

Federal Aviation Administration
Aviation Rulemaking Advisory Committee

Executive Committee
Digital Information Working Group

Task 1 – 14 CFR Parts 43, 121, 125, 129, 135, and 145

Task Assignment

[Federal Register: September 19, 1995 (Volume 60, Number 181)]
[Notices]
[Page 48586-48587]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr19se95-86]

DEPARTMENT OF TRANSPORTATION

Aviation Rulemaking Advisory Committee; New Task

AGENCY: Federal Aviation Administration (**FAA**), DOT.

ACTION: Notice of a new task assignment for the Aviation Rulemaking Advisory Committee (ARAC).

SUMMARY: Notice is given of a new task assigned to and accepted by the Aviation Rulemaking Advisory Committee (ARAC). This notice informs the public of the activities of ARAC.

FOR FURTHER INFORMATION CONTACT:

Mr. Chris Christie, Director, Office of Rulemaking (ARM-1), Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; phone (202) 267-9677; fax (202) 267-5075.

SUPPLEMENTARY INFORMATION:

Background

The **FAA** has established an Aviation Rulemaking Advisory Committee to provide advice and recommendations to the **FAA** Administrator, through the Associate Administrator for Regulation and Certification, on the full range of the **FAA**'s rulemaking activities with respect to aviation-related issues. This includes obtaining advice and recommendations on the **FAA**'s commitment to harmonize its Federal Aviation Regulations (FAR) and practices with its trading partners in Europe and Canada.

The Task

This notice is to inform the public that the **FAA** has asked ARAC to provide advice and recommendation on the following task:

Digital Information and Use: Review 14 CFR Parts 43, 121, 125, 129, 135, and 145, the corresponding sections of the European Joint Aviation Requirements (JAR), and supporting policy and guidance material, and recommend to the **FAA** appropriate revisions for harmonization, including advisory material, relative to the issue of regulations that prohibit or discourage the access or use of information, guidance material or performance data that is in digital or electronic form in order to permit the use of the other digital media.

The **FAA** also has asked that ARAC determine if rulemaking action (e.g., NPRM), should be taken, or advisory material should be issued. If so, ARAC has been asked to prepare the necessary documents, including economic analysis, to justify and carry out its recommendation(s).

ARAC Acceptance of Task

The ARAC Executive Committee has accepted the task and has chosen to establish a new Digital Information Working Group. The working group will serve as staff to the ARAC Executive Committee to assist it in the analysis of the assigned task. Working group recommendations must be reviewed and approved by the Executive Committee. If the Executive Committee accepts the working group's recommendations, it forwards them to the **FAA** as ARAC recommendations.

Working Group Activity

The Digital Information Working Group is expected to comply with the procedures adopted by ARAC. As part of the procedures, the working group is expected to:

[[Page 48587]]

1. Recommend a work plan for completion of the task, including the rationale supporting such a plan, for consideration at the meeting of the ARAC Executive Committee held following publication of this notice.
2. Give a detailed conceptual presentation of the proposed recommendations, prior to proceeding with the work stated in item 3 below.
3. Draft appropriate regulatory documents with supporting economic and other required analyses, and/or any other related guidance material or collateral documents the working group determines to be appropriate; or, if new or revised requirements or compliance methods are not recommended, a draft report stating the rationale for not making such recommendations.
4. Provide a status report at each meeting of the ARAC Executive Committee.

Participation in the Working Group

The Digital Information Working Group is composed of experts having an interest in the assigned task. A working group member need not be a representative of a member of the full committee.

An individual who has expertise in the subject matter and wishes to become a member of the working group should write to the person listed under the caption FOR FURTHER INFORMATION CONTACT expressing that desire, describing his or her interest in the task, and stating the expertise he or she would bring to the working group. The request will be reviewed by the chair, the executive director, and the working group chair, and the individual will be advised whether or not the request can be accommodated.

The Secretary of Transportation has determined that the formation and use of ARAC are necessary and in the public interest in connection with the performance of duties imposed on the **FAA** by law.

Meetings of the ARAC Executive Committee will be open to the public, except as authorized by section 10(d) of the Federal Advisory

Committee Act. Meetings of the Digital Information Working Group will not be open to the public, except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of working group meetings will be made.

Issued in Washington, DC, on September 13, 1995.
Chris Christie,
Executive Director, Aviation Rulemaking Advisory Committee.
[FR Doc. 95-23209 Filed 9-18-95; 8:45 am]
BILLING CODE 4910-13-M



U.S. Department
of Transportation

**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

SEP 13 1995

Ms. Sarah MacLeod
Executive Director
Aeronautical Repair Station Association
121 North Henry Street
Alexandria, VA 22314

Sarah
Dear Ms. MacLeod:

This is in reference to your July 28 letter requesting the FAA to task the Aviation Rulemaking Advisory Committee (ARAC) with reviewing 14 CFR Parts 43, 121, 125, 129, 135, and 145 and corresponding Joint Aviation Requirements (JAR) and recommend revision of regulations that prohibit or discourage the use of digital information.

We believe that the task you requested would result in significant savings in time and money for both the FAA and the rest of the aviation community. For that reason, we agree that assigning the task to ARAC would be appropriate.

The task is as follows:

Digital Information and Use: Review 14 CFR Parts 43, 121, 125, 129, 135, and 145, the corresponding sections of the European Joint Aviation Requirements (JAR), and supporting policy and guidance material, and recommend to the FAA appropriate revisions for harmonization, including advisory material, relative to the issue of regulations that prohibit or discourage the access or use of information, guidance material or performance data that is in digital or electronic form in order to permit the use of other digital media.

If you have any questions concerning this task, you may call Chris Christie on (202) 267-9683.

Sincerely,

for Anthony J. Broderick
Associate Administrator for
Regulation and Certification

Recommendation Letter

cc: AUM 200
Action



Robert E. Robeson, Jr.
Vice President
Civil Aviation
(202) 371-8415

February 9, 1998

Mr. Guy S. Gardner
Associate Administrator for
Regulation and Certification
Federal Aviation Administration
800 Independence Avenue S.W.
Washington, DC
20591

Dear Mr. Gardner:

Enclosed for your consideration are the following two documents:

Use of Electronic Signature (NPRM 2120-XXXX)
Acceptance and Use of Electronic Signatures (AC 120-ES)

Following review by the FAA legal and economic analysts and incorporation of their suggestions, this package was approved by the Aviation Rulemaking Advisory Committee Executive Committee on December 18.

It is the hope of the EXCOMM that the FAA will move expeditiously to process these documents, which provide important features to bring the regulations into line with modern business practices.

On behalf of the EXCOMM, thank you for your attention to this matter.

Sincerely,

Robert E. Robeson,
Chair
Aviation Rulemaking Advisory Committee

Encl.

cc (w/o encl): P. Boughton, ATA
J. Hawkins, FAA

Acknowledgement Letter



U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

APR 13 1998

Mr. Robert E. Robeson, Jr.
Chairman, Aviation Rulemaking Advisory
Committee
Aerospace Industries Association of America, Inc.
1250 Eye Street, NW
Washington, DC 20005

Dear Bob:

Thank you for your February 9 letter in which you transmitted recommendations of the Aviation Rulemaking Advisory Committee (ARAC). You provided a notice of proposed rulemaking (NPRM) concerning Use of Electronic Signatures and a proposed advisory circular titled Acceptance and Use of Electronic Signatures (AC 120-ES). The Federal Aviation Administration (FAA) accepts these recommendations provided there are no legal or other reasons why we cannot adopt them.

The complete rulemaking package will be reviewed and coordinated within the FAA and the Offices of the Secretary of Transportation and Management and Budget, if appropriate. The FAA will publish the NPRM for public comment as soon as the coordination process is complete. The proposed advisory circular will also be made available for public comment when the coordination process is complete. We will make every effort to handle these recommendations expeditiously.

I would like to thank the Executive Committee of ARAC, and particularly the Digital Information Working Group for its action on this task.

Sincerely,

for Guy S. Gardner
Associate Administrator for
Regulation and Certification



Regional Airline Association

1200 19th Street, NW • Suite 300 • Washington, DC 20036-2401 • 202/857-1170 • FAX 202/429-5113 • ARINC "WASRAXD"

July 28, 1995

Mr. Anthony Broderick
Associate Administrator
Regulation and Certification
Federal Aviation Administration
800 Independence Ave. SW
Washington, DC 20591

Re: Request the assignment of Digital Information and Use task to ARAC

Dear Tony:

ARAC has been asked to accept a task on Digital Information and Use. The ARAC Executive Committee has been briefed on the scope of the task, understands its objectives and requests that it be formally assigned as a task for ARAC.

A description of the proposed task is attached. Please contact me if there are questions regarding the task or the ARAC Executive Committee approval process.

Sincerely,

A handwritten signature in black ink that reads 'W. Coleman'.

Walter S. Coleman
Chairman, ARAC
Executive Committee

Enclosure

The following is a new proposed task that the Aviation Rulemaking Advisory Committee (ARAC) EXCOM would like approval from the FAA to proceed with.

Task 1 --- Digital Information and Use

Review 14 CFR Parts 43, 121, 125, 129, 135, and 145, the corresponding sections of the European Joint Aviation Requirements (JAR), and supporting policy and guidance material, and recommend to the FAA appropriate revisions for harmonization, including advisory material, relative to the issue of regulations that prohibit or discourage the access or use of information, guidance material or performance data that is in digital or electronic form in order to permit the use of other digital media.

BACKGROUND: FARs currently only allow paper or microfilm for technical information delivery and use. The cost of exemptions is currently \$80K/Yr./Airline and \$40K/Yr. to the FAA. Further, this proposal provides industry participation in the commitment made by the FAA in 1970 to "...consider the feasibility and applicability of using other technological advancements in related areas such as computer storage and transmission in an effort to provide the most effective system for the preparation, retention and use of required information.....", for certificate holder manuals. Once electronic systems are in place the total cost from production to operation will be a savings of \$200K/ A/C /Yr.

Personnel resources required to manage and track information using current prescribed media will continue to increase as the volume and complexity of information required by FARs increases. Most of the data that is now required is not used to spot problems because the volume is so immense that manhours are not available to analyze it. Many new technologies are available to manage, distribute and analyze technical information if it can be in digital form.

This proposal will provide for the potential to enhance safety while, at the same time, providing a lower cost to organizations employing digital information. The management and handling of information will be safer because the information that is now tracked manually will be available for electronic screening to spot patterns and trends that need addressing before they become a problem. Manpower to produce, manage, distribute, store and analyze information will be reduced, even though the volume and complexity of that information may increase.

The boundaries and scope of this workgroup will be constrained and controlled by the ARAC EXCOM.



AERONAUTICAL REPAIR STATION ASSOCIATION

121 NORTH HENRY STREET
ALEXANDRIA, VA 22314-2903
TEL: (703) 739-9543
FAX: (703) 739-9488

September 25, 1995

Mr. Phil Boughton
Air Transport Association
1301 Pennsylvania Avenue, N.W.
Suite 1100
Washington, D.C. 20004-1707

Dear Phil:

Please accept the position of Chair to the Aviation Rulemaking Advisory Committee's Executive Committee's Working Group entitled Digital Information and Use. The task, as assigned by the FAA in their September 13, 1995 letter, is as follows:

Digital Information and Use: Review 14 CFR Parts 43, 121, 125, 129, 135 and 145, the corresponding sections of the European Joint Aviation Requirements (JAR), and supporting policy and guidance material, and recommend to the FAA appropriate revisions for harmonization, including advisory material, relative to the issue of regulations that prohibit or discourage the access or use of information, guidance material or performance data that is in digital or electronic form in order to permit the use of other digital media.

Please find enclosed a copy of the September 13, 1995 letter assigning this task to the ARAC. I have asked that Jean Casciano forward you a copy of the ARAC Handbook which outlines the procedures for ARAC to make recommendations to the FAA. As a Working Group, you are the development arm of ARAC and must report to the ARAC and pass your recommendations through that Committee to the FAA. If you have any questions, please do not hesitate to contact me.

Sincerely,

Sarah MacLeod
Chair, Aviation Rulemaking Advisory
Committee, Executive Committee

Enclosure

cc: Jean Casciano
ARM-25

Recommendation

January 29, 1998

[4910-13-P]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR parts 21, 43, 91, and 119

[Docket No. ; Notice No.]

RIN: 2120-XXXX

Use of Electronic Signatures

AGENCY: Federal Aviation Administration, DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: This notice proposes to amend the regulations to permit the use of electronic signatures to satisfy maintenance, operational, and type certification record preparation and retention requirements. Current regulations do not reflect advances in information storage and retrieval technology and the widespread use of electronic systems in the aviation industry. By permitting the use of electronic signatures, the proposal would permit the full use of electronic systems to prepare and retain maintenance, operational, and type certification records.

DATES: Comments must be received on or before [].

ADDRESSES: Comments on this notice should be delivered, in triplicate, to: Federal Aviation Administration (FAA), Office of the Chief Counsel, Attention: Rules Docket (AGC-200),

800 Independence Avenue SW., Washington, DC 20591. Comments delivered must be marked Docket No. . Comments may also be submitted electronically to the following Internet address: 9-nprm-cmts@faa.dot.gov. Comments may be examined in Room 915G weekdays between 8:30 a.m. and 5 p.m., except on Federal holidays.

FOR FURTHER INFORMATION CONTACT: Wayne C. Nutsch,
Airworthiness, General Aviation, and Commercial Branch
(AFS-340), Aircraft Maintenance Division, Flight Standards Service, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone (202) 267-3804.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in the making of the proposed rule by submitting such written data, views, or arguments as they may desire. Comments relating to the environmental, energy, federalism, or economic impact that may result from adopting the proposals in this notice are also invited. Substantive comments should be accompanied by cost estimates. Comments should identify the regulatory docket or notice number, and should be submitted in triplicate to the Rules Docket address specified above. All comments received on or before the closing date for comments specified will be considered by the Administrator before taking action on this proposed rulemaking. The proposals contained in this notice

may be changed in light of the comments received. All comments received will be available, before and after the closing date for comments, in the Rules Docket, for examination by interested persons. A report that summarizes any contact with FAA personnel concerning the substance of this rulemaking will be filed in the Rules Docket. Commenters wishing the FAA to acknowledge receipt of their comments in response to this notice must submit a preaddressed, stamped postcard on which the following statement is made: "Comments to Docket No. . ." The postcard will be date-stamped and returned to the commenter.

Availability of the NPRM

Any person may obtain a copy of this notice by submitting a request to the Federal Aviation Administration, Office of Rulemaking, Attention: ARM-1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267-9677.

Communications must identify the notice number of this NPRM.

Persons interested in being placed on the mailing list for future NPRM's should request from the above office a copy of Advisory Circular No. 11-2A, "Notice of Proposed Rulemaking Distribution System," which describes the application procedure.

Background

The regulations governing the use of signatures to satisfy maintenance, operational, and type certification

requirements have not been revised to reflect recent advances in information storage and retrieval technology. These rules were developed at a time when the use of electronic media for the storage and retrieval of data and required records was not available to the aviation industry and the FAA.

As the complexity of aircraft design, operations, and maintenance processes has increased, the number of records and documents generated and required to be retained by aircraft owners, operators, manufacturers, and repair facilities has grown accordingly. The development of electronic information storage and retrieval systems facilitates the ability of the aviation industry not only to meet these regulatory requirements but also to manufacture, operate, and maintain today's highly complex aircraft and their systems in an increasingly demanding operational environment. This ability however, has been hindered by the existence of regulations that do not permit the use of electronic signatures on maintenance, operational, or type certification records and documents. This restriction has precluded owners, operators, and maintenance personnel from implementing complete electronic recordkeeping systems due to the need to place nonelectronic signatures on required records and documents. These nonelectronic signatures are required even when such records are being produced electronically, thereby diminishing many of the benefits inherent in the use of an electronic system.

The FAA has recognized the scope of this problem and has granted a number of exemptions permitting the use of electronic signatures to satisfy the regulatory requirements. The FAA specifically has granted exemptions permitting the use of electronic signatures to satisfy: the maintenance record entry and recordkeeping requirements of §§ 43.9, 43.11, and 91.417; the load manifest requirements of § 121.665; the dispatch release requirements of §§ 121.663 and 121.687; the flight release requirements of §§ 121.597 and 121.689; the record disposition requirements of § 121.697; and the airworthiness release requirements of § 121.709 of Title 14, Code of Federal Regulations (14 CFR). Additionally, the FAA has specifically recognized industry's use of computerized recordkeeping systems in § 121.401 by permitting computerized entries to be used to identify the instructor, supervisor, or check airman who certifies that specific training has been given. The FAA's favorable experience with these exemptions and § 121.401 permits the agency to propose expanding this relief to the signature requirements specified in 14 CFR parts 21, 43, 91 and 119.

To assist the industry in integrating new methods of information storage and retrieval systems into the regulatory structure and in facilitating the use of electronic systems, the FAA tasked the Aviation Rulemaking Advisory Committee (ARAC) to "review 14 CFR parts 43, 121, 125, 129, 135, and 145, the corresponding sections of the European Joint Aviation

Requirements (JAR) and supporting policy and guidance material, and recommend to the FAA appropriate revisions for harmonization, including advisory material, relative to the issue of regulations that prohibit or discourage the access or use of information, guidance material or performance data that is in digital or electronic form in order to permit the use of other digital media" (60 FR 48586, September 19, 1995). This task statement was later amended to also include a review of parts 21 and 119.

The FAA established the ARAC in February 1991 to provide advice and recommendations to the Administrator concerning the full range of the FAA's rulemaking activity with respect to safety-related issues. On September 19, 1995, the ARAC established the Digital Information Working Group (60 FR 48586, September 19, 1995) to conduct the necessary research and analysis to complete the task assigned to the ARAC by the FAA.

The Digital Information Working Group conducted its first of five meetings in November 1995, and has presented several recommendations to the ARAC in response to its task. The Working Group recommended the drafting of advisory material to facilitate the use of CD-ROM systems and the use of digital systems for the direct access and interchange of technical data. The ARAC accepted these recommendations and has forwarded these recommendations to the FAA for review. The Working Group also presented to the ARAC its recommendations

for revisions to the regulations to permit the use of electronic signatures to satisfy maintenance, operational, and type certification requirements. The ARAC accepted these recommendations, which now form the basis for the changes proposed by the FAA in this NPRM.

General Discussion of the Proposals

The proposals would revise parts 21, 43, 91, and 119 by adding the definition of the term "signature" to each of these parts. "Signature" would specifically be defined to mean an individual's unique identification that is used as a means of authenticating a record, record entry, or other document. The definition would also state that an acceptable signature must be traceable to the individual and may be in handwritten, electronic, or any other form acceptable to the Administrator.

By requiring the use of handwritten or other types of physical signatures (i.e., a mechanic's stamp) that can only be applied to paper documents, manufacturers, owners, operators, and maintenance personnel have been precluded from implementing complete electronic record preparation and retention systems in order to comply with the physical signature requirements of the current regulations. By permitting the use of electronic signatures, the proposal would permit owners, operators, manufacturers, and maintenance personnel to use electronic systems to prepare and retain those maintenance, operational, and type certification records that require a signature. The proposal would also facilitate

the design, production, and airworthiness approval activities of manufacturers involved in the certification of aircraft, airframes, aircraft engines, propellers, appliances, components, and parts. The increased use of electronic systems, which would occur as a result of the recognition of electronic signatures, would result in significant cost reductions to the aviation industry. The FAA notes, that although this proposal would encourage the use of electronic recordkeeping systems, it would not discourage the use of paper documents and records to satisfy regulatory requirements.

In developing this proposal, the FAA also considered adding the definition of "signature" to 14 CFR part 1, rather than amending parts 21, 43, 91, and 119. The FAA, however, did not propose such a comprehensive change in this proposal. The definitions found in part 1 apply to all sections contained in 14 CFR parts 1 through 191. Specific requirements for signatures are found throughout these parts. In addition to the parts of the regulations in which the proposed definition of the term "signature" would be added, specific signature requirements are also found in parts of the regulations, affecting areas such as: investigative and enforcement procedures, aircraft registration, the recording of titles and security documents, and airman certification requirements.

In many instances where signatures are required in parts other than those affected by this rulemaking, the FAA has not yet developed adequate methods and procedures either to accept or to ensure the authenticity of electronic signatures used to comply with these regulatory requirements. Although the FAA intends to implement the use of electronic signatures in projects that would revise airman certification and rating application procedures and permit the issuance of digital Operations Specifications, without defining "signature" in all associated parts, the FAA considers it premature to adopt a comprehensive definition of the term "signature" that would apply to all signature requirements. The FAA however does not believe that an inability to accept an electronic signature in certain instances should preclude its acceptance at later times when sufficient guarantees of its authenticity can be met. Therefore, the FAA has adopted the gradual and structured approach regarding the acceptance of electronic signatures that is embodied in this proposal. As the use and acceptance of electronic signatures becomes more widespread and the amount of experience that the FAA gains in a regulatory structure that permits the use of electronic signatures increases, the FAA may consider expanding the applicability of the proposal.

Acceptable Signature

The handwritten signature is universally accepted under current regulatory requirements due to certain qualities that

should be preserved in any electronic signature. To be considered acceptable to the Administrator under the terms of the proposed definition, an electronic signature should retain the qualities of a handwritten signature that guarantee its uniqueness. An electronic signature could be in the form of a digital signature (i.e., a message transformation using an asymmetric crypto-system), a digitized image of a paper signature, a typed notation, an electronic code, or other acceptable form. The FAA notes however, that not all identifying information found in an electronic system may constitute a signature as set forth in the proposal, unless certain conditions are met.

A signature should identify a specific individual and be difficult to reproduce. A unique signature provides evidence of an individual's attestation to a statement. An electronic system cannot provide a unique identification with reasonable certainty, unless the identification is difficult for an unauthorized person to reproduce. An acceptable method of proving the uniqueness of a signature is an identification and authentication procedure that validates the identity of the signatory. For example, an individual using an electronic signature should be required to identify himself or herself, and the system should then authenticate that identification. Acceptable means of identification and authentication would include the use of separate and unrelated identification and authentication codes. These codes could be encoded onto

badges, cards, cryptographic keys, or other devices. Systems using personal identification numbers or passwords memorized by an individual could also serve as an acceptable method of ensuring uniqueness. Additionally, a system could also use physical characteristics, such as a fingerprint, handprint, or voice pattern as a method of identification and authorization.

In the aviation environment, the purpose of a signature on a document such as an airworthiness release or other approval for return to service document is to demonstrate that certain critical requirements have been met. A signature on an airworthiness release or approval for return to service document demonstrates that an appropriately certificated and properly authorized person has accepted responsibility for the airworthiness of the work performed on an aircraft or aeronautical product and provides positive identification of that person. An electronic signature therefore must provide positive traceability to the person who signed a record, record entry, or any other document. The use of electronic signatures would enhance the ability to identify a signatory and eliminate the traceability difficulties associated with illegible handwritten entries and the deterioration of paper documentation.

A person using an electronic signature should also take deliberate and recognizable action to affix his or her signature to a record or a document. A signature that is automatically affixed to a document as it is viewed would not

be considered acceptable under the proposed definition of signature. Acceptable, deliberate actions for creating an electronic signature would include, but would not be limited to: badge swipes, signing an electronic document with a stylus, inputting a specific keystroke(s), or using a digital signature.

Affixation of a signature indicates the completion of a record, record entry, or other document that may not be altered except through the creation of a subsequent, superseding record. The proposed definition would permit an electronic entry or other unique form of individual identification in lieu of a handwritten signature if adequate guarantees of its authenticity are met. The FAA notes that the mere entry of an individual's name in an electronic system does not necessarily constitute an electronic signature under the proposed definition unless the guarantees commensurate with those of a handwritten signature are provided.

The scope of information being attested to via an electronic signature should be made clear to the signatory and to subsequent readers of the record, record entry, or document. While handwritten documents use the physical proximity of the signature to the information in order to identify those items attested to by a signature, electronic documents may not use the position of a signature in the same way. For an electronic signature to comply with the terms of the proposed definition, it would be important for a signatory

to clearly delineate the specific sections of a record or document that would be affected by a signature from those sections that would not be affected. The FAA contends that acceptable methods of delineation of the affected areas would include, but would not be limited to: highlighting, contrast inversion, or the use of borders or flashing characters.

Under current rules, the security of a person's handwritten signature is maintained by the physical difficulty for another person to recreate or alter it. The proposal would also require an electronic signature to maintain an equivalent level of security. Due to the reproduction capability inherent in an electronic system, an electronic system used to produce a signature that complies with the proposal should restrict the ability of any person to cause another person's signature to be affixed to a record, record entry, or document. Such a system should enhance safety by precluding an unauthorized person from certifying required documents, such as an airworthiness release. An acceptable method of implementation would be provided by the use of an authentication code that would be verified by the system prior to affixing the signature.

An electronic signature complying with the terms of the proposed definition should also prevent repudiation by the signatory to the same extent as a handwritten signature would prevent such a disclaimer. The more difficult it is to

reproduce a signature, the greater the likelihood that a signature was created by the signatory. Those security features of an electronic system that make it difficult for another person to reproduce a signature would tend to ensure that a signature was indeed made by the signatory.

Although the proposed rule specifically addresses electronic signatures, the FAA notes that the proposal not only provides for the acceptance of handwritten and electronic signatures but also other types of signatures that provide commensurate guarantees of authenticity. An example of an acceptable form of a "signature" other than a written name would be a mechanic's stamp. If a form of identification other than a handwritten signature were used, access to that identification should be limited to the named individual only. For example, a mechanic's stamp used to meet the proposed definition of "signature" should be secured when not in use by the individual whom the stamp identifies. Similarly, a computer entry that is used as a signature should have restricted access that is limited by an authentication code that is changed periodically. Access to stamps and authentication codes should be limited to the user and system security personnel. Although a signature may take many forms, the FAA again emphasizes that all electronic entries may not necessarily satisfy the criteria that would qualify an electronic entry as an acceptable signature.

Revising the regulations to permit the use of electronic signatures would allow owners, operators, manufacturers, and repair facilities to use electronic systems to satisfy their record preparation and retention requirements without resorting to the use of paper- or microfilm-based systems. Adoption of the proposed definition of the term "signature" would permit the use of a complete electronic system for the preparation and retention of required records in which recourse to paper documents would not be required. Such systems could be used to generate records such as a load manifest, flight release, or airworthiness release record. The ability to generate these records electronically would allow all owners and operators to manage their operations more efficiently and accurately, thereby decreasing recordkeeping errors and better ensuring the airworthiness of their aircraft. The enhanced use of these systems should also expedite the approval of an aircraft for return to service, thereby improving aircraft dispatch performance for air carriers and commercial operators. Additionally, the proposal should facilitate the use of fully integrated computer systems that could be used to assist owners and operators in controlling inventories, scheduling aircraft maintenance, budgeting resources, and controlling logbook records. It should also improve the ability of FAA and quality assurance personnel to audit actions taken at remote locations because records may be immediately accessed via electronic data link,

thereby permitting any corrective actions to be taken immediately, if required.

The increased use of these systems expected as a result of the adoption of this proposal would also facilitate the performance of all maintenance activity on an aircraft, airframe, aircraft engine, propeller, appliance, component, or part because such activity could be performed without recourse to the use of paper records. Additionally, the proposal would enable owners, operators, and maintenance personnel to use electronic maintenance records or logbooks to document work performed.

Persons subject to the proposed rule would continue to be permitted to utilize recordkeeping systems that would provide for the retention of records in paper, electronic, microfilm, or any other format that would permit their retrieval for use or inspection by the Administrator. The proposal, however, would provide these persons with an additional means to comply with current regulatory requirements without any compromise of safety.

The FAA also notes that although the proposal may permit the use of electronic signatures, any electronic system used to generate the required documents and records would also be required to meet current regulatory requirements prior to its implementation. A proper signature affixed to an improperly created document would still result in a document that does not meet regulatory requirements. The record system, and the

methods and procedures used to generate an electronic signature must therefore meet all regulatory requirements in order to be used by a manufacturer, owner, operator, repair facility, or maintenance personnel.

Section-by-Section Analysis

§ 21.1

The heading of § 21.1 would be changed from "Applicability" to "Applicability and definitions".

The proposal would also add paragraph (c) to the current section. This new paragraph would define the term "signature."

§ 43.1

The heading of § 43.1 would be changed from "Applicability" to "Applicability and definitions".

The proposal would also add paragraph (c) to the current section. This new paragraph would define the term "signature."

§ 91.1

The heading of § 91.1 would be changed from "Applicability" to "Applicability and definitions".

The proposal would also add paragraph (c) to the current section. This new paragraph would define the term "signature."

§ 119.3

The proposal would add the term "signature" to the list of definitions that are applicable to subchapter G (parts 121, 125, 129, 133, 135, 137, and 139). The proposed definition would facilitate the use of electronic and other acceptable forms of signatures by owners, operators, and certificate holders subject to the requirements of that subchapter.

Paperwork Reduction Act

Information collection requirements in the proposed rule have been previously approved by the Office of Management and Budget (OMB) under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) and have been assigned OMB Control Number 2120- .

Regulatory Evaluation Summary

Three principal requirements pertain to the economic impacts of changes to the Federal Regulations. First, Executive Order 12866 directs Federal Agencies to promulgate new regulations or modify existing regulations after consideration of the expected benefits to society and the expected costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Finally, the Office of Management and Budget directs agencies to assess the effect of regulatory changes on international trade. In conducting these analyses, the FAA has determined that this rule: 1) would generate benefits exceeding costs; 2) is not ~~significant~~ as defined in Executive Order 12866 and DOT Order 2100.5, Policies and Procedures for Simplification, Analysis, and Review of Regulations; 3) would not have a significant impact on a substantial number of small entities; and 4) would lessen restraints on international trade. These analyses, available in the docket, are summarized below.

Over a ten year period, the proposed rule would provide cost savings and regulatory relief to owners, manufacturers, and operators, and repair stations who obtain or use electronic recordkeeping systems. The estimated cost savings would be \$87 million, or \$60 million (discounted). In addition to the cost savings, the proposed rule would have some qualitative benefits. Costs for this proposed rule would be negligible. Aviation interests could continue to use hand written signatures, if they so desired.

International Trade Impact Assessment

The FAA has determined that the proposed rule would neither affect the sale of aviation products and services in the United States nor the sale of U.S. products and services in foreign countries.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily and disproportionately burdened by government regulations. The RFA requires a Regulatory Flexibility Analysis if a rule would have a significant economic impact on a substantial number of small entities.

The FAA's criteria for a ~~substantial number~~ is a number that is not less than 11 and that is more than one-third of the small entities subject to the rule. The small entities that could be potentially affected by the implementation of the proposed rule would be scheduled and non-scheduled operators of aircraft for hire owning nine or fewer aircraft. Because this is a cost-saving rule that imposes no negligible costs, the agency certifies that the proposed rule would not have a significant impact, positive or negative, on a substantial number of small entities.

Federalism Implications

The regulations proposed herein would not have substantial direct effects on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this proposal would not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

International Civil Aviation Organization and Joint Aviation Requirements

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with the Standards and Recommended Practices of the International Civil Aviation Organization to the maximum extent practicable. The FAA is not aware of any differences that this proposal

would present if adopted. Any differences that may be presented in comments to this proposal, however, will be taken into consideration.

Unfunded Mandates

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of \$100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed

⌘ significant intergovernmental mandate.⌘ A ⌘ significant intergovernmental mandate⌘ under the Act is any provision in a Federal agency regulation that would impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of \$100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have

developed a plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

This rule does not contain a Federal intergovernmental or private sector mandate that exceeds \$100 million a year.

List of Subjects

14 CFR Part 21

Air transportation, Aircraft, Aviation safety, Safety.

14 CFR Part 43

Air carriers, Air transportation, Aircraft, Aviation safety, Reporting and recordkeeping requirements, Safety.

14 CFR Part 91

Air carriers, Air transportation, Aircraft, Airmen, Airworthiness directives and standards, Aviation safety, Reporting and recordkeeping requirements, Safety.

14 CFR Part 119

Administrative practice and procedures, Air carriers, Air taxis, Air transportation, Aircraft, Aviation safety, Charter flights, Commuter operations, Reporting and recordkeeping requirements.

THE PROPOSED AMENDMENT

In consideration of the foregoing, the Federal Aviation Administration proposes to amend parts 21, 43, 91, and 119 of Title 14, Code of Federal Regulations (14 CFR parts 21, 43, 91, and 119) as follows:

PART 21 - CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS

1. The authority citation for part 21 continues to read as follows:

Authority: 42 U.S.C. 7572; 49 U.S.C. 106(g), 40105, 40113, 44701-44702, 44707, 44709, 44711, 44713, 44715, 45303.

2. Section 21.1 amended by revising the section heading and adding paragraph (c) to read as follows:

§ 21.1 Applicability and definitions.

* * * * *

(c) For the purposes of this part, signature means an individual's unique identification used as a means of authenticating a record, record entry, or other document. A signature acceptable to the Administrator must be traceable to the individual and may be in handwritten, electronic, or any other form acceptable to the Administrator.

PART 43 - MAINTENANCE, PREVENTIVE MAINTENANCE, REBUILDING, AND ALTERATION

3. The authority citation for part 43 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44703, 44705, 44707, 44711, 44713, 44717.

4. Section 43.1 is amended by revising the section heading and by adding paragraph (c) to read as follows:

§ 43.1 Applicability and definitions.

* * * * *

(c) For the purposes of this part, signature means an individual's unique identification used as a means of authenticating a record, record entry, or other document. A signature acceptable to the Administrator must be traceable to the individual and may be in handwritten, electronic, or any other form acceptable to the Administrator.

PART 91 -- GENERAL OPERATING AND FLIGHT RULES

5. The authority citation for part 91 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120, 44101, 44111, 44701, 44709, 44711, 44712, 44715, 44716, 44717, 44722, 46306, 46315, 46316, 46502, 46504, 46506-46507, 47122, 47508, 47528-47531.

6. Section 91.1 is amended by revising the section heading and by adding paragraph (c) to read as follows:

§ 91.1 Applicability and definitions.

* * * * *

(c) For the purposes of this part, signature means an individual's unique identification used as a means of authenticating a record, record entry, or other document. A signature acceptable to the Administrator must be traceable to the individual and may be in handwritten, electronic, or any other form acceptable to the Administrator.

PART 119 - CERTIFICATION: AIR CARRIERS AND COMMERCIAL OPERATORS

7. The authority citation for part 119 continues to read as follows:

Authority: 49 U.S.C. 106(g), 1153, 40101, 40102, 40103, 40113, 44105, 44106, 44111, 44701-44717, 44722, 44901, 44903, 44904, 44906, 44912, 44914, 44936, 44938, 46103, 46105.

8. Section 119.3 is amended by adding the definition of signature between the definitions of scheduled operation and supplemental operation to read as follows:

§ 119.3 Definitions.

* * * * *

Signature means an individual's unique identification that is used as a means of authenticating a record, record entry, or other document. A signature acceptable to the Administrator must be traceable to the individual and may be in handwritten, electronic, or any other form acceptable to the Administrator.

* * * * *

Issued in Washington, DC, on .



U.S. Department
of Transportation
**Federal Aviation
Administration**

DRAFT

Advisory Circular

Subject: Acceptance and Use of
Electronic Signatures

Date: 12/04/96
Initiated by: AFS-350

AC No: 120-ES
Change:

1. PURPOSE. This advisory circular (AC) provides guidance on the acceptance and use of electronic signatures to satisfy operational, maintenance, and type certification requirements.
2. FOCUS. This AC applies to air carriers using electronic signatures under Part 121 or Part 135 of Title 14, Code of Federal Regulations (14 CFR). Persons performing maintenance or preventive maintenance under 14 CFR Part 43, operators under 14 CFR Part 91 or Part 125, repair stations under 14 CFR Part 145, and manufacturers subject to the requirements of 14 CFR Part 21 may use the criteria of this AC to the extent that its provisions are pertinent to their operations.
3. RELATED MATERIAL.
 - a. Title 14, Code of Federal Regulations, §§ 21.1, 43.1, 91.1, and 119.3.
 - b. Federal Aviation Administration (FAA) Order 8300.10, Airworthiness Inspector's Handbook; FAA Order 8400.10, Air Transportation Operations Inspector's Handbook. Copies of these documents may be purchased from: New Orders, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.
 - c. Digital Signature Guidelines, Legal Infrastructure for Certification Authorities and Electronic Commerce, draft revision, October 5, 1995. Information Security Committee, American Bar Association.
 - d. Secure Hash Standard, Federal Information Processing Standards Publication 180-1. U.S. Department of Commerce, April 17, 1995.
 - e. The Digital Signature Standard (DSS), Federal Information Processing Standards Publication 186. U.S. Department of Commerce, May 19, 1994.

f. Standard Security Label for Information Transfer, Federal Information Processing Standards Publication 188. U.S. Department of Commerce, September 6, 1994.

g. Guidelines for the Use of Advanced Authentication Technology Alternatives, Federal Information Processing Standards Publication 190. U.S. Department of Commerce, September 28, 1994.

4. BACKGROUND.

a. Prior to XXXX, 199X, the regulations governing the use of signatures to satisfy maintenance, operational, and type certification requirements did not reflect current advances in information storage and retrieval technology. These earlier rules were developed at a time when the use of electronic media for the storage and retrieval of data was neither available to, nor contemplated by, the aviation industry or the FAA.

b. As the complexity of aircraft design, operations, and maintenance processes increased, the number of records and documents generated and required to be retained by aircraft owners, operators, manufacturers, and repair facilities expanded dramatically. The development of electronic information storage and retrieval systems has significantly enhanced the ability of the aviation industry not only to meet FAA record-retention requirements, but also to manufacture, operate, and maintain today's highly complex aircraft and aircraft systems in a demanding operational environment.

c. Prior regulations restricted the full implementation of electronic information storage and retrieval systems because electronic signatures were not permitted on any record or document that required the affixation of a signature. Any record or document produced electronically continued to be authenticated using a non-electronic signature. This practice greatly diminished the benefits inherent in the use of any electronic system.

d. The FAA recognized the limitations imposed by these restrictions on the use of electronic signatures and, in XXXX 199X, revised the regulations governing the use of signatures to permit the use of electronic signatures on maintenance, operational, and type certification records. Owners, operators, and maintenance personnel may now implement complete electronic recordkeeping systems because the earlier requirement to authenticate these documents using non-electronic signatures has been eliminated. Such systems may now be used to generate records such as load manifests, dispatch releases, task

cards, flight releases, airworthiness releases, flight test reports, and statements of conformity that can be authenticated using an electronic signature.

e. Acceptance of electronic signatures will encourage the use of electronic maintenance logbooks to comply with record retention and record entry requirements because maintenance, preventive maintenance, rebuilding, and alteration records may now be authenticated using an electronic signature. Additionally, the required procedures for the certification of type designs and for the approval of manufacturing and quality control processes for aircraft, airframes, aircraft engines, propellers, appliances, components, and parts can be complied with more easily through the use of electronic signatures. The acceptance of electronic signatures will also facilitate the transfer of type certificates, simplify the application process for a Designated Alteration Station (DAS) or delegation option authorization, and expedite the process by which changes are made to a DAS procedure manual or quality control system.

f. The use of electronic signatures enhances the ability to identify a signatory and helps to eliminate the traceability difficulties associated with illegible handwritten entries and the deterioration of paper documentation.

5. DEFINITIONS. For the purposes of this AC, the following definitions apply:

a. Asymmetric Crypto-System. An algorithm or series of algorithms that provide a secure key pair.

b. Authentication. The means by which a system validates the identity of an authorized user. These may include a password, a personal identification number (PIN), a cryptographic key, a badge, or a stamp.

c. Digital Signature. A type of electronic signature that employs a transformation of a digital representation of information using an asymmetric crypto-system. A person possessing the initial digital representation and the signer's public key can accurately determine: (1) whether the digital representation was created using the private key that corresponds to the signer's public key; and (2) whether the digital representation of information has been altered since the transformation was made.

d. Electronic Signature. A type of signature that employs an electronic means to uniquely identify an individual. An electronic signature may be a digital signature, a digitized image of a paper signature, a typed notation such as "R_CONNOLLY," an electronic code, or any other type of electronic signature acceptable to the Administrator.

e. Key Pair. A private key and its corresponding public key in an asymmetric crypto-system, which have the property such that the public key can verify a digital signature that the private key creates.

f. Signature. An individual's unique identification used as a means of authenticating a record, record entry, or other document. A signature must be traceable to the individual and may be in handwritten, electronic, or other form acceptable to the Administrator.

6. DISCUSSION.

a. General. Before recent changes to permit the use of electronic signatures, a handwritten signature was the primary means by which an individual could comply with the requirement for a signature on any required record, record entry, or document. Although an electronic signature may be essentially a new form of signature, its purpose is identical to that of a handwritten signature or any other form of signature currently accepted by the FAA. The handwritten signature is universally accepted because it has certain qualities and attributes that should be preserved in any electronic signature. Therefore, to be considered acceptable, an electronic signature should possess those qualities and attributes intrinsic to a handwritten signature that guarantee its authenticity.

b. Forms of Electronic Signatures. An electronic signature may be in the form of a digital signature, a digitized image of a paper signature, a typed notation, an electronic code, or any other unique form of individual identification that can be used as a means of authenticating a record, record entry, or document. Users of electronic signatures should be aware that not all identifying information found in an electronic system may constitute a signature. For example, the entry of an individual's name in an electronic system may not constitute an electronic signature. Other guarantees commensurate with those of a handwritten signature should be provided.

c. Attributes of an Acceptable Electronic Signature.

(1) Uniqueness. An electronic signature should retain those qualities of a handwritten signature that guarantee its uniqueness. A signature should identify a specific individual and be difficult to duplicate. A unique signature provides evidence that an individual attests to a statement. An electronic system cannot provide a unique identification with reasonable certainty unless the identification is difficult for an unauthorized person to duplicate. An acceptable method of proving the uniqueness of a signature is an identification and authentication procedure that validates the identity of the signatory. For example, an individual using an electronic signature should be required to identify himself or herself, and the system that produces the electronic signature should then authenticate that identification. Acceptable means of identification and authentication include the use of separate and unrelated identification and authentication codes. These codes could be encoded onto badges, cards, cryptographic keys, or other objects. Systems using personal identification numbers or passwords memorized by an individual could also serve as an acceptable method of ensuring uniqueness. Additionally, a system could also use physical characteristics, such as a fingerprint, handprint, or voice pattern as a method of identification and authorization.

(2) Significance. An individual using an electronic signature should take deliberate and recognizable action to affix his or her signature. Acceptable, deliberate actions for creating an electronic signature include, but are not limited to: badge swipes, signing an electronic document with a stylus, inputting a specific keystroke(s), or using a digital signature.

(3) Scope. The scope of information being attested to via an electronic signature should be made clear to the signatory and to subsequent readers of the record, record entry, or document. While handwritten documents use the physical proximity of the signature to the information in order to identify those items attested to by a signature, electronic documents may not use the position of a signature in the same way. It is therefore important to clearly delineate the specific sections of a record or document that are affected by a signature from those sections that are not affected. Acceptable methods of delineation of the affected areas include, but are not limited to: highlighting, contrast inversion, or the use of borders or flashing characters. In addition, the system should notify the signatory that the signature has been affixed.

(4) Signature Security. The security of an individual's handwritten signature is maintained by the difficulty of another person to duplicate or alter it. An electronic signature should maintain an equivalent level of security. Due to the reproduction capability inherent in an electronic system, an electronic system used to produce a signature should restrict the ability of any person to cause another individual's signature to be affixed to a record, record entry, or document. Such a system enhances safety by precluding an unauthorized person from certifying required documents, such as an airworthiness release.

(5) Nonrepudiation. An electronic signature should prevent a signatory from denying that he or she affixed a signature to a specific record, record entry, or document. The more difficult it is to duplicate a signature, the greater the likelihood that a signature was created by the signatory. Those security features of an electronic system that make it difficult for another person to duplicate a signature, or for a signed document to be altered, tend to ensure that a signature was indeed made by the signatory.

(6) Traceability. An electronic signature should provide positive traceability to the individual who signed a record, record entry, or any other document.

d. Other Acceptable Forms of Signatures. Although this AC specifically addresses electronic signatures, other types of signatures may also be acceptable to the Administrator. An example of an acceptable form of a "signature" other than a written name is a mechanic's stamp. If a form of identification other than a handwritten signature is used, access to that identification should be limited to the named individual only. For example, a mechanic's stamp should be secured when not in use by the individual whom the stamp identifies. Similarly, a computer entry used as a signature should have restricted access that is limited by an authentication code that is changed periodically. Access to issued stamps or authentication codes should be limited to the user. Although a signature may take many forms, the FAA emphasizes that all electronic entries may not necessarily satisfy the criteria that would qualify an electronic entry as an acceptable signature.

e. Restrictions on the Use of Electronic Signatures. Owners, operators, and maintenance personnel should note that provisions regarding the acceptability of electronic signatures are not found in 14 CFR Part 1, which is of general applicability, but rather in Parts 21, 43, 91, and 119, which are of more limited applicability. Specific requirements for the use of signatures are found throughout the Federal Aviation

Regulations. These requirements affect areas other than those discussed in this AC. Electronic signatures may not be considered acceptable in these areas and, therefore, should only be used to satisfy maintenance, operational, and type certification requirements, unless otherwise permitted. Although the acceptance of electronic signatures will foster the use of electronic recordkeeping systems, the FAA continues to accept the use of paper documents to satisfy current regulatory requirements.

f. Compliance with Other Regulatory Requirements. The FAA notes that, although it now permits the use of electronic signatures, any electronic system used to generate the required documents and records must continue to meet current regulatory requirements. A proper signature affixed to an improperly created document still results in a document that does not meet regulatory requirements. In any recordkeeping system, methods and procedures used to generate an electronic signature must therefore meet all regulatory requirements in order to be used by an owner, operator, or maintenance personnel.

William J. White
Deputy Director, Flight Standards Service



**Aerospace
Industries
Association**



Robert E. Robeson, Jr.
Vice President
Civil Aviation
(202) 371-8415

May 27, 1998

Mr. Guy S. Gardner
Associate Administrator for
Regulation and Certification
Federal Aviation Administration
800 Independence Avenue S.W.
Washington, DC
20591

Dear Mr. Gardner:

Enclosed for your consideration is AC 120-XX: "Use of Computer Technology for Accessing Information Used in Aviation Operations, Maintenance and Support".

Following review by the FAA legal and economic analysts and incorporation of their suggestions, this package was approved by the Aviation Rulemaking Advisory Committee Executive Committee on May 13.

It is the hope of the EXCOMM that the FAA will move expeditiously to process this document, which provides important features to bring the regulations into line with modern business practices.

On behalf of the EXCOMM, thank you for your attention to this matter.

Sincerely,

Robert E. Robeson,
Chair
Aviation Rulemaking Advisory Committee

Encl.

cc (w/o encl): J. Hawkins, FAA



U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

JUN 24 1998

Robert E. Robeson
Aviation Rulemaking Advisory Committee
Aerospace Industries Association of America, Inc.
1250 Eye Street, NW
Washington, DC 20005

Dear Mr. Robeson:

Thank you for your May 27 letter forwarding the recommendation of the Aviation Rulemaking Advisory Committee (ARAC). The recommendation consists of a proposed advisory circular AC 120-XX: "Use of Computer Technology for Accessing Information Used in Aviation Operations, Maintenance, and Support."

The proposed advisory circular will be reviewed and coordinated within the Federal Aviation Administration (FAA). As soon as the coordination process is complete, the FAA will make the advisory circular available to the public for comment through a notice of availability to be published with the Notice of Proposed Rulemaking entitled "Use of Electronic Signatures." We will make every effort to handle these recommendations expeditiously.

I would like to thank the aviation community for its commitment to ARAC and its expenditure of resources in the development of this recommendation. More specifically, I would like to thank the members of the Digital Communications Working Group for their commitment to the ARAC process and prompt action on these tasks.

Sincerely,

for Guy S. Gardner
Associate Administrator for
Regulation and Certification



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Use of Computer Technology for Accessing Information used in Aviation Operations, Maintenance and Support.	Date: 3/11/1998 Initiated By: AFS-350	AC No: 120-XX Change:
---	--	--

1. PURPOSE. The purpose of this advisory circular (AC) is to furnish guidance on the use of computer technology to access information used in aviation operations, maintenance and support.

2. BACKGROUND.

a. The typical manufacturer, owner/operator or maintenance facility managed its operations, maintenance and support information in the same way for many years. Generally, for example, a manufacturer prepared a written maintenance manual and supporting information for its products and furnished the necessary information to the operator. Additionally operators may have added their own information and distributed the composite document, manuals or supporting information to the appropriate persons. By regulation, any person performing maintenance must ensure that the information used is current and complete. When the manufacturer made changes to this documentation, these changes were passed on to the certificate holder who in turn had to pass the changes on to its personnel. This update process was handled by furnishing copies of the revised pages with a record of revisions to its personnel. While this system worked quite well, the use of computer technology to access this information allows for improvement of the process. This use of computer technology can improve distribution and increase integrity of aviation operations, maintenance and support information.

b. Manufacturer, owner/operator or maintenance facilities, and the FAA sought out improved distribution systems that were simpler for keeping manuals and other supporting information up-to-date. In the 1970's microfilm and microfiche systems were methods of addressing the problem. In addition to reducing the physical volume of the documents, microfilm or microfiche allowed manufacturers, owner/operators or maintenance facilities to redistribute entire manuals when changes were made. While this worked in most applications, the problems of making sure that every manual was updated never went completely away.

c. With the advancement of computer and digital technology, systems now exist that are capable of making manuals, documents and supporting information available to each person electronically. With these systems, manufacturers, owner/operators or maintenance facilities have the capability of distributing an exact duplicate of up-to-date information from a central location to all potential persons using that information. This advisory circular furnishes guidance on steps a person may take to demonstrate that their system using computer technology to access information used in aviation operations, maintenance and support is acceptable to the administrator.

d. A recent change in FAR Part 121 allows the preparation or retention of manuals in printed form or other form acceptable to the Administrator. Manufacturers, owner/operators or maintenance facilities have continued to look for ways to improve the process of accessing, maintaining and distributing aviation operations, maintenance and support information. This improvement process resulted in using microfilm and microfiche in addition to or in place of paper manuals. Several manufacturer, owner/operator or maintenance facility operators have developed computer technology systems that manage information stored in a repository. These computer technology systems distribute information to computers or computer terminals at locations other than the repository. Systems using computer technology have demonstrated significant improvements in the reduction of distribution time for revisions, ensuring that current information is available to personnel, and ensuring the accuracy of information.

e. Using computer technology in accessing aviation operations, maintenance and support information has significant advantages for industry and government when compared with the use of similar procedures for the distribution of information in paper or microfilm format. Benefits of systems that make use of computer technology are improved ability for verification of accuracy, completeness and information integrity over traditional paper or microfilm based systems. This application of computer technology allows enhanced safety and reduces economic burden on industry and government. This reduced economic burden is a result of the cost reduction by improved information management, data verification and integrity. Additional reductions occur from decreased costs in distribution, storage and manual updating of paper, microfilm or microfiche documents.

3. USE OF COMPUTER TECHNOLOGY SYSTEMS.

a. General. An acceptable system using computer technology designed to access manuals and documentation must deliver the information to the user with at least the same degree of ease, accuracy, and integrity afforded by the use of a system based on a paper or microfilm format. During the design, installation, or modification of a system making use of computer technology, the following areas should be addressed:

- (i.) Accessibility and Availability of Information.
- (ii.) System Usage and Training.
- (iii.) Verification of Information.
- (iv.) Information Security.
- (v.) Information Retention.
- (vi.) Backup Capability.
- (vii.) Manuals.
- (viii.) System Output.

b. Accessibility and availability of information. The manufacturer, owner/operator or maintenance facility should demonstrate that authorized personnel have ready access to the electronic information. The FAA is unable to specify a formula for determining the proper ratio of display devices (e.g. monitors) to authorized employees. The specific situation of each operator should be considered. The operator should demonstrate that access to the system is readily available. Nothing can be gained if the display device is located in an inconvenient location, the authorized personnel must line-up to use the display device, or the distance between the display device and the work site is so distant that authorized personnel would find it easier to not use the information rather than endure the hardships related to accessing a display device.

c. System Usage and Training.

(1) System usage. Systems implemented by the manufacturer, owner/operator or maintenance facility should be of a level and sophistication such that they are simple to use by authorized persons.

(2) Training and System Knowledge. Users should be trained in the operation of the system and in the retrieval of information that is contained within the system. System training should ensure that users are able to demonstrate proficiency in system operation, security awareness, and adherence to regulations and/or policies related to the appropriate use of the information contained within the system. Acceptable methods of providing this training may include, but are not limited to, classroom instruction, on-line tutorials, user guides, and simulated problem-solving exercises. Training programs should define minimum competency criteria and define the method for demonstration of user competence.

(3) Instructions to the User. Instructions should be furnished that describe the operation and use of computer technology for accessing information used in aviation operations, maintenance and support. This may include operating instructions, user guides and system administration information available to required persons responsible for systems administration. These instructions need not be in paper form and may consist of electronic, context-sensitive help; responses to specific user queries; or other information included in the system.

d. Verification of Information.

(1) Verification of Information. Users should have a means to verify that the information is appropriate, complete and current (e.g., effectivity and revision date). The manufacturer, owner/operator or maintenance facility should be able to demonstrate the current status and completeness of any information contained in the system. This should be a process equivalent in capability to a "Record of Revisions" or "List of Effective Pages" such as those used in paper or microfilm based systems.

Sample Letter of FAA Acceptance

Federal Aviation Administration
San Antonio Flight Standards District Office
1992 Barrett Avenue
Travis, Texas 76321

June 2, 1997

Mr. John Smith
ABC Airways, Inc.
1234 South Airport Way
San Antonio, Texas 78910

Dear Mr. Smith:

This letter confirms acceptance of the computerized system and technology for accessing information used in aviation operations, maintenance and support by ABC Airways, Inc., holder of Air Carrier Certificate No. ABC-001. The direct access information interchange system meets the requirements of § 121.133 of Title 14, Code of Federal Regulations.

FAA acceptance is limited to those persons who are trained by ABC Airways, Inc., in the use of direct access information interchange equipment in accordance with ABC Airways, Inc., training programs.

This office should be notified of any significant changes in the design or operation of the system.

The FAA should have access to the system at all times. Any changes to designated FAA user identification codes or passwords should be submitted to the FAA Certificate Holding District Office, as soon as practicable after the change.

Unless sooner withdrawn, this letter is valid for an indefinite period of time.

Sincerely,

Principal Aviation Safety Inspector (Operations)

(2) Information Completeness and Currency Users of information should have a means to demonstrate that the information contained in the system is appropriate, complete, and current for the task being performed. This should include methods to ensure that the information is current and complete. The FAA holds the manufacturer, owner/operator or maintenance facility responsible for using current information. It is not unusual for the FAA to request the user to demonstrate their knowledge of how to determine the currency and completeness of information.

(3) Information Integrity. An acceptable system should not allow information contained in the system to be altered during transfer, storage or use without the authorization of the persons responsible for control of the system. Data integrity and assurance that the data is not intentionally or unintentionally altered is of utmost importance.

(4) Revision Control Procedures. Revision control procedures consist of positive control over what information is being distributed, who it is distributed to, where it is distributed to, the current revision date and/or level, and a record of revision activity.

e. Information Security.

(1) General. A computer technology system for accessing information used in aviation operations, maintenance and support should be designed so that its component parts and digital communication services are in a safe and secure environment commensurate with the nature of the information contained within the system. Accordingly, the system should include procedures and methods to ensure that information contained within the system is protected from unauthorized alteration.

(2) Information security. The information system should not allow anyone but authorized personnel to make changes to data processed within the system. Users may demonstrate such security in the following manner:

(a) System access to user functions is controlled (passwords, coded Ids, etc.) so that only authorized persons can modify information contained within the system.

(b) Demonstrate that information contained within a system is what it is represented to be and that users of the information are appropriately authorized to perform the intended function.

Generally accepted industry practices should be followed.

f. Information Retention. Information referenced in operations, maintenance and support records should be accessible and retained for the appropriate period of time, as specified in the applicable regulations.

g. Backup Capability. Consideration should be given to providing alternate access to information in the event of information unavailability or a system outage. This access may include an archive source of information or a secondary source of information (e.g. alternate electronic access, paper, microfilm or other means to get the data).

h. Manuals. When required to furnish a "manual" to comply with a regulatory requirement, one of the following items is necessary to satisfy that requirement:

(1) A paper or microfilm copy of the information.

(2) The information in a format that is acceptable to the Administrator (e.g. microfiche, CD-ROM).

(3) Direct electronic access to the information.

i. System Output.

(1) General. Computer technology systems for accessing information used in aviation operations, maintenance and support have the capability to output various forms of data. Regardless of the output form, information should be identical in content and meet the provisions specified in paragraph (3.d). Examples of these various output forms include: printed pages, visual displays, video, graphic files, audio, animation, and computer file output.

(2) Pages. Information contained in systems making use of computer technology may not have traditional sequential pages as found in printed manuals. The capabilities and advantages of digital information allow data to be presented in a form other than paper or microfilm pages. Traditional systems used paper and microfilm and had information presented in page form. Computer technology now allows information to be presented in other forms such as a video monitor (or other display device). In such cases the information may not be presented in "page" form.

(3) Non-printed output. From non-printed output, a person should be able to demonstrate that the information is appropriate for accomplishment of the intended task, the information is complete, and current (e.g., by effectivity and revision date). A date contained on non-printed output that represents the currency of the information may be considered the date of last revision. This date of last revision should be represented in a manner that will allow positive identification of the date that the information was originated or revised. One example would be to have a record of revisions and a list of effective changes. In all cases it should be possible for the person using the documentation to determine the revision status of the information.

(4) Printed Output. From printed output, a person should be able to demonstrate that the information is appropriate for accomplishment of the intended task, complete, and current (e.g., by effectivity and revision date). A date contained on the page that represents the currency of the information may be considered the date of last revision. This date of last revision may be represented in a manner that will allow positive identification of the date the information was originated or revised. One example would be to have a record of revisions or a list of effective changes. In all cases it should be possible for the person using the documentation to determine the revision status of the information. Printed output should include a means to ensure the sequential integrity of the printed material (e.g. Page numbering, paragraph numbering, sheet numbering etc.).

4. FAA ACCEPTANCE OF COMPUTER TECHNOLOGY SYSTEMS FOR ACCESSING INFORMATION USED IN AVIATION OPERATIONS, MAINTENANCE AND SUPPORT.

b.Notification of Intent. Any person who intends to use computer technology systems for accessing information used in aviation operations, maintenance and support should communicate the intent to use such a system to the FAA office having geographic jurisdiction over that person's operations. This notification should be submitted at least 30 days prior to the date on which the person intends to initiate use of the system. Submission of this notification will facilitate the coordination process necessary to demonstrate that the system is acceptable to the Administrator. A sample letter of intent is provided as appendix 1.

c. FAA Acceptance. FAA acceptance of a digital system for direct access and interchange of information is normally accomplished through the issuance of a letter from the local FAA office. A sample letter of acceptance is provided as appendix 2. The letter confirms FAA acceptance of the digital system and contains information specifying:

- (1) The type of certificate held by the requester;
- (2) The requester's certificate number;
- (3) An identification of the digital system, and the type of information contained within the system; and
- (4) Any other limitations that are necessary to ensure the system's continued acceptability and safe operation.

Director, Flight Standards Service

Sample Letter of Intent

[Requester Letterhead]

To: [FAA Flight Standards District Office with geographic jurisdiction over the requester's operations]
From: [Requester]
Date: [Date]
Subject: Use of a Computerized System and Technology for Accessing Information used in Aviation Operations, Maintenance and Support.

This letter is to inform you that [requester] intends to use a computerized system and technology for accessing information used in aviation operations, maintenance and support. This system has been established using the guidelines outlined in FAA Advisory Circular 120-XX.

This organization intends 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 FAA concerns.

Thank you in advance for your assistance in this matter.

Sincerely,

[Requester]

f.

ARM-200

Aviation Rulemaking Advisory Committee
Executive Committee
c/o 121 North Henry Street
Alexandria, VA 22314
TEL: 703-739-9543
FAX: 703-739-9488

July 2, 1996

Mr. Barry Valentine
Acting Associate Administrator
Certification and Regulation
800 Independence Avenue, S.W.
Washington, D.C. 20519

Dear Mr. Valentine:

Please find attached for FAA consideration, an Aviation Rulemaking Advisory Committee Executive Committee recommended Advisory Circular entitled "Use of CD-ROM Systems". This document is a partial response to the Executive Committee's task to develop recommended rulemaking and guidance on digital information exchange.

The Executive Committee urges the FAA to accept, acknowledge and process this recommendation and to support any other activity which will recognize and allow digital information exchange in the aviation industry, provided necessary safeguards are instituted and maintained.

If we may be of assistance or you have any questions, please do not hesitate to call.

Sincerely,



Sarah MacLeod
Chair
Aviation Rulemaking Advisory Committee

cc: Executive Committee
Phil Boughton
Bill Henry



U.S. Department
of Transportation

**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

JUL 24 1996

Ms. Sarah MacLeod
Executive Director
Aeronautical Repair Station Association
121 North Henry Street
Alexandria, VA 22314

Dear Ms. ^{Sarah}~~MacLeod~~:

Thank you for your July 2 letter forwarding the Aviation Rulemaking Advisory Committee's (ARAC) recommendation in the form of a draft Advisory Circular on Use of CD-ROM Systems.

I would like to thank the aviation community for its commitment to ARAC and its expenditure of resources to develop the recommendation. We in the Federal Aviation Administration (FAA) pledge to process the document expeditiously as a high-priority action.

Again, let me thank the ARAC and, in particular, the Digital Information Working Group for its dedicated efforts in completing the task assigned by the FAA.

Sincerely,

A handwritten signature in cursive script that reads "Barry L. Valentine".

Barry L. Valentine
Acting Associate Administrator
for Regulation and Certification



U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Use of CD-ROM Systems

Date: 05/13/96

AC No: 120-CD

Initiated by: AFS-350

Change:

-
1. PURPOSE. This advisory circular (AC) provides guidance on the use of CD-ROM systems for the electronic retrieval of technical data to satisfy operational and maintenance requirements.
 2. RELATED MATERIAL.
 - a. Title 14, Code of Federal Regulations, sections 43.13, 121.133, 121.137, 121.139, 121.141, 121.369, 125.71, 125.75, 125.249, 129.14, 135.21, and 135.427.
 - b. AC No. 21-33, Quality Assurance of Software Used in Aircraft or Related Products; AC No. 21-35, Computer Generated/Stored Records. Copies of these documents may be obtained from the U.S. Department of Transportation, M-483.7, Washington, D.C. 20590.
 - c. Federal Aviation Administration (FAA) Order 8300.10, Airworthiness Inspector's Handbook; FAA Order 8400.10, Air Transportation Operations Inspector's Handbook; FAA Order 8700.1, General Aviation Inspector's Handbook. Copies of these documents may be purchased from: New Orders, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.
 3. BACKGROUND. Current regulations permit the preparation, use, and retention of manuals in electronic form. Additionally, technical data contained in certificate holders' manuals and manufacturers' maintenance manuals may also be prepared, used, and retained in electronic form. Electronic retrieval of maintenance information and instructions, operational information, and technical data from CD-ROM systems offers improved data accessibility, quality control, and speed of distribution over paper- or microfilm-based systems. These improvements over earlier forms of information retrieval systems result in enhanced safety, and a reduced economic burden on both industry and government by providing users with more rapid access to a wider range of technical data at significantly reduced cost.

4. DEFINITIONS. The following definitions are unique to this AC, and should be applied only to the use of CD-ROM electronic retrieval systems.

a. Electronic retrieval. The technique of extracting information content using electronic retrieval tools from technical data that supports operational, maintenance, or repair activity. This technique uses technical data that is stored electronically on computer media, such as CD-ROM, and used in either a stand-alone or shared environment.

b. Facsimile. The result of extracting technical data content, and displaying or printing the content using an acceptable output format. An acceptable output format for a facsimile should include: an identification of the information presented, an indication of any effective changes to the information, the effectivity of the information, and if printed, the revision date of the logical unit, and the time and date when the print request was made.

c. Page. With respect to electronic retrieval systems, a page is an electronic logical unit of technical data. In a maintenance manual prepared in ATA 100 format, the logical unit could be a chapter, section, subject, pageblock, task, subtask, or graphic. In an illustrated parts catalog prepared in ATA 100 format the logical unit could be a chapter, section, subject, figure, item, or illustration.

d. Technical data. Any collection of operational, maintenance, or repair information that is used to continue the safe and efficient use of aircraft, airframes, engines, propellers, appliances, components, or parts. Examples of technical data include: aircraft/engine maintenance manuals, illustrated parts catalogs, engine shop manuals, and instructions for continued airworthiness.

5. CD-ROM ELECTRONIC RETRIEVAL SYSTEMS.

a. General. Any acceptable CD-ROM system should deliver operational, maintenance, or repair data to the user with at least the same degree of ease and accuracy afforded by the use of a system based on a paper or microfilm format. Additional features, such as text searching and hypertext links, are merely enhancements, which facilitate access to the information content and are not mandatory for a system to be acceptable.

b. Operational considerations. When implementing a CD-ROM electronic retrieval system, the user should ensure that the following processes are addressed:

(1) Specification and installation of computing platform hardware, software, and retrieval tools.

(2) On-going maintenance and support of the computing platform(s), including provisions for outages and necessary alternate retrieval services. Maintenance and support may be provided by a centralized support organization.

(3) Distribution of technical data to authorized users. The procedures for the distribution of technical data should be virtually identical to those used for the distribution of technical data by other media. Every certificate holder or operator has a system for the distribution of its technical data. This system should also be applicable to CD-ROM distribution.

(4) Creation and distribution of any incremental or temporary revisions that are required between scheduled revisions. The system should include procedures to verify that revisions to the technical data have been authorized by the appropriate authority (e.g., certificate holder, manufacturer, supplier) prior to distribution.

(5) Accessibility by the FAA or National Transportation Safety Board to retrieve, view, and print the data.

c. Instructions to the end-user. User information should be provided that describes the operation and use of the CD-ROM electronic retrieval system to include: information and instructions for using publications, reference information, and systems administration information. These instructions need not be in paper form. They may consist of electronic, context-sensitive help; responses to specific operator queries; or other information included in the retrieval system.

d. Training. Procedures should be established by the user to train each employee who is involved with a CD-ROM electronic retrieval system. The subject matter and objectives of the training should vary depending on the employee's job responsibilities and functional level within the organization. Training should include security awareness, organizational policy, system operation, and technical data storage requirements.

e. Functional requirements - retrieval, view, print. A CD-ROM electronic retrieval system should provide the user with the ability to retrieve, view, and print technical data contained in the system. Other functional requirements that can improve system effectiveness may also be incorporated into the CD-ROM system implementation. The system should afford the user the

ability to identify technical data that has been retrieved and used in the performance of any task.

(1) Retrieval. Any CD-ROM electronic retrieval system should have the ability to access, navigate, and retrieve applicable technical data on a computer workstation. The user will access this data via the methods provided by the system.

(2) View. The complete content of a manual must be available and able to be viewed by the user. When the requested information is presented by the electronic retrieval system, it will display the result on a computer screen. One result of using electronic technical data is that the selected information may be displayed differently than it appears on printed or microfilm pages. For example, the display may not contain any page numbering since the data may be in one continuous stream without page breaks.

(3) Print. When connected to a printer, the system should have the ability to output applicable technical data in paper form. The capabilities and advantages of electronic data may cause data to be presented in a different format than it appears on the original paper or microfilm pages. However, the technical data should be identical in content. For example, these differences could be caused by selecting only a portion of a page for output. The system could, for example, output the first printed page of a manual as "Page 1," even though the selected page is "Page 1,024" in paper and/or microfilm versions of the manual.

(i) Omission of page numbers. The page numbers may be omitted from any data output. For example, the contents of a chapter, section, or subject in a maintenance manual may be a continuous flow of data. The organizational format of the data, however, should be retained.

(ii) Printing output format. The format of printed output is similar to that of a standard manual. Each page of printed output should contain: the manual title; applicable aircraft, airframe, engine, propeller, appliance, component, or part make and model; effectivity of the data; and the revision number/date of the printed output.

f. System outage. A CD-ROM electronic retrieval system should possess the ability to recover from a system outage of a workstation. The procedures used to recover from a system outage are similar to methods used to replace technical data contained in paper or microfilm systems. During the replacement interval, users rely on their support organizations to provide interim information to continue operations in a safe and timely manner.

g. Data archives. Although the FAA does not require that technical data be archived, maintenance and operational record retention requirements frequently require access to previously used technical data. To facilitate compliance with these requirements, a certificate holder or operator may decide to archive technical data in the event of a future need to duplicate, regenerate, or reconstruct the data. There are two components of the archive activity: reconstruction of past information, and technology advances relating to data archival.

(1) Reconstruction of past information. Archived technical data should be retrievable from the original approved source of the data. These approved sources could include the developing organization or company, original equipment manufacturer, airline engineering department, or data supply vendor. Procedures should be established by the user to ensure the integrity of the stored technical data (regardless of the medium of the storage). These should include:

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

(ii) Selecting storage media that minimize regeneration errors or deterioration.

(iii) Exercising and/or refreshing archived technical data at a frequency compatible with the storage life of the medium.

(iv) Storing duplicate copies in physically separate archives to minimize the risk of loss in the event of a disaster.

(2) Technology advances. Users should ensure that all system components are maintained such that archived technical data can be retrieved.

h. Revision Control Procedures.

(1) Validation of revision control process. Users should establish revision control procedures to validate the revision process and ensure that the contents of an electronic retrieval system are current and complete. Users should publish a procedure for verifying the currency of revisions to the technical data in their procedure manual(s). The revision control procedures for CD-ROM data should be similar to the revision control procedures used for any other media that stores data. However, by its very nature, CD-ROM data are much less likely to be incomplete than data contained in a paper manual.

(2) Revision transmittal letter/release notes. Many certificate holders and operators frequently use internal distribution documentation that specifies the current revision number and date for each revision. Inspection and review of this documentation can provide a means that can be used to determine data currency. This documentation is sometimes provided separately, in which case it conveys revision numbers and dates, with applicable instructions to the users.

(3) Temporary revisions. The list of temporary revisions provided by the data supplier can be reviewed to determine if the temporary revisions are current and complete.

(4) Data currency audit. Procedures should be established by the user to ensure the currency of the technical data (regardless of storage media). Users should ensure that all CD-ROM contain the current revisions and/or dates. With CD-ROM media, page level insertion audits are no longer necessary to ensure technical data currency.

William J. White
Deputy Director, Flight Standards Service



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: USE OF CD-ROM SYSTEMS

Date: 8/14/97

AC No: 120-69

Initiated by: AFS-350

Change:

1. PURPOSE. This advisory circular (AC) provides guidance on the use of CD-ROM (compact disk read-only memory) systems for the preservation and retention of the maintenance portion of a certificate holder's manual. The AC also provides guidance on the use of CD-ROM systems for the retrieval of the technical data contained in a certificate holder's manual.

2. FOCUS. This AC applies to certificate holders conducting operations under Title 14 of the Code of Federal Regulations (14 CFR) parts 121, 129, and 135. Operators under 14 CFR part 91 or 125 and repair stations certificated under 14 CFR part 145 also may use the guidance contained in this AC to the extent that it is applicable to the conduct of their operations.

3. RELATED MATERIAL.

a. 14 CFR §§ 43.13, 121.133, 121.135, 121.137, 121.139, 121.141, 121.369, 125.71, 125.73, 125.75, 125.249, 129.14, 135.21, 135.23, and 135.427.

b. AC 21-33, Quality Assurance of Software Used in Aircraft or Related Products; AC 21-35, Computer Generated/Stored Records. Copies of these documents may be obtained from the U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Ave., Landover, MD 20785.

c. Federal Aviation Administration (FAA) Order 8300.10, Airworthiness Inspector's Handbook; FAA Order 8400.10, Air Transportation Operations Inspector's Handbook; FAA Order 8700.1, General Aviation Inspector's Handbook. Copies of these documents may be purchased from: New Orders, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.

4. BACKGROUND.

a. The Federal Aviation Regulations permit the preparation, use, and retention of the maintenance portion of a certificate holder's manual in electronic format if that format is acceptable to the Administrator. The FAA has determined that electronic storage and retrieval of the information contained in those manuals that are in a CD-ROM format offers improved data accessibility, quality control, and speed of distribution over paper- or microfilm-based information storage systems. These improvements result in enhanced safety and a reduced economic burden on industry and government by providing users with more rapid access to information at a reduced cost. These improvements also provide industry with a means to enhance the manner in which it presents the technical data contained in a certificate holder's manual by facilitating the use of media formats (e.g., visual displays, video, graphic files, audio, animation, and computer files) that are incompatible with the use of paper- or microfilm-based manuals.

b. Any acceptable CD-ROM system must deliver to the user the information contained in the system with at least the same degree of accuracy and integrity afforded by the use of a system based on a paper or microfilm format. The use of a CD-ROM system for the storage and retrieval of technical data does not relieve a certificate holder or operator from compliance with other regulatory requirements pertaining to the currency, completeness, use, or availability of technical data.

5. CD-ROM SYSTEMS.

a. Considerations that an Acceptable CD-ROM System Should Address. Prior to the implementation of a CD-ROM system, the certificate holder or operator should ensure that the following subjects are addressed:

(1) Specification and Installation of Computing Platform Hardware, Software, and Retrieval Tools. The computing platform hardware, software, and retrieval tools should be able to store and retrieve the technical data contained in the manuals under conditions of normal operation and use. The system should not permit unauthorized modification of the technical data it contains.

(2) On-going Maintenance and Support of the Computing Platform(s), Including Provisions for Outages and Necessary Alternative Retrieval Services. Although maintenance and support for the system may be provided by a source independent of the certificate holder or operator, responsibility for compliance with all regulatory requirements cannot be delegated.

(3) Distribution of Technical Data to Authorized Users. Certificate holders and operators should ensure that required personnel are provided with copies of manuals contained on a CD-ROM system or that the manuals are made available to the personnel, as appropriate. The procedures for the distribution of these manuals and their included technical data need not differ substantially from the procedures used for the distribution of information contained in paper or microfilm manuals. Certificate holders and operators may use their current manual distribution system for the distribution of manuals in a CD-ROM format.

(4) Creation and Distribution of any Incremental or Temporary Revisions Required Between Scheduled Revisions. The certificate holder or operator should establish procedures to verify that revisions to the technical data contained in the maintenance portion of its manual are current and complete and have been authorized by the appropriate authority before distribution.

(5) Accessibility by the FAA or National Transportation Safety Board (NTSB). The CD-ROM system must permit any authorized representative of the Administrator or the NTSB to retrieve, print, or view the information contained in any manual that is in CD-ROM format, upon request. If a certificate holder or operator is required to provide information to the FAA or NTSB, the certificate holder or operator must be able to provide the data in a format that is usable by the requesting agency.

(6) User Instructions. A certificate holder or operator should provide the user with information describing the operation and use of the CD-ROM system, to include: information and instructions for using publications, reference information, and system administration information. These instructions need not be in paper form. They may consist of electronic, context-sensitive help; on-line or system responses to specific operator queries; telephonic or electronic access to a designated assistance line; or other information included in the CD-ROM system.

(7) Training. The certificate holder or operator should establish a training program for employees who use a CD-ROM system. The subject matter and objectives of the training provided should vary depending on the employee's job responsibilities and functional level within the organization. Training should include security awareness and the policy and procedures for system operation. Acceptable methods of providing this training may include, but are not limited to, classroom instruction, on-line or system tutorials, user guides, and simulated problemsolving exercises. Any training program should

define minimum competency criteria and the method for demonstration of user competence.

(8) 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 considered acceptable.

b. Functional Considerations.

(1) A CD-ROM system should provide the user with the ability to retrieve the technical data contained within any manual stored in the system. Any CD-ROM system should have the ability to access, navigate, and retrieve applicable technical data at a computer workstation. The user accesses these data via the specific methods provided by the system. Electronic retrieval of information stored in a CD-ROM system may occur in either a stand-alone environment or a shared environment.

(2) The content of a manual contained in a CD-ROM system must be available and able to be viewed by the user. When the requested information is presented by the CD-ROM system, the result should be capable of being displayed on a computer screen or comparable device. If connected to a paper printer, the CD-ROM system should have the ability to output in paper form any information contained in a manual stored within the system. The format of any printed output from the system should clearly identify the information presented and be easily correlated to corresponding information contained in a printed version of the manual.

c. Revision Control Procedures.

(1) Validation of Revision Control Process. Certificate holders and operators should establish revision control procedures to audit the revision process and ensure that the contents of a CD-ROM system are current and complete. The revision control procedures for CD-ROM data may be similar to the revision control procedures used for any other medium that stores data.

(2) Revision Transmittal Letter/Release Notes. Many certificate holders and operators frequently use internal distribution documentation that specifies the current revision number and date for each revision. This documentation is sometimes provided separately, in which case it conveys revision numbers and dates, with applicable instructions to the users. A user can inspect and review this documentation to determine data currency.

(3) Data Currency Audit. Certificate holders and operators should establish procedures to ensure the currency of the technical data (regardless of storage media) that they use. Certificate holders and operators must ensure that all CD-ROM storage media contain the current revisions and associated revision dates. With CD-ROM media, page level insertion audits of manuals by the user may no longer be necessary to ensure information currency.

(4) User Responsibilities. Users of information obtained from CD-ROM systems, especially the data output in printed form, should ensure that the output was obtained from the most current CD-ROM data available to the certificate holder or operator.

d. Special Considerations in Displaying Output.

(1) Data Content and Output Form.

(a) The capabilities and advantages of electronic retrieval systems may cause information retrieved from a manual stored in a CD-ROM system to be displayed in a different format than it appears on paper or microfilm pages. The information should be identical in content regardless of output form.

(b) Any displayed output should be readily traceable to its original source. From the displayed output, the user should be able to obtain: the manual title; applicable aircraft, airframe, engine, propeller, appliance, component, or part make and model; effectivity of the data; and the revision number/date of the data. This information need not be concurrently displayed with the output display of the technical data (e.g., on the computer screen); however, this information must be readily accessible to the user.

(2) Page Numbers and Revision Data.

(a) The design of the display screen on many video monitors does not allow for the complete display of a traditional letter size (8 1/2" X 11") paper page. Frequently, the video monitor will display only one-third to one-half of a paper page, and the user must scroll the on-screen display to see the complete page. Conversely, some systems will print an entire page even though the video monitor is displaying a partial page. This situation may result in the page numbers assigned by an electronic system and displayed or printed not to be in agreement with the page numbers on the approved copy of the manual. Therefore, certificate holders and operators must ensure that the information that is displayed or printed can be traced to the correct revision level of the manual.

(b) The contents of a chapter, section, or subject in a maintenance manual may be displayed as a continuous flow of information without the actual page numbers of the approved manual. The user may elect to output only a portion of a page of a manual containing the relevant information. 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.

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

(4) The most common method of updating a manual in CD-ROM format is to issue a new compact disk (CD). The CD-ROM system usually displays the date of the issuance of the most recent CD as the date of the entire manual. Although, only the affected portions of the manuals are updated and marked with the most current revision date, the date contained on the entire manual may not correspond to the revision date contained on each page. When this method of updating the manual through the issuance of a replacement CD is used, a date for the CD issuance may be considered the date of last revision of the manual. The FAA recommends that certificate holders and operators prepare a table of revisions and include that table on the CD to show when each page of the manual was revised.

e. Data Archives. Maintenance recordkeeping requirements frequently require retention of and access to previously used technical data to substantiate a method of repair or maintenance. To facilitate compliance with those traceability requirements, a certificate holder or operator may decide to archive earlier versions of manuals in the event of a future need to duplicate, regenerate, or reconstruct maintenance instructions. This archived data may be retained by the certificate holder or operator, or could 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.

(1) Preservation of Stored Data. Procedures should be established by the certificate holder or operator to ensure the integrity of the stored technical data (regardless of the medium of the storage). These procedures should include:

(a) Ensuring that no unauthorized changes can be made.

(b) Selecting a storage medium that minimizes regeneration errors or deterioration.

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

(d) Storing duplicate copies in physically separate archives to minimize the risk of data loss in the event of a disaster.

(2) Technology Advances. Certificate holders and operators should ensure that all CD-ROM system components are maintained so that archived manuals can be retrieved. Future technological advancements in data storage media may result in the replacement of current system hardware or the use of another storage medium. Future systems must be able to retrieve the archived technical data or the certificate holder or operator will have to maintain the old CD-ROM system to ensure data availability.



Richard Gordon

Acting Deputy Director, Flight Standards Service