, navigate, and retrieve applicable information at a computer workstation. Information stored in the electronic manual may occur in either a stand-alone or a shared environment;

(b) The content of an electronic manual must be clearly identifiable and viewable by the user. This material must easily correlate to corresponding information in a printed version of the manual. Requested information must be displayed on a computer screen or comparable device. If connected to a paper printer, the system must be able to print any information contained in an electronic manual.

(3) **Revision Control Procedures.** These procedures apply to organizations operating under a TTCAA-issued certificate with a continuous aircraft maintenance program. An application for approval of revision to an electronic manual should be submitted by letter giving a brief description of the revision.

In most cases, the approval of manual revisions only require the inspector to initial and date the list of affected pages. However, if the computer system uses a continuous flow of information process, a table of revisions should be used. The table of revisions must contain each chapter, section, task or sub-task number to be revised. With a table of revisions, the same process of initialing and dating the list of affected sections will apply. In either case, the copy of signed revisions will become archive copies of the manual revisions for the operator and the TTCAA. The following revision control procedures apply:

(a) **Validation of Revision Control Procedures.** Procedures must be established to audit the revision process to ensure contents of the electronic system are current and complete. The revision control procedures for electronic manual data may be similar to the revision control procedures used for other storage media;

(b) **Revision Transmittal Letter/Release Notes.** Many certificate holders and operators frequently use internal distribution documents that specify the current revision number and date for each revision. If this document is provided separately, it conveys the revision number and date with applicable instructions to the users. A user can inspect and review this documentation to determine data currency;

(c) **Currency of Data Currency.** Procedures must be established to ensure the currency of the technical data (regardless of the storage media). They must ensure that all electronic storage media contain the current revision and associated revision dates. With electronic media, page level insertion audits of manuals may no longer be necessary for users to ensure information currency;

(d) **User Responsibility.** Users of information or printed data from electronic manuals systems must ensure the information or printed data is from the most current manual.

(4) **Special Considerations in Displaying Information.**

(a) **Data Content and Information Form:** Any computer-displayed information should be readily traceable to its original source. This information must be readily accessible to the user and should be able to obtain the following:

(i) The manual title;

(ii) Applicable aircraft, airframe, engine, propeller, appliance, component, or part make and model;

(iii) Effective date of the data;

(iv) Revision simultaneously displayed with the technical data (e.g., on the computer screen).

(b) **Page Numbers and Revision Data:**

(i) Complete display of traditional letter size (8.5” x 11”) documents may not be possible on certain computer displays. Frequently, the video monitor will display only one-third to one-half of a paper page, and the user must scroll through the on-screen display to see the complete page. In addition, some systems may print an entire page although the video monitor displays only a partial page. This situation may result in electronic systems assigning, displaying, or printing page numbers not matching the approved copy of the manual. Therefore, certificate holders and operators must ensure information displayed or printed can be traced to the correct revision level of the manual;

(ii) The contents of a chapter, section, or subject in a maintenance manual may be displayed as a continuous flow of information without displaying the actual page numbers of the approved manual. The user may elect to display only a portion of a manual page. If this occurs, the organizational format of the manual should be retained, and a means of referencing the section or page of the manual from which the data was obtained should be provided. Some electronic manuals systems may provide a page number as with paper manuals. Some systems will only provide the chapter, section, and a page block or task number. In these cases, the user must output such blocks of information after selecting them;

(iii) References to specific chapters, sections, or paragraphs of the manual may be used to ensure information traceability to corresponding sections of a printed version. This permits the technical data to be easily referenced by the user and ensures traceability of the information to its source;

(iv) The most common method of updating a manual is to issue a revision with a list identifying the pages to which the revision applies. Each subsequently revised page contains the revision status. This same process may be applied when the manuals are in electronic format. The TTCAA recommends that certificate holders and operators prepare a table of revisions. That table should be included in the electronic manual to show when each page of the manual was revised. Some electronic manuals using a continuous flow of information process may not be capable of producing a list of effected pages. Therefore, a table of revisions needs to contain the revised manual, chapter, section, subject, task or sub-task numbers;

(5) **Data Archive.** A maintenance recordkeeping requirement often requires retention or access to previously used technical data to support or verify a method of repair or maintenance. To comply with those traceability requirements, a certificate holder or operator must archive earlier versions of manuals to provide for future needs to duplicate, regenerate, or reconstruct maintenance instructions. The archived materials should be obtained from the original source of the data. Regardless of the source, the certificate holder or operator is responsible for ensuring the availability of any required record and should also take into consideration the following:

(a) **Preservation of Stored Data.** Procedures will be established to ensure the integrity of the stored technical data, regardless of the storage medium. These procedures should include:

(i) Ensuring that no unauthorized changes can be made;

(ii) Selecting storage mediums that minimize regeneration of errors or deterioration;

(iii) Exercising, refreshing, or duplicating archived technical data at a frequency compatible with the storage life of the medium (i.e., before the storage medium deteriorates);

(iv) Storing duplicate copies in physically separate archives to minimize the risk of data loss in the event of a fire or natural disaster;

(b) **Technological Advances.** Certificate holders and operators should ensure all electronic systems components are maintained to enable retrievable archived manuals. Future changes in data storage media may result in a need to replace current computer hardware or a need to use

another storage medium. Future systems must be able to retrieve archived technical data. Otherwise, the certificate holder or operator will have to maintain the old system to ensure data availability.

OBTAINING TTCAA ACCEPTANCE FOR USE OF AN ELECTRONIC MANUAL

6. (1) **Announcing Intent to Use Electronic Manual.** Certificate holders and operators who propose to use an electronic manual should consult with the TTCAA before implementing an electronic system. To obtain TTCAA approval, the certificate holder or operator must submit a letter to the TTCAA (see Appendix 1 for sample letter) describing the proposed system and include the proposed section or revision to the operator's manual.

(2) **Description of Electronic System.** The electronic system description should explain how the electronic manual will be used in the operator's maintenance and operational activities. The proposed manual section or revision should clearly state who in the organization has authority and the overall responsibility for implementing, modifying, revising, and monitoring the electronic manual computer software.

(3) **TTCAA Acceptance Process.** A TTCAA inspector will be assigned to review the electronic manual proposal. If the proposed electronic hardware and computer software system meets the elements of this TAC, the inspector will make the appropriate entry on the operator's operations specifications. In the case of a general aviation operator, the TTCAA will review the operator's proposed procedures and if acceptable, will provide the operator with a letter of acceptance (see Appendix 2 for sample letter).

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Ramesh Lutchmedial
Director General of Civil Aviation

APPENDIX 1

SAMPLE LETTER OF INTENT FOR NON-CERTIFICATE HOLDERS

[Applicant's *Letterhead*]

Applicant's Address

Date

Executive Manager Safety Regulations

Civil Aviation Authority

Subject: Use of Electronic Manuals System

This letter is to inform you that [applicant/certificate holder] proposes to use an electronic manual system for [*describe what the system will be used for*]. This system has been established using the guidelines outlined in TTCAA Advisory Circular TAC- 38

We propose to implement the system on [*date*].

Company facilities, equipment, and personnel are available for your review and/or inspection at [*address*] on [*date*]. Please contact [*name*] at [*telephone*] to arrange a visit to review the system and to discuss any TTCAA concerns.

Your assistance in this matter would be much appreciated.

Sincerely,

[Applicant]

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APPENDIX 2

SAMPLE LETTER OF TTCAA ACCEPTANCE FOR NON-CERTIFICATE HOLDERS

[*Date*]
Mr. John Smith
1234 Pole Mark
Piarco

Dear Mr. Smith,

This letter confirms acceptance of the electronic manual system used by the owner/operator of [*registration number or attached list*]. The accepted procedures meet the intent of the TAC – 38.

TTCAA acceptance is limited to those persons who are trained by the owner/operator in the use of electronic equipment in accordance with the owner's/operator's required procedures.

The TTCAA must be notified of any significant changes in the design or operation of the system.

The TTCAA should have access to the system at all times. Any changes to designated TTCAA user identification codes or passwords should be submitted to the TTCAA as soon as practical after the change.

Unless withdrawn, this letter is valid indefinitely, and should be transferred with the aircraft records as part of any aircraft ownership transfer.

Sincerely,

[Name]
Aviation Safety Inspector