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 .

DRAFT

U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Acceptance and Use of Electronic Signatures

Date: 12/04/96 **AC No:** 120-ES
Initiated by: AFS-350 **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.

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