



U.S. Department  
of Transportation

**Federal Aviation  
Administration**

# Memorandum

Subject: INFORMATION: Clarification of Policy and Advisory  
Material Associated with Certification of Flight Data  
Recording Systems on 14 CFR Part 25 Aircraft

Date: DRAFT

From: Manager, Transport Airplane Directorate, Aircraft  
Certification Service, ANM-100

Reply to  
Attn. of: ANM-03-117-58

To: See Distribution

Regulatory Reference: §§ 121.344, 121.344a,  
125.226, 135.152

## PURPOSE

This memorandum:

- Establishes working definitions for the terms “filtered data” as used in AC 20-141, “Airworthiness and Operational Approval of Digital Flight Data Recorder Systems,” and “method of readily retrieving” as used in § 121.344, § 121.344a, § 125.226, and § 135.152. It also describes how these terms apply within a flight data recording (FDR) system certification program.
- Explains how FDR operational rules in part 121, part 125, and part 135 affect certification of FDR systems, as well as the scope of findings to be made on such programs.
- Clarifies the guidance associated with AC 20-141, particularly paragraph 7b(1) that deals with “filtered” data.
- Addresses how to document compliance findings associated with the “intended function” requirement of § 25.1301 for FDR installations approved as part of type, amended type or supplemental type certification programs.

## DEFINITIONS

For the purposes of this memo the following definitions apply:

*“Filtered” Flight Recorder Parameters:* Data for which the actual sensor signal is amended, altered, modified, or changed in any manner beyond that which is required for normal analog-to-digital conversion or for the reformatting of a digital signal into an FDR compatible format.

*“Method of readily retrieving.”* There is a method for readily retrieving “Filtered” FDR data if the actual sensor value of the required parameter can be determined from the “filtered” data

by any technically cognizant individual in an 8-hour period: (a) using existing, easily understood instructions and commonly available tools and techniques; and (b) when detailed instructions containing step-by-step procedures and all conversion algorithms necessary to derive and validate the pre-filtered values are a permanent part of the aircraft-specific FDR system documentation package or are recorded on the FDR. Further, prior testing should have shown that actual sensor values can be derived, as described above, from the “filtered” data within the tolerances specified in § 121.344, appendix M; § 125.226, Appendix E; or § 135.152, Appendix F, as applicable.

Although the terms “filtered” and “method of readily retrieving” are used in AC 20-141 and the operational rules, they are not defined there. If there is a need to establish definitions for these terms during a certification program, it should be done through negotiation with the applicant using the issue paper process, with the definitions above forming the basis of the FAA position.

## **BACKGROUND**

Over the last decade, investigations of airplane accidents and incidents have resulted in heightened awareness of the importance of the flight data recorder (FDR) accurately recording the actual sensed value of a parameter. Several accident and incident investigations have been hindered because investigators have been unable to determine the absolute flight control surface position during critical flight phases under study. This problem was a result of the recording of “filtered” data for which there is not a “method of readily retrieving” the actual sensed value of the parameter. On some FDR installations “filtered” data is being recorded either because such data can be more easily obtained from existing data sources, or because such data was thought by the installer to be a better medium for investigation. Regardless of the reasons for filtering, in some cases investigators have been unable to determine precisely the actual sensed value of a parameter when that value was needed during an investigation. In other cases, the process of determining the actual value from the filtered data has been detrimental to the course of the investigation because the process was overly complex and many investigative resources were required.

In 1997, the FAA addressed the problems described above, as well as other FDR deficiencies, in changes to certain Federal Aviation Regulations (FAR): part 121 (§ 121.344, § 121.344a, and Appendix M); part 125 (§ 125.226 and Appendix E); and part 135 (§ 135.152 and Appendix F). The FAA considered that these rule changes, along with the associated FAA Advisory Circular (AC) 20-141, would result in FDR recordings of actual sensor-measured parameters where necessary and particularly for the flight control surface parameters. In addition, the FAA considered that where filtering occurred and the actual data was necessary for investigational purposes that the actual values could be readily retrieved from recorded data.

Unfortunately, problems encountered in retrieving data during some recent accident investigations have raised doubts about whether all operators, manufacturers, and FAA certification offices correctly interpreted these rule changes with regard to filtering. It is

apparent that there are FDR installations in service where “filtered” parameters are still recorded and the actual values cannot be readily derived.

### **INTENDED FUNCTION/SCOPE**

In almost every transport category airplane FDR certification project, applications for type certification are made with the intent of satisfying the applicable operating rules, as well as § 25.1459 and all other applicable airworthiness rules. Hence, as explained in AC 20-141, compliance with § 25.1301 for most flight data recorder installations entails a showing that the FDR meets the specific requirements of the applicable operating rules. It is therefore important to understand the intent of the latest operating rules, as amended in 1997, and how application of these rules differs from how the airworthiness rules under part 25 are normally applied.

*Intended Function.* The intent of the latest FDR operating rules is that, in most cases, the actual sensor determined value of each required parameter be recorded with the range, accuracy, and resolution listed in the applicable operating rule table such as § 121.344, appendix M. As a matter of practicality, the rule language and associated guidance of AC 20-141 made provision for those cases where an applicant's FDR installation for some reason records a “filtered” value for a particular parameter in place of the actual sensed value. However, when filtered parameters are recorded, it is inherent in both the intent of the rules and guidance that there be a process in place whereby:

- Either the actual sensed value of the parameter can be readily and unambiguously derived from the recorded value, and the derived value can be shown to be within the range, accuracy, and resolution listed in the applicable operating rule appendix.
- Or, it is shown by the applicant and accepted by the FAA that the ‘filtered’ value adequately meets the intent of the operating rule.

*Scope.* The operational requirements for FDRs are fully retroactive for those aircraft identified in the applicable rule. This means that during certification of an FDR system intended to meet the latest operational rules, compliance with the particular performance requirements described should be found for **all parameters**. It is not sufficient for an applicant to show compliance only for those parameters added by a change to the operational rules. The operating rules specifically require that, where applicable, all parameters meet the intent and specific requirements of the latest rule and, accordingly, a showing of intended function for such an FDR system should include all required parameters, regardless of the findings made during certification programs done when earlier operational requirements were in effect. The certification data used to show compliance during previous certification programs may be applicable and resubmitted, but such data should be re-evaluated in consideration of the intent, scope, and specific requirements of the latest operational rules. On the other hand, an applicant is not required to show compliance for unchanged parameters if there is evidence that performance for those parameters was previously shown to be compliant with the latest operational rules.

**“FILTERED DATA” and ADVISORY CIRCULAR 20-141**

Paragraph 7b(1) of AC 20-141 describes a means of determining compliance in terms of the operating rules for those recorded parameters of an FDR system that are “filtered.” In order to properly apply the guidance of this paragraph, the definitions above for “filtered data” and “readily” retrievable should be used. Again, since these terms are not defined anywhere in the rules or guidance, applying these definitions may require negotiation with the applicant via the issue paper process.

An applicant using the guidance of AC 20-141 for certification of an FDR installation intended to comply with the operating rules should:

- Identify those parameters that are filtered as defined in this Memorandum. If compliance with the operating rules is an “intended function” for the installation, all required parameters should be evaluated, regardless of whether the parameters are added by the installation or not.

And either:

1. Define a means of showing, by test, that “there is no significant difference between the recorded parameter data under both static and dynamic conditions.” To accomplish this, the applicant should do all of the following--

- Directly record the sensor-determined value of the parameter and the ability to correlate the sensor values to the filtered values recorded by the FDR;
- Define a test program where sufficient representative dynamic and static sensor-determined values and filtered FDR data are recorded over the range and speed of operation defined by the airplane flight manual (AFM) to provide a basis for comparison;
- Determine, from the FDR recorded filtered data, the derived values of the required parameters using the definition for “readily retrievable;” and
- Compare the directly recorded sensor-determined values and derived values to show that the values derived from the FDR data are within the range, accuracy, and resolution required for the parameter by the operating rules. When compared to the directly recorded sensor values, the derived values should not be significantly different than the directly recorded values under both static and dynamic conditions. Successful comparison will also serve the purpose of establishing that there is a “method of readily retrieving” the filtered data per the definition in this Memorandum and the intent of the operating rules.

-OR-

2. Provide an acceptable justification to the FAA for any "filtered" parameter for which there is not a method of readily retrieving the actual sensed value of the parameter. Acceptance should be documented via the issue paper process.

**Note: In almost all cases, in order to meet the intent of the most recent FDR operational requirements, FDR parameters that result from the measurement of a geometric value such as flight control surface position should not be filtered or have a demonstrated method, per 1. above, of readily retrieving the actual sensed value of the parameter within the range, accuracy, and resolution required for the parameter by the operating rules.**

### **DOCUMENTING INTENDED FUNCTION FINDINGS**

With a proper understanding of the intent and scope of the operating requirements as outlined above, sufficient guidance exists, either in the rules themselves or in available guidance material such as AC 20-141, to establish a compliance program for certification of FDR installations. At the completion of type, amended type, or supplemental type certification projects where the FDR installation has been shown to meet the requirements of the applicable operating rules, the following statement should be added to the recorder section of the FAA AFM or AFM supplement:

**The flight data recorder system installed in this airplane has been shown, using the guidance of AC 20-141, to meet the requirements of <insert applicable operating rule, such as 14 CFR 121.344, here>.**

Conversely, if operational rule compliance was not shown as part of the certification program, the AFM or AFM supplement should state:

**The flight data recorder system installed in this airplane has NOT been shown to meet the requirements of <insert applicable operating rule, such as 14 CFR 121.344, here>.**

### **EFFECT OF FAA POLICY**

The general policy stated in this document does not constitute a new regulation or create what the courts refer to as a "binding norm." The office that implements policy should follow this policy when applicable to the specific project. Whenever an applicant's proposed method of compliance is outside this established policy, it must be coordinated with the policy issuing office (e.g., through the issue paper process or equivalent). Similarly, although this policy is not binding on the FAA, if the implementing office becomes aware of reasons that an applicant's proposal that meets this policy should not be approved, the office must coordinate its response with the policy issuing office.

*Applicants should expect that the certificating officials will consider this information when making findings of compliance relevant to new certificate actions. Also, as with all advisory material, this policy statement identifies one means, but not the only means, of compliance.*

Questions regarding this Memorandum should be directed to Mr. Forrest Keller of the Airplane and Flight Crew Interface Branch, ANM-111. Mr. Keller's telephone number is (425) 227-2790 and his e-mail address is [Forrest.Keller@faa.gov](mailto:Forrest.Keller@faa.gov).

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