DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 121, 125 and 135

[Docket No.: FAA–2003–15682; Amendment Nos. 121–288, 125–42, 135–84]

RIN 2120–AH81

Digital Flight Data Recorder Requirements—Changes to Recording Specifications and Additional Exceptions

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This action amends the flight data recorder regulations by expanding the recording specifications of certain data parameters for specified airplanes, and by adding aircraft models to the lists of aircraft excepted from the 1997 regulations. In addition, this rule corrects specifications in an operating rule appendix that were inadvertently omitted in previous actions. These changes are necessary to allow the continued operation of certain aircraft that are unable to meet the existing recorder criteria using installed equipment. The changes are also necessary for certain aircraft for which the cost to retrofit under 1997 regulatory changes would be cost prohibitive.

DATES: This final rule is effective August 18, 2003.

FOR FURTHER INFORMATION CONTACT: Gary Davis, Flight Standards Service, Air Transportation Division, AFS–201A, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone (202) 267-8166; facsimile (202) 267–5229, e-mail *gary.davis@faa.gov*.

SUPPLEMENTARY INFORMATION:

Availability of Rulemaking Documents

You can get an electronic copy using the Internet by:

(1) Searching the Department of Transportation's electronic Docket Management System (DMS) Web page (*http://dms.dot.gov/search*);

(2) Visiting the Office of Rulemaking's Web page at *http://www.faa.gov/avr/arm/index.cfm;* or

(3) Accessing the Government Printing Office's Web page at *http://www.access.gpo.gov/su_docs/aces/aces140.html.*

You can also get a copy by submitting a request to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267–9680. Make sure to identify the amendment number or docket number of this rulemaking.

Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, *etc.*). You may review DOT's complete Privacy Act statement in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70; Pages 19477–78) or you may visit *http://dms.dot.gov.*

Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires the FAA to comply with small entity requests for information or advice about compliance with statutes and regulations within its jurisdiction. Therefore, any small entity that has a question regarding this document may contact its local FAA official, or the person listed under **FOR FURTHER INFORMATION CONTACT**. You can find out more about SBREFA on the Internet at *http://www.faa.gov/avr/arm/sbrefa.htm,* or by e-mailing us at *9-AWA-SBREFA@faa.gov.*

Background

In response to a series of recommendations issued by the National Transportation Safety Board (NTSB), the FAA revised and updated parts 121, 125 and 135 of Title 14, Code of Federal Regulations (14 CFR) in 1997 to require that flight data recorders on U.S. registered airplanes be upgraded to record additional parameters of data (62 FR 38362, July 17, 1997). The exact number of parameters required depends on the age of the airplane; airplanes manufactured after August 19, 2002, must record 88 parameters of flight data.

Prior to the 1997 rule, the specifications for flight data recorders (the range, accuracy, sampling intervals, and resolution required for each parameter) were found in appendix B to part 121. As part of the 1997 rule upgrade, a new appendix M to part 121 was created, which includes the newly required parameters and new specifications for some of the existing parameters. The standards of appendix M were based in part on the specifications found in the European Organization for Civil Aviation Equipment (EUROCAE)'s Document ED–55, Minimum Operational Performance Specifications (MOPS) for Flight Data Recorder Systems. Appendix M requires increased range, accuracy, sampling interval, and resolution requirements, and reflects the performance expected of newer technologies. The same changes were made to appendix E to part 125 (appendix E), and appendix F to part 135 (appendix F) to apply to airplanes operating under those parts. Discussion of changes made to appendix M in this document also apply to appendices E and F.

Actions Following the 1997 Rulemaking

Airbus Industries. Following the adoption of the 1997 regulations, Airbus Industries (Airbus) notified the FAA that, in order to comply with the new requirements of appendix M to part 121, several of its airplane models would have to undergo major equipment retrofits, a circumstance the 1997 rule explicitly tried to avoid. Airbus stated that although the DFDR's in its airplanes recorded the required parameters, some of the resolution and sampling intervals for certain parameters differed slightly from those required by appendix M. The FAA found that while Airbus had noted these differences in its comment to the NPRM proposing the 1997 regulations, its comment was not fully addressed in the preamble to the final rule.

After consulting with the NTSB, the FAA determined that the Airbus differences were acceptable as an alternative. The FAA determined the most appropriate way to accommodate the differences was to add footnotes to specific parameters of appendix M noting the Airbus airplanes affected and the different specifications. Footnote changes for Airbus airplanes were adopted in 1999, 2000, and 2002.

Corrections to appendix F to part 135. When the regulations were modified to accommodate Airbus airplanes, and during the adoption of other recent changes affecting all airplanes, the same changes should have been made to appendix M to part 121, appendix E to part 125, and appendix F to part 135 to reflect the fact that affected aircraft may operate under any of these three parts. On at least two occasions the amendments to appendix F were inadvertently omitted. Accordingly, this amendment incorporates all of the corresponding changes to appendix F that were not made previously. These changes are considered conforming changes to appendix F that are in the nature of a correction. The FAA is not specifically requesting comment on these changes, although any operator that finds itself adversely affected by these changes to appendix F may submit this information to the person listed under the **FOR FURTHER INFORMATION CONTACT** heading.

SFAR 89

On May 31, 2001, the Boeing Company (Boeing) petitioned the FAA for exemptions for three of its airplane models that did not meet the resolution requirements of appendix M for certain parameters, and for an exemption to the August 20, 2001, compliance date. Boeing requested that operators of its airplanes be allowed to continue operating without meeting the resolution requirements of appendix M, or that appendix M be revised to reflect the current recording capabilities of the affected airplanes.

After reviewing the petition, the FAA determined that it could not issue an exemption from an operating rule to a manufacturer on behalf of the operators of its affected airplanes. Further, the FAA found that the issues raised in Boeing's petition were complex and could not be resolved before the August 20 compliance date. The FAA found that additional time was needed to gather the technical and cost information necessary to make an informed decision and implement a solution.

In order to prevent the grounding of non-compliant airplanes, the FAA issued Special Federal Aviation Regulation Number 89 (SFAR 89)—Suspension of Certain Flight Data Recorder Requirements, on August 15, 2001 (66 FR 44270, August 22, 2001). The SFAR, published as a final rule with request for comments, provides temporary relief by suspending the resolution recording requirements for certain parameters on specified airplanes operating under part 121, part 125, or part 135, until August 18, 2003.

In memos dated June 25 and 27, 2001, Dassault Aviation (Dassault) notified the FAA that two of its model airplanes could not comply with DFDR resolution requirements. Dassault stated that, as configured with the current flight data acquisition unit and bus assembly, affected airplanes did not meet the resolution requirements of the regulation. Dassault indicated development of a new data acquisition unit to meet the resolution requirements of appendix M would be expensive, and requested relief similar to that previously granted to Airbus. Similar to the Boeing request, the FAA determined that there was not enough time to gather the information necessary to resolve these issues before the August 20, 2001, compliance date. The FAA included temporary relief for operators of affected Dassault airplanes in SFAR 89, and maintained that relief upon receiving a specific petition for rulemaking from Dassault on October 11, 2002.

Anticipating that there might be other airplanes with similar DFDR resolution issues that had not yet become evident, the FAA included a provision in SFAR 89 that provides relief to operators of other airplanes that might not meet the resolution recording requirements. Operators of those airplanes were required to notify the FAA of the situation and provide requested information in order to take advantage of the relief provided in the SFAR. Several operators of affected Boeing airplanes contacted the FAA to indicate that they were making use of the SFAR relief, but no other noncompliant aircraft models have been reported or identified.

Disposition of Comments to SFAR 89

Five comments were received in response to SFAR 89. Four of the five comments fully support the SFAR and urge the FAA to adopt a solution that would prevent the retrofit of currently installed equipment. The NTSB commented in favor of the SFAR as well, but also questioned some definitions and conclusions presented in the original Boeing petition. All of the comments addressed the problem on Boeing airplanes.

In a comment supplementing its original petition, Boeing stresses that the relief from the resolution requirements provided in SFAR 89 do not compromise the integrity of the DFDR signal and ''should not hinder any accident or incident investigation.'' Boeing's comment includes detailed technical information illustrating the difference between the requirements of appendix M and the existing resolution recorded by affected Boeing airplanes. In specific instances, Boeing notes, the differences between the requirements and the actual resolution are negligible, such as 9/10,000 of an inch of movement on the aileron trailing edge.

Boeing estimates that it would cost $38 million to redesign the components and modify the data frames in the 534 airplanes currently affected by the regulations, and the redesign and retrofit would take up to 3 years to complete. Boeing requests that the relief provided in the SFAR be made a permanent part of part 121 appendix M.

The Air Transport Association (ATA) submitted two comments on behalf of its member airlines. The first comment, dated September 21, 2001, supports the SFAR and recommends that the relief provided by the SFAR be made permanent for affected Boeing airplanes. Citing the parameters that were changed for specific Airbus airplanes, the ATA states that there is no justification for forcing further changes on Boeing airplanes because they already meet the intended purpose of the rule. The ATA attached comments from two of its members—Airborne Express and American Airlines—which also support adoption of a permanent change to the rule.

In a comment dated October 16, 2001, the ATA forwarded comments from Delta Airlines who also urges permanent adoption of the SFAR specifications for Boeing airplanes. The ATA and two of its members each expressed concern that a retrofit of the affected airplanes would be costly without providing any discernible improvement in the quality of recorded data.

United Parcel Service (UPS) supports permanent relief for Boeing 767 model airplanes. In its comment, UPS notes that the NTSB has found the varied resolution acceptable, and that the FAA had set the precedent for such action by amending the regulations for Airbus airplanes. The UPS comment includes specific technical information for the 767 model airplane. UPS states that permanent relief will allow it to continue operating 32 Boeing 767 model airplanes without incurring additional modification costs, and suggests that the change be adopted in the form of a footnote, similar to those used for Airbus airplanes.

Airbus submitted a comment supporting the FAA's action to provide relief by suspending the resolution requirements. Most of the Airbus comment, however, addresses the relationship between the operating rules and the certification rules of part 25, and the steps required for certification. Airbus's comment is directed at some of the information provided in the initial Boeing petition that was not adopted as part of the SFAR. This includes a Boeing statement that if its definition of resolution were adopted, there would be no need for a list of specific resolution requirements in the regulations. Airbus recognizes that this topic is outside the scope of the SFAR, but indicates that the FAA should not simply accept Boeing's suggested changes, and instead should take a harmonized approach to adoption of working definitions for DFDR systems and specifications.

The National Transportation Safety Board (NTSB) concurs with the intent of the SFAR to provide temporary relief while reviewing the comments. The NTSB states that since the SFAR resulted from the May 2001 Boeing petition, the NTSB's comments address the specifics of the Boeing petition rather than the SFAR language itself.

The NTSB notes that the Boeing petition includes a number of requests

for changes to the regulations addressing flight data recorders that are not relevant to the action providing relief for resolution requirements on certain Boeing airplanes.

The NTSB states that resolution is critical to the quality of digital flight data. If coarser resolution is allowed, data quality could be reduced to an unacceptable level and would more easily be subject to misinterpretation. The NTSB concludes that explicit resolution requirements should remain in the regulations.

The NTSB also notes that for many parameters, the resolution requirement is expressed as a percentage of the full range of travel of the control surface being measured, rather than the actual range of travel, since the latter differs widely between aircraft models. The NTSB notes that when the total range of motion is short, the percentages make the regulation more stringent. In such cases, the NTSB concludes, ''The minimum resolution for a given parameter should be evaluated to determine if regulatory relief could be granted and the accuracy requirements maintained.'' Using that criterion, the NTSB concludes it has no objection to the specific resolution relief requested by Boeing (with the exception of vertical acceleration in the Boeing 717 model airplane).

The NTSB comment goes on to give its position regarding each of the 11 specific changes requested in the Boeing petition.

FAA Response

The FAA agrees with Airbus that the issue of a new resolution definition is beyond the scope of the rulemaking. The FAA will continue to consider the broader issues outlined in the Boeing request, but will not change the current format of the regulation or adopt definitions that affect virtually all airplanes operating today. Any changes the FAA may choose to propose would be accomplished only after input from the industry.

In its original petition, Boeing requested that the amendments affecting its aircraft be codified as footnotes to the affected parameters. Based on discussions with Boeing technical representatives and NTSB, the FAA is amending the affected appendices by making appropriate changes requested by Boeing, except for the change to parameter 5 (vertical acceleration).

Boeing was asked to submit additional data to the FAA in order to clarify questions and concerns raised in the original petition and the NTSB comment. Boeing submitted the requested data and the new information was reviewed in a June 26, 2002, meeting between FAA personnel and NTSB representatives. In the meeting, NTSB agreed that global changes for the following parameters under appendix M of part 121 were acceptable: 12a, 14a, 16, 23, and 26. An amendment to footnote 12 to coordinate with changes to parameter 23 was also accepted during the meeting. The NTSB does not support a global change to the appendix concerning parameter 5. Instead, the NTSB agrees with the insertion of a footnote into each affected appendix providing the necessary relief for the Boeing B–717 airplane.

Boeing submitted another petition on October 18, 2002, seeking changes to three additional parameters. The requested changes would affect parameters 9, 87, and 88 for Boeing 737 and 777 airplanes. FAA personnel later discussed the request with NTSB representatives and the changes were found to be acceptable. The additional petition is consistent with a request by the FAA for information regarding airplane models that could not meet the resolution requirements, but were not included in the relief granted in SFAR 89.

No comments were received concerning Dassault's request to amend the resolution recording requirements for parameters 5 and 26 for two of its airplane models. Therefore, the FAA is revising footnotes 9 and 14 in each affected appendix to accommodate Dassault's requested relief from the existing requirement.

If the rule is not changed, operators of certain Boeing and Dassault airplanes would be required to complete costly retrofits. The incremental differences in the measurements obtained are considered insignificant. By incorporating global changes and footnotes into this rule, retrofits will not be necessary, and it is accepted that accident investigations will not be compromised. Therefore, the FAA has determined that retrofitting to meet the higher standards is unnecessary. Accordingly, the FAA is amending the resolution recording requirements for parameters 9, 12a, 14a, 16, 19, 23, 87, 88, and adding revised footnotes to parameters 5 and 26 of appendix M of part 121, appendix E of part 125, and appendix F of part 135. This rule also makes a correction to footnote 11 to add a missing decimal point. The revision of the recording requirements for parameters 9 and 19 will remove the need for the footnotes (9 and 14) in the current regulation. Rather than renumber each footnote in this rule, we are using footnotes 9 and 14 to apply the specific changes requested for the B–717 and Dassault airplanes. Therefore, footnotes 9 and 14 will be revised to apply to parameters 5 and 26 respectively.

Exceptions to DFDR Requirements

When the FAA developed the 1997 DFDR regulations, we recognized that the costs of retrofitting some older aircraft models would be prohibitive and would likely force the aircraft out of service. The regulations incorporated an exceptions paragraph into each of the operating rule parts; these paragraphs list specific aircraft models that are not subject to the 1997 upgrade requirements. These aircraft must continue to comply with the flight data recorder regulations previously in effect for their operation.The FAA also noted in the final rule that operators that found other models of aircraft appropriate for exception status could petition the FAA for inclusion of the aircraft model in the exceptions paragraph. In general, the FAA bases exception status on the age of the aircraft, the number of aircraft still in operation, and the expected cost of DFDR upgrades.

Since the 1997 rule was promulgated, the FAA has received a number of requests for exception status. After reviewing information submitted, most of the models were granted exemptions to continue operating without the upgrades until the operating rules were changed. No opposing comments were received when the exemption requests were published. Accordingly, this rulemaking includes those additions to the lists of excepted aircraft. While these aircraft are excepted from upgrade requirements, most are still covered under other current sections and as such, all installed equipment must continue to be used and maintained according to the regulation. The sections that are being amended to include additional excepted aircraft are Sections 121.344(l)(2), 121.344a(f), 125.226(l)(2), and 135.152(k).

Paperwork Reduction Act

There are no current or new requirements for information collection associated with this amendment.

International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has determined that there are no ICAO Standards and Recommended Practices that correspond to these regulations.

Economic Evaluation, Regulatory Flexibility Determination, Trade Impact Assessment, and Unfunded Mandates Assessment

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs each Federal agency to propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (19 U.S.C. section 2531–2533) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act also requires agencies to consider international standards and, where appropriate, use them as the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation.).

Regulations that are expected to have minimal impact are not required to be analyzed as described above. The Department of Transportation Order 2100.5 prescribes policies and procedures for simplification, analysis, and review of regulations. If it is determined that the expected impact is so minimal that the proposal does not warrant a full Evaluation, a statement to that effect and the basis for it is included in the proposed regulation. The FAA has determined that there are no costs associated with this final rule. Instead, this rule relieves operators of Boeing and other aircraft from a cost that would have been inadvertently imposed on them in the adoption of the 1997 regulations. This cost would have been imposed on Boeing beginning on August 20, 2002. Without exemption relief, other operators would have been affected at various times depending on the date of manufacture and type of equipment. This change effectuates the original intent of the 1997 regulations.

In conducting these analyses, the FAA has determined this rule (1) has benefits which justify its costs; (2) is not a ''significant regulatory action'' as defined in section 3(f) of Executive Order 12866 and is not ''significant'' as defined in DOT's Regulatory Policies and Procedures; (3) will not have a significant impact on a substantial number of small entities; (4) will have little effect on international trade; and (5) does not impose an unfunded mandate on state, local, or tribal governments, or on the private sector.

The purpose of this rule is to eliminate the necessity to incorporate unnecessary changes into an existing type of aircraft that already meets the requirements of the rule except for minor variations in the resolution-recording requirement or because of age and remaining service life it is impractical to install the new DFDR's. The FAA has determined that allowing the continued resolution recording at a slightly different value will not impact safety or the collection of accident investigation data nor will excepting certain older aircraft from the rules have a negative impact on safety. This rule relieves air carriers from a costly retrofit with no reduction in safety.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) directs the FAA to fit regulatory requirements to the scale of the business, organizations, and governmental jurisdictions subject to the regulation. We are required to determine whether a proposed or final action will have a ''significant economic impact on a substantial number of small entities'' as they are defined in the Act. If we find that the action will have a significant impact, we must do a ''regulatory flexibility analysis.''

This final rule will relieve unnecessary costs to operators of certain aircraft. Therefore, the FAA expects this rule to impose no cost on small entities. Consequently, the FAA certifies that the rule will not have a significant economic impact on a substantial number of small entities.

Trade Impact Assessment

The Trade Agreement Act of 1979 prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. The FAA has assessed the potential effect of this rulemaking and has determined that it will reduce costs to U.S. operators of certain airplanes but will have a minimal effect on international trade.

Unfunded Mandates Assessment

The Unfunded Mandates Reform Act of 1995 (the Act), is intended, among other things, to curb the practice of imposing unfunded Federal mandates on State, local, and tribal governments. Title II of the Act requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in a $100 million or more expenditure (adjusted annually for inflation) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a ''significant regulatory action.''

This final rule does not contain such a mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

Executive Order 13132, Federalism

The FAA has analyzed this final rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action will not have a substantial direct effect on the States, or the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government, and therefore does not have federalism implications.

Environmental Analysis

FAA Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental impact statement. In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), this rulemaking action qualifies for a categorical exclusion.

Energy Impact

The energy impact of the notice has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) Pub. L. 94–163, as amended (42 U.S.C. 6362) and FAA Order 1053.1. We have determined that the final rule is not a major regulatory action under the provisions of the EPCA.

List of Subjects

14 CFR Part 121

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

14 CFR Part 125

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

14 CFR Part 135

Air taxis, Aircraft, Aviation safety, Reporting and record keeping requirements.

The Amendment

■ In consideration of the foregoing, the Federal Aviation Administration amends Chapter I of Title 14, Code of Federal Regulations as follows:

PART 121—OPERATING REQUIREMENTS: DOMESTIC, FLAG, AND SUPPLEMENTAL OPERATIONS

■ 1. The authority citation for part 121 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 40119, 41706, 44101, 44701–44702, 44705, 44709–44711, 44713, 44716–44717, 44722, 46105.

■ 2. Section 121.344(l)(2) is revised to read as follows:

§ 121.344 Digital flight data recorders for transport category airplanes.

* * * * *

(l) * * *

(2) British Aerospace 1–11, General Dynamics Convair 580, General Dynamics Convair 600, General Dynamics Convair 640, deHavilland Aircraft Company Ltd. DHC–7, Fairchild Industries FH 227, Fokker F–27 (except Mark 50), F–28 Mark 1000 and Mark 4000, Gulfstream Aerospace G–159, Jetstream 4100, Lockheed Aircraft Corporation Electra 10–A, Lockheed Aircraft Corporation Electra 10–B, Lockheed Aircraft Corporation Electra 10–E, Lockheed Aircraft Corporation Electra L–188, Lockheed Martin Model 382 (L–100) Hercules, Maryland Air Industries, Inc. F27, Mitsubishi Heavy Industries, Ltd. YS–11, Short Bros. Limited SD3–30, Short Bros. Limited SD3–60.

■ 3. Section 121.344a(f) is revised to read as follows:

§ 121.344a Digital flight data recorders for 10–19 seat airplanes.

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(f) For airplanes that were manufactured before August 18, 1997, the following airplane types need not comply with this section, but must continue to comply with applicable paragraphs of § 135.152 of this chapter, as appropriate: Beech Aircraft–99 Series, Beech Aircraft 1300, Beech Aircraft 1900C, Construcciones Aeronauticas, S.A. (CASA) C–212, deHavilland DHC–6, Dornier 228, HS–748, Embraer EMB 110, Jetstream 3101, Jetstream 3201, Fairchild Aircraft SA–226, Fairchild Metro SA–227.

■ 4. Appendix M to part 121 is amended to revise item numbers 5, 9, 12a, 14a, 16, 19, 23, 26, 87 and 88 and footnotes 5, 9, 11, 12 and 14 to read as follows:

Appendix M to Part 121—Airplane Flight Recorder Specifications

The recorded values must meet the designated range, resolution, and accuracy requirements during dynamic and static conditions. All data recorded must be correlated in time to within one second.

Parameters	Range	Accuracy (sensor input)	Seconds per sampling interval	Resolution	Remarks
*	*	*	*	*	*
5. Normal acceleration (vertical) [9].	−3g to +6g	±1% of max range excluding datum error of ±5%.	0.125	0.004g.	
*	*	*	*	*	*
9. Thrust/power on each engine—primary flight crew reference.	Full range forward	±2%	1 (per engine)	0.3% of full range.	Sufficient parameters (*e.g.* EPR, N1 or Torque, NP) as appropriate to the particular engine being recorded to determine power in forward and reverse thrust, including potential overspeed condition.
*	*	*	*	*	*
12a. Pitch control(s) (non fly-by-wire systems).	Full range	±2% Unless higher accuracy uniquely required.	0.5 or 0.25 for airplanes operated under $121.344(f).	0.5% of full range.	For airplanes that have a flight control break away capability that allows either pilot to operate the controls independently, record both control inputs. The control inputs may be sampled alternately once per second to produce the sampling interval of 0.5 or 0.25, as applicable.
*	*	*	*	*	*
14a. Yaw control position(s) (non-fly-by-wire) [5].	Full range	±2° Unless higher accuracy uniquely required.	0.5	0.3% of full range.	For airplanes that have a flight control break away capability that allows either pilot to operate the controls independently, record both control inputs. The control inputs may be sampled alternately once per second to produce the sampling interval of 0.5.
*	*	*	*	*	*
16. Lateral control surface(s) position [7].	Full range	±2° Unless higher accuracy uniquely required.	0.5 or 0.25 for airplanes operated under § 121.344(f).	0.3% of full range.	A suitable combination of surface position sensors is acceptable in lieu of recording each surface separately. The control surfaces may be sampled alternately to produce the sampling interval of 0.5 or 0.25.
*	*	*	*	*	*
19. Pitch trime surface position.	Full range	±3° Unless higher accuracy uniquely required.	1	0.6% of full range.	
*	*	*	*	*	*
23. Ground spoiler position or brake selection [12].	Full range or each position (discrete).	±2° Unless higher accuracy uniquely required.	1 or 0.5 for airplanes operated under § 121.344(f).	0.5% of full range.	

Parameters	Range	Accuracy (sensor input)	Seconds per sampling interval	Resolution	Remarks
*	*	*	*	*	*
26. Radio Altitude [14].	−20 ft to 2,500 ft	±2 ft or ±3% whichever is greater below 500 ft and ±5% above 500 ft.	1	1 ft +5% above 500 ft.	For autoland/category 3 operations. Each radio altimeter should be recorded, but arranged so that at least one is recorded each second.
*	*	*	*	*	*
87. Ground spoiler position and speed brake selection.	Full range or discrete	±5%	0.5	0.3% of full range.	
88. All cockpit flight control input forces (control wheel, control column, rudder pedal).	Full range control wheel ±70 lb control column ±85 rudder pedal ±165.	±5%	1	0.3% full range	For fly-by-wire flight control systems, where flight control surface position is a function of the displacement of the control input device only, it is not necessary to record this parameter. For airplanes that have a flight control break away). capability that allows either pilot to operate the control independently, record both control force inputs. The control force inputs may be sampled alternately once per 2 seconds to produce the sampling interval of 1.

* * * * * * *

[5] For A330/A340 series airplanes, resolution = 1.18% (0.703°>0.120°).

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[7] For A330/A340 series airplanes, aileron resolution = 0.704% (0.352°>0.100°). For A330/A340 series airplanes, spoiler resolution = 1.406% (0.703°>0.100°).

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[9] For B–717 series airplanes, resolution = .005g. For Dassault F900C/F900EX airplanes, resolution = .007g.

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[11] For A330/A340 series airplanes, resolution = 1.05% (0.250°>0.120°). For A300 B2/B4 series airplanes, resolution = 0.92% (0.230°>0.125°).

[12] For A330/A340 series airplanes, spoiler resolution = 1.406% (0.703°>0.100°).

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[14] For Dassault F900C/F900EX airplanes, Radio altitude resolution = 1.25 ft.

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■ 5.–6. Special Federal Aviation Regulation No. 89 (SFAR 89)—Suspension of Certain Flight Recorder Requirements is removed on the date this rule becomes effective.

PART 125—CERTIFICATION AND OPERATIONS: AIRPLANES HAVING A SEATING CAPACITY OF 20 OR MORE PASSENGERS OR A MAXIMUM PAYLOAD CAPACITY OF 6,000 POUNDS OR MORE; AND RULES GOVERNING PERSONS ON BOARD SUCH AIRCRAFT

■ 7. The authority citation for part 125 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701–44702, 44705, 44710–44711, 44713, 44716–44717, 44722.

■ 8. Section 125.226(l)(2) is revised to read as follows:

§ 125.226 Digital flight data recorders.

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(l) * * *

(2) British Aerospace 1–11, General Dynamics Convair 580, General Dynamics Convair 600, General Dynamics Convair 640, deHavilland Aircraft Company Ltd. DHC–7, Fairchild Industries FH 227, Fokker F–27 (except Mark 50), F–28 Mark 1000 and Mark 4000, Gulfstream Aerospace G–159, Jetstream 4100, Lockheed Aircraft Corporation Electra 10–A, Lockheed Aircraft Corporation Electra 10–B, Lockheed Aircraft Corporation Electra 10–E, Lockheed Aircraft Corporation Electra L–188, Lockheed Martin Model 382 (L–100) Hercules, Maryland Air Industries, Inc. F27, Mitsubishi Heavy Industries, Ltd. YS–11, Short Bros. Limited SD3–30, Short Bros. Limited SD3–60.

■ 9. Appendix E to part 125 is amended to revise item numbers 5, 9, 12a, 14a, 16, 19, 23, 26, 87 and 88 and footnotes 5, 9, 11, 12 and 14 to read as follows:

Appendix E to Part 125—Airplane Flight Recorder Specifications

The recorded values must meet the designated range, resolution, and accuracy requirements during dynamic and static conditions. All data recorded must be correlated in time to within one second.

Parameters	Range	Accuracy (sensor input)	Seconds per sampling interval	Resolution	Remarks
*	*	*	*	*	*
5. Normal Acceleration (Vertical) [9].	−3g to +6g	±1% of max range excluding datum error of ±5%.	0.125	0.004g.	
*	*	*	*	*	*
9. Thrust/Power on each engine—primary flight crew reference.	Full Range Forward	±2%	1 (per engine)	0.3% of full range.	Sufficient parameters (*e.g.* EPR, N1 or Torque, NP) as appropriate to the particular engine being recorded to determine power in forward and reverse thrust, including potential overspeed condition.

Parameters	Range	Accuracy (sensor input)	Seconds per sampling interval	Resolution	Remarks
*	*	*	*	*	*
12a. Pitch Control(s) position (non-fly-by-wire systems).	Full Range	±2% Unless Higher Accuracy Uniquely Required.	0.5 or 0.25 for airplanes operated under § 121.344(f).	0.5% of full range.	For airplanes that have a flight control break away capability that allows either pilot to operate the controls independently, record both control inputs. The control inputs may be sampled alternately once per second to produce the sampling interval of 0.5 or 0.25, as applicable.
*	*	*	*	*	*
14a. Yaw Control position(s) (non-fly-by-wire) [5].	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5	0.3% of full range.	For airplanes that have a flight control break away capability that allows either pilot to operate the controls independently, record both control inputs. The control inputs may be sampled alternately once per second to produce the sampling interval of 0.5.
*	*	*	*	*	*
16. Lateral Control Surface(s) Position [7].	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5 or 0.25 for airplanes operated under § 121.344(f).	0.3% of full range.	A suitable combination of surface position sensors is acceptable in lieu of recording each surface separately. The control surfaces may be sampled alternately to produce the sampling interval of 0.5 or 0.25.
*	*	*	*	*	*
19. Pitch Trim Surface Position.	Full Range	±3° Unless Higher Accuracy Uniquely Required.	1	0.6% of full range	
*	*	*	*	*	*
23. Ground Spoiler Position or Speed Brake Selection [12].	Full Range or Each Position (discrete).	±2° Unless Higher Accuracy Uniquely Required.	1 or 0.5 for airplanes operated under § 121.344(f).	0.5% of full range	
*	*	*	*	*	*
26. Radio Altitude [14]	−20 ft to 2,500 ft	±2 ft or ±3% Whichever is Greater Below 500 ft and ±5% above 500 ft.	1	1 ft +5% Above 500 ft.	For autoland/category 3 operations. Each radio altimeter should be recorded, but arranged so that at least one is recorded each second.
*	*	*	*	*	*
87. Ground spoiler position and speed brake selection.	Full Range or Discrete	±5%	0.5	0.3% of full range	
88. All cockpit flight control input forces (control wheel, control column, rudder pedal).	Full Range Control Wheel ±70 lbs Control Column ±85 lb Rudder pedal ±165 lbs.	±5%	1	0.3% of full range	For fly-by-wire flight control systems, where flight control surface position is a function of the displacement of the control input device only, it is not necessary to record this parameter. For airplanes that have a flight control break away capability that allows either pilot to operate the control independently, record both control force inputs. The control force inputs may be sampled alternately once per 2 seconds to produce the sampling interval of 1.

* * * * * * *

[5] For A330/A340 series airplanes, resolution = 1.18% (0.703°>0.120°).

* * * * * * *

[7] For A330/A340 series airplanes, aileron resolution = 0.704% (0.352°>0.100°). For A330/A340 series airplanes, spoiler resolution = 1.406% (0.703°>0.100°).

* * * * * * *

[9] For B–717 series airplanes, resolution = .005g. For Dassault F900C/F900EX airplanes, resolution = .007g.

* * * * * * *

[11] For A330/A340 series airplanes, resolution = 1.05% (0.250°>0.120°). For A330 B2/B4 series airplanes, resolution = 0.92% (0.230°>0.125°).

[12] For A330/A340 series airplanes, spoiler resolution = 1.406% (0.703°>0.100°).

* * * * * * *

[14] For Dassault F900C/F900EX airplanes, Radio Altitude resolution = 1.25 ft.

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PART 135—OPERATING REQUIREMENTS: COMMUTER AND ON DEMAND OPERATIONS AND RULES GOVERNING PERSONS ON BOARD SUCH AIRCRAFT

■ 10.–11. The authority citation for part 135 continues to read as follows:

Authority: 49 U.S.C. 106(g), 41706, 44113, 44101, 44701–44702, 44705, 44709, 44711–44713, 44715–44717, 44722.

■ 12. Section 135.152(k) is revised to read as follows:

§ 135.152 Flight recorders.

* * * * *

(k) For aircraft manufactured before August 18, 1997, the following aircraft types need not comply with this section: Bell 212, Bell 214ST, Bell 412, Bell 412SP, Boeing Chinook (BV–234), Boeing/Kawasaki Vertol 107 (BV/KV–107–II), deHavilland DHC–6, Eurocopter Puma 330J, Sikorsky 58, Sikorsky 61N, Sikorsky 76A.

■ 13. Appendix F to part 135 is amended to revise item numbers 1, 5, 7, 9, 12a, 12b, 13b, 14a, 15, 16, 17, 19, 20, 21, 23, 24, 26, 37, 42, 57, 87 and 88 and adding footnotes 1 through 17 to read as follows:

Appendix F to Part 135—Airplane Flight Recorder Specifications

The recorded values must meet the designated range, resolution, and accuracy requirements during dynamic and static conditions. All data recorded must be correlated in time to within one second.

Parameters	Range	Accuracy (sensor input)	Seconds per sampling interval	Resolution	Remarks
*	*	*	*	*	*
1. Time or Relative Time Counts [1].	24 Hrs, 0 to 4095	±0.125% Per Hour	4	1 sec	UTC time preferred when available. Counter increments each 4 seconds of system operation.
*	*	*	*	*	*
5. Normal Acceleration (Vertical) [9].	−3g to +6g	±1% of max range excluding datum error of ±5%.	0.125	0.004g	
*	*	*	*	*	*
7. Roll Attitude [2]	±180°	±2°	1 or 0.5 0.5 airplanes operated under § 135.152(j).	0.5°	A sampling rate of 0.5 is recommended.
*	*	*	*	*	*
9. Thrust/Power on each engine—primary flight crew reference.	Full Range Forward	±2%	1 (per engine)	0.3% of full range.	*COM041*Sufficient parameters (e.g. EPR, N1 or Torque, NP) as appropriate to the particular engine being recorded to determine power in forward and reverse thrust, including potential overspeed condition.
*	*	*	*	*	*
12a. Pitch Control(s) position (non-fly-by-wire systems).	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5 or 0.25 for airplanes operated under § 135.152(j).	0.5% of full range.	For airplanes that have a flight control break away capability that allows either pilot to operate the controls independently, record both control inputs. The control inputs may be sampled alternately once per second to produce the sampling interval of 0.5 or 0.25, as applicable.
12b. Pitch Control(s) position (fly-by-wire systems) [3].	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5 or 0.25 for airplanes operated under § 135.152(j).	0.2% of full range	
*	*	*	*	*	*
13b. Lateral Control position(s) (fly-by-wire) [4].	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5 or 0.25 for airplanes operated under § 135.152(j).		
14a. Yaw Control position(s) (non-fly-by-wire) [5].	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5 or 0.25 for airplanes operated under § 135.152(j).	0.3% of full range	For airplanes that have a flight control break away capability that allows either pilot to operate the controls independently, record both control inputs. The control inputs may be sampled alternately once per second to produce the sampling interval of 0.5.
*	*	*	*	*	*
15. Pitch Control Surface(s) Position [6].	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5 or 0.25 for airplanes operated under § 135.152(j).	0.2% of full range.	For airplanes fitted with multiple or split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately. The control surfaces may be sampled alternately to produce the sampling interval of 0.5 or 0.25.
16. Lateral Control Surface(s) Position [7].	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5 or 0.25 for airplanes operated under § 135.152(j).	0.2% of full range.	A suitable combination of surface position sensors is acceptable in lieu of recording each surface separately. The control surfaces may be sampled alternately to produce the sampling interval of 0.5 or 0.25.

Parameters	Range	Accuracy (sensor input)	Seconds per sampling interval	Resolution	Remarks
17. Yaw Control Surface(s) Position [8].	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5	0.2% of full range.	For airplanes with multiple or split surfaces, a suitable combination of surface position sensors is acceptable in lieu of recording each surface separately. The control surfaces may be sampled alternately to produce the sampling interval of 0.5.
*	*	*	*	*	*
19. Pitch Trim Surface Position.	Full Range	±3° Unless Higher Accuracy Uniquely Required.	1	0.6% of full range	
20. Trailing Edge Flap or Cockpit Control Selection [10].	Full Range or Each Position (discrete).	±3° or as Pilot's Indicator.	2	0.5% of full range.	Flap position and cockpit control may each be sampled alternately at 4 second intervals, to give a data point every 2 seconds.
21. Leading Edge Flap or Cockpit Control Selection [11].	Full Range or Each Discrete Position.	±3° or as Pilot's Indicator and sufficient to determine each discrete position.	2	0.5% of full range.	Left and right sides, of flap position and cockpit control may each be sampled at 4 second intervals, so as to give a data point to every 2 seconds.
*	*	*	*	*	*
23. Ground Spoiler Position or Speed Brake Selection [12].	Full Range or Each Position (discrete).	±2° Unless Higher Accuracy Uniquely Required.	1 or 0.5 for airplanes operated under § 135.152(j).	0.5% of full range	
24. Outside Air Temperature or Total Air Temperature [13].	−50° C to +90° C	±2° C	2	0.3° C	
*	*	*	*	*	*
26. Radio Altitude [14]	−20 ft to 2,500 ft	±2 ft or ±3% Whichever is Greater Below 500 ft and ± 5% Above 500 ft.	1	1 ft +5% above 500 ft.	For autoland/category 3 operations. Each radio altimeter should be recorded, but arranged so that at least one is recorded each second.
*	*	*	*	*	*
37. Drift Angle [15]	As installed	As installed	4	0.1°	
*	*	*	*	*	*
42. Throttle/power lever position [16].	Full Range	±2%	1 for each lever	2% of full range	For airplanes with non-mechanically linked cockpit engine controls.
*	*	*	*	*	*
57. Thrust comand [17]	Full Range	±2%	2	2% of full range	
*	*	*	*	*	*
87. Ground spoiler position and speed brake selection.	Full Range or Discrete	±5%	0.5	0.3% of full range	
88. All cockpit flight control input forces (control wheel, control column, rudder pedal).	Full Range Control Wheel ±70 lbs Control Column ±85 lb Rudder pedal ±165 lbs.	±5%	1	0.3% of full range.	For fly-by-wire flight control systems, where control surface position is a function of the displacement of the control input device only, it is not necessary to record this parameter. For airplanes that have a flight control break away capability that allows either pilot to operate the control independently, record both control force inputs. The control force inputs may be sampled alternately once per 2 seconds to produce the sampling interval of 1.
*	*	*	*	*	*

[1] For A300 B2/B4 airplanes, resolution = 6 seconds.
[2] For A330/A340 series airplanes, resolution = 0.703°.
[3] For A318/A319/A320/A321 series airplanes, resolution = 0.275% (0.088°>0.064°). For A330/A340 series airplanes, resolution = 2.20% (0.703°>0.064°).
[4] For A318/A319/A320/A321 series airplanes, resolution = 0.22% (0.088°>0.080°). For A330/A340 series airplanes, resolution = 1.76% (0.703°>0.080°).
[5] For A330/A340 series airplanes, resolution = 1.18% (0.703°>0.120°).
[6] For A330/A340 series airplanes, resolution = 0.783% (0.352°>0.090°).
[7] For A330/A340 series airplanes, aileron resolution = 0.704% (0.352°>0.100°). For A330/A340 series airplanes, spoiler resolution = 1.406% (0.703°>0.100°).
[8] For A330/A340 series airplanes, resolution = 0.30% (0.176°>0.12°). For A330/A340 series airplanes, seconds per sampling interval = 1.
[9] For B–717 series airplanes, resolution = .005g. For Dassault F900C/F900EX airplanes, resolution = .007g.
[10] For A330/A340 series airplanes, resolution = 1.05% (0.250°>0.120°).
[11] For A330/A340 series airplanes, resolution = 1.05% (0.250°>0.120°). For A300 B2/B4 series airplanes, resolution = 0.92% (0.230°>0.125°).
[12] For A330/A340 series airplanes, spoiler resolution = 1.406% (0.703°>0.100°).
[13] For A330/A340 series airplanes, resolution = 0.5° C.
[14] For Dassault F900C/F900EX airplanes, Radio Altitude resolution = 1.25 ft.
[15] For A330/A340 series airplanes, resolution = 0.352 degrees.
[16] For A318/A319/A320/A321 series airplanes, resolution = 4.32%. For A330/A340 series airplanes, resolution is 3.27% of full range for throttle lever angle (TLA); for reverse thrust, reverse throttle lever angle (RLA) resolution is nonlinear over the active reverse thrust range, which is 51.54 degrees to 96.14 degrees. The resolved element is 2.8 degrees uniformly over the entire active reverse thrust range, or 2.9% of the full range value of 96.14 degrees.
[17] For A318/A319/A320/A321 series airplanes, with IAE engines, resolution = 2.58%.

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Marion C. Blakey,

Administrator.

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