

**§ 121.344 Digital flight data recorders for transport category airplanes.**

- (a) Except as provided in [paragraph \(l\)](#) of this section, no person may operate under this part a turbine-engine-powered transport category airplane unless it is equipped with one or more approved flight recorders that use a digital method of recording and storing data and a method of readily retrieving that data from the storage medium. The operational parameters required to be recorded by digital flight data recorders required by this section are as follows: The phrase “when an information source is installed” following a parameter indicates that recording of that parameter is not intended to require a change in installed equipment:
- (1) Time;
  - (2) Pressure altitude;
  - (3) Indicated airspeed;
  - (4) Heading—primary flight crew reference (if selectable, record discrete, true or magnetic);
  - (5) Normal acceleration (Vertical);
  - (6) Pitch attitude;
  - (7) Roll attitude;
  - (8) Manual radio transmitter keying, or CVR/DFDR synchronization reference;
  - (9) Thrust/power of each engine—primary flight crew reference;
  - (10) Autopilot engagement status;
  - (11) Longitudinal acceleration;
  - (12) Pitch control input;
  - (13) Lateral control input;
  - (14) Rudder pedal input;
  - (15) Primary pitch control surface position;
  - (16) Primary lateral control surface position;
  - (17) Primary yaw control surface position;
  - (18) Lateral acceleration;
  - (19) Pitch trim surface position or parameters of [paragraph \(a\)\(82\)](#) of this section if currently recorded;
  - (20) Trailing edge flap or cockpit flap control selection (except when parameters of [paragraph \(a\)\(85\)](#) of this section apply);
  - (21) Leading edge flap or cockpit flap control selection (except when parameters of [paragraph \(a\)\(86\)](#) of this section apply);
  - (22) Each Thrust reverser position (or equivalent for propeller airplane);
  - (23) Ground spoiler position or speed brake selection (except when parameters of [paragraph \(a\)\(87\)](#) of this section apply);

- (24) Outside or total air temperature;
- (25) Automatic Flight Control System (AFCS) modes and engagement status, including autothrottle;
- (26) Radio altitude (when an information source is installed);
- (27) Localizer deviation, MLS Azimuth;
- (28) Glideslope deviation, MLS Elevation;
- (29) Marker beacon passage;
- (30) Master warning;
- (31) Air/ground sensor (primary airplane system reference nose or main gear);
- (32) Angle of attack (when information source is installed);
- (33) Hydraulic pressure low (each system);
- (34) Ground speed (when an information source is installed);
- (35) Ground proximity warning system;
- (36) Landing gear position or landing gear cockpit control selection;
- (37) Drift angle (when an information source is installed);
- (38) Wind speed and direction (when an information source is installed);
- (39) Latitude and longitude (when an information source is installed);
- (40) Stick shaker/pusher (when an information source is installed);
- (41) Windshear (when an information source is installed);
- (42) Throttle/power lever position;
- (43) Additional engine parameters (as designated in [Appendix M of this part](#));
- (44) Traffic alert and collision avoidance system;
- (45) DME 1 and 2 distances;
- (46) Nav 1 and 2 selected frequency;
- (47) Selected barometric setting (when an information source is installed);
- (48) Selected altitude (when an information source is installed);
- (49) Selected speed (when an information source is installed);
- (50) Selected mach (when an information source is installed);
- (51) Selected vertical speed (when an information source is installed);
- (52) Selected heading (when an information source is installed);
- (53) Selected flight path (when an information source is installed);

- (54) Selected decision height (when an information source is installed);
- (55) EFIS display format;
- (56) Multi-function/engine/alerts display format;
- (57) Thrust command (when an information source is installed);
- (58) Thrust target (when an information source is installed);
- (59) Fuel quantity in CG trim tank (when an information source is installed);
- (60) Primary Navigation System Reference;
- (61) Icing (when an information source is installed);
- (62) Engine warning each engine vibration (when an information source is installed);
- (63) Engine warning each engine over temp. (when an information source is installed);
- (64) Engine warning each engine oil pressure low (when an information source is installed);
- (65) Engine warning each engine over speed (when an information source is installed);
- (66) Yaw trim surface position;
- (67) Roll trim surface position;
- (68) Brake pressure (selected system);
- (69) Brake pedal application (left and right);
- (70) Yaw or sideslip angle (when an information source is installed);
- (71) Engine bleed valve position (when an information source is installed);
- (72) De-icing or anti-icing system selection (when an information source is installed);
- (73) Computed center of gravity (when an information source is installed);
- (74) AC electrical bus status;
- (75) DC electrical bus status;
- (76) APU bleed valve position (when an information source is installed);
- (77) Hydraulic pressure (each system);
- (78) Loss of cabin pressure;
- (79) Computer failure;
- (80) Heads-up display (when an information source is installed);
- (81) Para-visual display (when an information source is installed);
- (82) Cockpit trim control input position—pitch;
- (83) Cockpit trim control input position—roll;

- (84) Cockpit trim control input position—yaw;
  - (85) Trailing edge flap and cockpit flap control position;
  - (86) Leading edge flap and cockpit flap control position;
  - (87) Ground spoiler position and speed brake selection;
  - (88) All cockpit flight control input forces (control wheel, control column, rudder pedal);
  - (89) Yaw damper status;
  - (90) Yaw damper command; and
  - (91) Standby rudder valve status.
- (b) For all turbine-engine powered transport category airplanes manufactured on or before October 11, 1991, by August 20, 2001.
- (1) For airplanes not equipped as of July 16, 1996, with a flight data acquisition unit (FDAU), the parameters listed in [paragraphs \(a\)\(1\) through \(a\)\(18\)](#) of this section must be recorded within the ranges and accuracies specified in [Appendix B of this part](#), and—
    - (i) For airplanes with more than two engines, the parameter described in paragraph (a)(18) is not required unless sufficient capacity is available on the existing recorder to record that parameter;
    - (ii) Parameters listed in paragraphs (a)(12) through (a)(17) each may be recorded from a single source.
  - (2) For airplanes that were equipped as of July 16, 1996, with a flight data acquisition unit (FDAU), the parameters listed in [paragraphs \(a\)\(1\) through \(a\)\(22\)](#) of this section must be recorded within the ranges, accuracies, and recording intervals specified in [Appendix M of this part](#). Parameters listed in paragraphs (a)(12) through (a)(17) each may be recorded from a single source.
  - (3) The approved flight recorder required by this section must be installed at the earliest time practicable, but no later than the next heavy maintenance check after August 18, 1999 and no later than August 20, 2001. A heavy maintenance check is considered to be any time an airplane is scheduled to be out of service for 4 or more days and is scheduled to include access to major structural components.
- (c) For all turbine-engine powered transport category airplanes manufactured on or before October 11, 1991 —
- (1) That were equipped as of July 16, 1996, with one or more digital data bus(es) and an ARINC 717 digital flight data acquisition unit (DFDAU) or equivalent, the parameters specified in [paragraphs \(a\)\(1\) through \(a\)\(22\)](#) of this section must be recorded within the ranges, accuracies, resolutions, and sampling intervals specified in [Appendix M of this part](#) by August 20, 2001. Parameters listed in paragraphs (a)(12) through (a)(14) each may be recorded from a single source.
  - (2) Commensurate with the capacity of the recording system (DFDAU or equivalent and the DFDR), all additional parameters for which information sources are installed and which are connected to the recording system must be recorded within the ranges, accuracies, resolutions, and sampling intervals specified in [Appendix M of this part](#) by August 20, 2001.
  - (3) That were subject to [§ 121.343\(e\) of this part](#), all conditions of [§ 121.343\(e\)](#) must continue to be met until compliance with [paragraph \(c\)\(1\)](#) of this section is accomplished.

- (d) For all turbine-engine-powered transport category airplanes that were manufactured after October 11, 1991—
- (1) The parameters listed in [paragraph \(a\)\(1\)](#) through [\(a\)\(34\)](#) of this section must be recorded within the ranges, accuracies, resolutions, and recording intervals specified in [Appendix M of this part](#) by August 20, 2001. Parameters listed in paragraphs (a)(12) through (a)(14) each may be recorded from a single source.
  - (2) Commensurate with the capacity of the recording system, all additional parameters for which information sources are installed and which are connected to the recording system must be recorded within the ranges, accuracies, resolutions, and sampling intervals specified in [Appendix M of this part](#) by August 20, 2001.
- (e) For all turbine-engine-powered transport category airplanes that are manufactured after August 18, 2000—
- (1) The parameters listed in [paragraph \(a\)\(1\)](#) through [\(57\)](#) of this section must be recorded within the ranges, accuracies, resolutions, and recording intervals specified in [Appendix M of this part](#).
  - (2) Commensurate with the capacity of the recording system, all additional parameters for which information sources are installed and which are connected to the recording system, must be recorded within the ranges, accuracies, resolutions, and sampling intervals specified in [Appendix M of this part](#).
  - (3) In addition to the requirements of [paragraphs \(e\)\(1\)](#) and [\(e\)\(2\)](#) of this section, all Boeing 737 model airplanes must also comply with the requirements of [paragraph \(n\)](#) of this section, as applicable.
- (f) For all turbine-engine-powered transport category airplanes manufactured after August 19, 2002—
- (1) The parameters listed in [paragraphs \(a\)\(1\)](#) through [\(a\)\(88\)](#) of this section must be recorded within the ranges, accuracies, resolutions, and recording intervals specified in appendix M to this part.
  - (2) In addition to the requirements of [paragraphs \(f\)\(1\)](#) of this section, all Boeing 737 model airplanes must also comply with the requirements of [paragraph \(n\)](#) of this section.
- (g) Whenever a flight data recorder required by this section is installed, it must be operated continuously from the instant the airplane begins its takeoff roll until it has completed its landing roll.
- (h) Except as provided in [paragraph \(i\)](#) of this section, and except for recorded data erased as authorized in this paragraph, each certificate holder shall keep the recorded data prescribed by this section, as appropriate, until the airplane has been operated for at least 25 hours of the operating time specified in [§ 121.359\(a\) of this part](#). A total of 1 hour of recorded data may be erased for the purpose of testing the flight recorder or the flight recorder system. Any erasure made in accordance with this paragraph must be of the oldest recorded data accumulated at the time of testing. Except as provided in [paragraph \(i\)](#) of this section, no record need be kept more than 60 days.
- (i) In the event of an accident or occurrence that requires immediate notification of the National Transportation Safety Board under [49 CFR 830](#) of its regulations and that results in termination of the flight, the certificate holder shall remove the recorder from the airplane and keep the recorder data prescribed by this section, as appropriate, for at least 60 days or for a longer period upon the request of the Board or the Administrator.
- (j) Each flight data recorder system required by this section must be installed in accordance with the requirements of [§ 25.1459\(a\)](#) (except paragraphs (a)(3)(ii) and (a)(7)), (b), (d) and (e) of this chapter. A correlation must be established between the values recorded by the flight data recorder and the

corresponding values being measured. The correlation must contain a sufficient number of correlation points to accurately establish the conversion from the recorded values to engineering units or discrete state over the full operating range of the parameter. Except for airplanes having separate altitude and airspeed sensors that are an integral part of the flight data recorder system, a single correlation may be established for any group of airplanes—

- (1) That are of the same type;
  - (2) On which the flight recorder system and its installation are the same; and
  - (3) On which there is no difference in the type design with respect to the installation of those sensors associated with the flight data recorder system. Documentation sufficient to convert recorded data into the engineering units and discrete values specified in the applicable appendix must be maintained by the certificate holder.
- (k) Each flight data recorder required by this section must have an approved device to assist in locating that recorder under water.
- (l) The following airplanes that were manufactured before August 18, 1997 need not comply with this section, but must continue to comply with applicable [paragraphs of § 121.343 of this chapter](#), as appropriate:
- (1) Airplanes that meet the State 2 noise levels of [part 36 of this chapter](#) and are subject to [§ 91.801\(c\) of this chapter](#), until January 1, 2000. On and after January 1, 2000, any Stage 2 airplane otherwise allowed to be operated under [Part 91 of this chapter](#) must comply with the applicable flight data recorder requirements of this section for that airplane.
  - (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 Series, 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.
- (m) All aircraft subject to the requirements of this section that are manufactured on or after April 7, 2010, must have a digital flight data recorder installed that also—
- (1) Meets the requirements of [§ 25.1459\(a\)\(3\)](#), [\(a\)\(7\)](#), and [\(a\)\(8\) of this chapter](#); and
  - (2) Retains the 25 hours of recorded information required in [paragraph \(h\)](#) of this section using a recorder that meets the standards of TSO–C124a, or later revision.
- (n) In addition to all other applicable requirements of this section, all Boeing 737 model airplanes manufactured after August 18, 2000 must record the parameters listed in [paragraphs \(a\)\(88\) through \(a\)\(91\)](#) of this section within the ranges, accuracies, resolutions, and recording intervals specified in Appendix M to this part. Compliance with this paragraph is required no later than February 2, 2011.

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