(8) For all models of the McDonnell Douglas DC–8, the flight cycle implementation time is 30,000 flights.

(9) For all models of the McDonnell Douglas DC–9/MD–80, the flight cycle implementation time is 60,000 flights.

(10) For all models of the McDonnell Douglas DC–10, the flight cycle implementation time is 30,000 flights.

(11) For all models of the Lockheed L–1011, the flight cycle implementation time is 27,000 flights.

(12) For the Fokker F–28 Mark, 1000, 2000, 3000, and 4000, the flight cycle implementation time is 60,000 flights.

(b) [Reserved]

[Doc. No. 29104, 65 FR 24126, Apr. 25, 2000; 65 FR 50744, Aug. 21, 2000, as amended by Amdt. 125–36, 66 FR 23131, May 7, 2001; Amdt. 125–40, 67 FR 72834, Dec. 9, 2002; Amdt. 125–46, 69 FR 45942, July 30, 2004. Redesignated by Amdt. 125–53, 72 FR 63412, Nov. 8, 2007]

§ 125.507 Fuel tank system inspection program.

(a) Except as provided in paragraph (g) of this section, this section applies to transport category, turbine-powered airplanes with a type certificate issued after January 1, 1958, that, as a result of original type certification or later increase in capacity, have—

(1) A maximum type-certificated passenger capacity of 30 or more, or

(2) A maximum payload capacity of 7500 pounds or more.

(b) For each airplane on which an auxiliary fuel tank is installed under a field approval, before June 16, 2008, the certificate holder must submit to the FAA Oversight Office proposed maintenance instructions for the tank that meet the requirements of Special Federal Aviation Regulation No. 88 (SFAR 88) of this chapter.

(c) After December 16, 2008, no certificate holder may operate an airplane identified in paragraph (a) of this section unless the inspection program for that airplane has been revised to include applicable inspections, procedures, and limitations for fuel tank systems.

(d) The proposed fuel tank system inspection program revisions must be based on fuel tank system Instructions for Continued Airworthiness (ICA) that have been developed in accordance with the applicable provisions of SFAR 88 of this chapter or §25.1529 and part 25, Appendix H, of this chapter, in effect on June 6, 2001 (including those developed for auxiliary fuel tanks, if any, installed under supplemental type certificates or other design approval) and that have been approved by the FAA Oversight Office.

(e) After December 16, 2008, before returning an aircraft to service after any alteration for which fuel tank ICA are developed under SFAR 88, or under §25.1529 in effect on June 6, 2001, the certificate holder must include in the inspection program for the airplane inspections and procedures for the fuel tank system based on those ICA.

(f) The fuel tank system inspection program changes identified in paragraphs (d) and (e) of this section and any later fuel tank system revisions must be submitted to the Principal Inspector for review and approval.

(g) This section does not apply to the following airplane models:

(1) Bombardier CL–44
(2) Concorde
(3) deHavilland D.H. 106 Comet 4C
(4) VFW–Vereinigte Flugtechnische Werk VFW–614
(5) Illyushin Aviation IL 96T
(6) Bristol Aircraft Britannia 305
(7) Handley Page Herald Type 300
(8) Avions Marcel Dassault—Breguet Aviation Mercure 100C
(9) Airbus Caravelle
(10) Lockheed L–300

APPENDIX A TO PART 125—ADDITIONAL EMERGENCY EQUIPMENT

(a) *Means for emergency evacuation.* Each passenger-carrying landplane emergency exit (other than over-the-wing) that is more that 6 feet from the ground with the airplane on the ground and the landing gear extended must have an approved means to assist the occupants in descending to the ground. The assisting means for a floor level emergency exit must meet the requirements of §25.809(f)(1) of this chapter in effect on April 30, 1972, except that, for any airplane for which the application for the type certificate was filed after that date, it must meet the requirements under which the airplane was type certificated. An assisting means that deploys automatically must be armed during taxiing, takeoffs, and landings. However, if the Administrator finds that the design of the exit makes compliance impractical, the Administrator may grant a deviation from the requirement of automatic deployment if

the assisting means automatically erects upon deployment and, with respect to required emergency exits, if an emergency evacuation demonstration is conducted in accordance with §125.189. This paragraph does not apply to the rear window emergency exit of DC–3 airplanes operated with less than 36 occupants, including crewmembers, and less than five exits authorized for passenger use.

(b) *Interior emergency exit marking.* The following must be complied with for each passenger-carrying airplane:

(1) Each passenger emergency exit, its means of access, and means of opening must be conspicuously marked. The identity and location of each passenger emergency exit must be recognizable from a distance equal to the width of the cabin. The location of each passenger emergency exit must be indicated by a sign visible to occupants approaching along the main passenger aisle. There must be a locating sign—

(i) Above the aisle near each over-the-wing passenger emergency exit, or at another ceiling location if it is more practical because of low headroom;

(ii) Next to each floor level passenger emergency exit, except that one sign may serve two such exits if they both can be seen readily from that sign; and

(iii) On each bulkhead or divider that prevents fore and aft vision along the passenger cabin, to indicate emergency exits beyond and obscured by it, except that if this is not possible the sign may be placed at another appropriate location.

(2) Each passenger emergency exit marking and each locating sign must meet the following:

(i) For an airplane for which the application for the type certificate was filed prior to May 1, 1972, each passenger emergency exit marking and each locating sign must be manufactured to meet the requirements of §25.812(b) of this chapter in effect on April 30, 1972. On these airplanes, no sign may continue to be used if its luminescence (brightness) decreases to below 100 microlamberts. The colors may be reversed if it increases the emergency illumination of the passenger compartment. However, the Administrator may authorize deviation from the 2-inch background requirements if the Administrator finds that special circumstances exist that make compliance impractical and that the proposed deviation provides an equivalent level of safety.

(ii) For an airplane for which the application for the type certificate was filed on or after May 1, 1972, each passenger emergency exit marking and each locating sign must be manufactured to meet the interior emergency exit marking requirements under which the airplane was type certificated. On these airplanes, no sign may continue to be used if its luminescence (brightness) decreases to below 250 microlamberts.

(c) *Lighting for interior emergency exit markings.* Each passenger-carrying airplane must have an emergency lighting system, independent of the main lighting system. However, sources of general cabin illumination may be common to both the emergency and the main lighting systems if the power supply to the emergency lighting system is independent of the power supply to the main lighting system. The emergency lighting system must—

(1) Illuminate each passenger exit marking and locating sign; and

(2) Provide enough general lighting in the passenger cabin so that the average illumination, when measured at 40-inch intervals at seat armrest height, on the centerline of the main passenger aisle, is at least 0.05 foot-candles.

(d) *Emergency light operation.* Except for lights forming part of emergency lighting subsystems provided in compliance with §25.812(g) of this chapter (as prescribed in paragraph (h) of this section) that serve no more than one assist means, are independent of the airplane's main emergency lighting systems, and are automatically activated when the assist means is deployed, each light required by paragraphs (c) and (h) must comply with the following:

(1) Each light must be operable manually and must operate automatically from the independent lighting system—

(i) In a crash landing; or

(ii) Whenever the airplane's normal electric power to the light is interrupted.

(2) Each light must—

(i) Be operable manually from the flightcrew station and from a point in the passenger compartment that is readily accessible to a normal flight attendant seat;

(ii) Have a means to prevent inadvertent operation of the manual controls; and

(iii) When armed or turned on at either station, remain lighted or become lighted upon interruption of the airplane's normal electric power.

Each light must be armed or turned on during taxiing, takeoff, and landing. In showing compliance with this paragraph, a transverse vertical separation of the fuselage need not be considered.

(3) Each light must provide the required level of illumination for at least 10 minutes at the critical ambient conditions after emergency landing.

(e) *Emergency exit operating handles.* (1) For a passenger-carrying airplane for which the application for the type certificate was filed prior to May 1, 1972, the location of each passenger emergency exit operating handle and instructions for opening the exit must be shown by a marking on or near the exit that is readable from a distance of 30 inches. In

addition, for each Type I and Type II emergency exit with a locking mechanism released by rotary motion of the handle, the instructions for opening must be shown by—

(i) A red arrow with a shaft at least ¾ inch wide and a head twice the width of the shaft, extending along at least 70 degrees of arc at a radius approximately equal to ¾ of the handle length; and

(ii) The word ''open'' in red letters 1 inch high placed horizontally near the head of the arrow.

(2) For a passenger-carrying airplane for which the application for the type certificate was filed on or after May 1, 1972, the location of each passenger emergency exit operating handle and instructions for opening the exit must be shown in accordance with the requirements under which the airplane was type certificated. On these airplanes, no operating handle or operating handle cover may continue to be used if its luminescence (brightness) decreases to below 100 microlamberts.

(f) *Emergency exit access.* Access to emergency exits must be provided as follows for each passenger-carrying airplane:

(1) Each passageway between individual passenger areas, or leading to a Type I or Type II emergency exit, must be unobstructed and at least 20 inches wide.

(2) There must be enough space next to each Type I or Type II emergency exit to allow a crewmember to assist in the evacuation of passengers without reducing the unobstructed width of the passageway below that required in paragraph (f)(1) of this section. However, the Administrator may authorize deviation from this requirement for an airplane certificated under the provisions of part 4b of the Civil Air Regulations in effect before December 20, 1951, if the Administrator finds that special circumstances exist that provide an equivalent level of safety.

(3) There must be access from the main aisle to each Type III and Type IV exit. The access from the aisle to these exits must not be obstructed by seats, berths, or other protrusions in a manner that would reduce the effectiveness of the exit. In addition—

(i) For an airplane for which the application for the type certificate was filed prior to May 1, 1972, the access must meet the requirements of §25.813(c) of this chapter in effect on April 30, 1972; and

(ii) For an airplane for which the application for the type certificate was filed on or after May 1, 1972, the access must meet the emergency exit access requirements under which the airplane was certificated.

(4) If it is necessary to pass through a passageway between passenger compartments to reach any required emergency exit from any seat in the passenger cabin, the passageway must not be obstructed. However, curtains may be used if they allow free entry through the passageway.

(5) No door may be installed in any partition between passenger compartments.

(6) If it is necessary to pass through a doorway separating the passenger cabin from other areas to reach any required emergency exit from any passenger seat, the door must have a means to latch it in open position, and the door must be latched open during each takeoff and landing. The latching means must be able to withstand the loads imposed upon it when the door is subjected to the ultimate interia forces, relative to the surrounding structure, listed in §25.561(b) of this chapter.

(g) *Exterior exit markings.* Each passenger emergency exit and the means of opening that exit from the outside must be marked on the outside of the airplane. There must be a 2-inch colored band outlining each passenger emergency exit on the side of the fuselage. Each outside marking, including the band, must be readily distinguishable from the surrounding fuselage area by contrast in color. The markings must comply with the following:

(1) If the reflectance of the darker color is 15 percent or less, the reflectance of the lighter color must be at least 45 percent. ''Reflectance'' is the ratio of the luminous flux reflected by a body to the luminous flux it receives.

(2) If the reflectance of the darker color is greater than 15 percent, at least a 30 percent difference between its reflectance and the reflectance of the lighter color must be provided.

(3) Exits that are not in the side of the fuselage must have the external means of opening and applicable instructions marked conspicuously in red or, if red is inconspicuous against the background color, in bright chrome yellow and, when the opening means for such an exit is located on only one side of the fuselage, a conspicuous marking to that effect must be provided on the other side.

(h) *Exterior emergency lighting and escape route.* (1) Each passenger-carrying airplane must be equipped with exterior lighting that meets the following requirements:

(i) For an airplane for which the application for the type certificate was filed prior to May 1, 1972, the requirements of §25.812(f) and (g) of this chapter in effect on April 30, 1972.

(ii) For an airplane for which the application for the type certificate was filed on or after May 1, 1972, the exterior emergency lighting requirements under which the airplane was type certificated.

(2) Each passenger-carrying airplane must be equipped with a slip-resistant escape route that meets the following requirements:

(i) For an airplane for which the application for the type certificate was filed prior to May 1, 1972, the requirements of §25.803(e) of this chapter in effect on April 30, 1972.

(ii) For an airplane for which the application for the type certificate was filed on or after May 1, 1972, the slip-resistant escape route requirements under which the airplane was type certificated.

(i) *Floor level exits.* Each floor level door or exit in the side of the fuselage (other than those leading into a cargo or baggage compartment that is not accessible from the passenger cabin) that is 44 or more inches high and 20 or more inches wide, but not wider than 46 inches, each passenger ventral exit (except the ventral exits on M–404 and CV–240 airplanes) and each tail cone exit must meet the requirements of this section for floor level emergency exits. However, the Administrator may grant a deviation from this paragraph if the Administrator finds that circumstances make full compliance impractical and that an acceptable level of safety has been achieved.

(j) *Additional emergency exits.* Approved emergency exits in the passenger compartments that are in excess of the minimum number of required emergency exits must meet all of the applicable provisions of this section except paragraph (f), (1), (2), and (3) and must be readily accessible.

(k) On each large passenger-carrying turbojet-powered airplane, each ventral exit and tailcone exit must be—

(1) Designed and constructed so that it cannot be opened during flight; and

(2) Marked with a placard readable from a distance of 30 inches and installed at a conspicuous location near the means of opening the exit, stating that the exit has been designed and constructed so that it cannot be opened during flight.

APPENDIX B TO PART 125—CRITERIA FOR DEMONSTRATION OF EMERGENCY EVACUATION PROCEDURES UNDER § 125.189

(a) *Aborted takeoff demonstration.* (1) The demonstration must be conducted either during the dark of the night or during daylight with the dark of the night simulated. If the demonstration is conducted indoors during daylight hours, it must be conducted with each window covered and each door closed to minimize the daylight effect. Illumination on the floor or ground may be used, but it must be kept low and shielded against shining into the airplane's windows or doors.

(2) The airplane must be in a normal ground attitude with landing gear extended.

(3) Stands or ramps may be used for descent from the wing to the ground. Safety equipment such as mats or inverted life rafts may be placed on the ground to protect participants. No other equipment that is not part of the airplane's emergency evacuation equipment may be used to aid the participants in reaching the ground.

(4) The airplane's normal electric power sources must be deenergized.

(5) All emergency equipment for the type of passenger-carrying operation involved must be installed in accordance with the certificate holder's manual.

(6) Each external door and exit and each internal door or curtain must be in position to simulate a normal takeoff.

(7) A representative passenger load of persons in normal health must be used. At least 30 percent must be females. At least 5 percent must be over 60 years of age with a proportionate number of females. At least 5 percent, but not more than 10 percent, must be children under 12 years of age, prorated through that age group. Three life-size dolls, not included as part of the total passenger load, must be carried by passengers to simulate live infants 2 years old or younger. Crewmembers, mechanics, and training personnel who maintain or operate the airplane in the normal course of their duties may not be used as passengers.

(8) No passenger may be assigned a specific seat except as the Administrator may require. Except as required by item (12) of this paragraph, no employee of the certificate holder may be seated next to an emergency exit.

(9) Seat belts and shoulder harnesses (as required) must be fastened.

(10) Before the start of the demonstration, approximately one-half of the total average amount of carry-on baggage, blankets, pillows, and other similar articles must be distributed at several locations in the aisles and emergency exit access ways to create minor obstructions.

(11) The seating density and arrangement of the airplane must be representative of the highest capacity passenger version of that airplane the certificate holder operates or proposes to operate.

(12) Each crewmember must be a member of a regularly scheduled line crew, must be seated in that crewmember's normally assigned seat for takeoff, and must remain in that seat until the signal for commencement of the demonstration is received.

(13) No crewmember or passenger may be given prior knowledge of the emergency exits available for the demonstration.

(14) The certificate holder may not practice, rehearse, or describe the demonstration for the participants nor may any participant have taken part in this type of demonstration within the preceding 6 months.

(15) The pretakeoff passenger briefing required by § 125.327 may be given in accordance with the certificate holder's manual. The passengers may also be warned to follow directions of crewmembers, but may not be instructed on the procedures to be followed in the demonstration.

(16) If safety equipment as allowed by item (3) of this section is provided, either all passenger and cockpit windows must be blacked out or all of the emergency exits must have safety equipment to prevent disclosure of the available emergency exits.

(17) Not more than 50 percent of the emergency exits in the sides of the fuselage of an airplane that meet all of the requirements applicable to the required emergency exits for that airplane may be used for the demonstration. Exits that are not to be used in the demonstration must have the exit handle deactivated or must be indicated by red lights, red tape or other acceptable means, placed outside the exits to indicate fire or other reason that they are unusable. The exits to be used must be representative of all of the emergency exits on the airplane and must be designated by the certificate holder, subject to approval by the Administrator. At least one floor level exit must be used.

(18) All evacuees, except those using an over-the-wing exit, must leave the airplane by a means provided as part of the airplane's equipment.

(19) The certificate holder's approved procedures and all of the emergency equipment that is normally available, including slides, ropes, lights, and megaphones, must be fully utilized during the demonstration.

(20) The evacuation time period is completed when the last occupant has evacuated the airplane and is on the ground. Evacuees using stands or ramps allowed by item (3) above are considered to be on the ground when they are on the stand or ramp: *Provided*, That the acceptance rate of the stand or ramp is no greater than the acceptance rate of the means available on the airplane for descent from the wing during an actual crash situation.

(b) *Ditching demonstration.* The demonstration must assume that daylight hours exist outside the airplane and that all required crewmembers are available for the demonstration.

(1) If the certificate holder's manual requires the use of passengers to assist in the launching of liferafts, the needed passengers must be aboard the airplane and participate in the demonstration according to the manual.

(2) A stand must be placed at each emergency exit and wing with the top of the platform at a height simulating the water level of the airplane following a ditching.

(3) After the ditching signal has been received, each evacuee must don a life vest according to the certificate holder's manual.

(4) Each liferaft must be launched and inflated according to the certificate holder's manual and all other required emergency equipment must be placed in rafts.

(5) Each evacuee must enter a liferaft and the crewmembers assigned to each liferaft must indicate the location of emergency equipment aboard the raft and describe its use.

(6) Either the airplane, a mockup of the airplane, or a floating device simulating a passenger compartment must be used.

(i) If a mockup of the airplane is used, it must be a life-size mockup of the interior and representative of the airplane currently used by or proposed to be used by the certificate holder and must contain adequate seats for use of the evacuees. Operation of the emergency exits and the doors must closely simulate that on the airplane. Sufficient wing area must be installed outside the over-the-wing exits to demonstrate the evacuation.

(ii) If a floating device simulating a passenger compartment is used, it must be representative, to the extent possible, of the passenger compartment of the airplane used in operations. Operation of the emergency exits and the doors must closely simulate operation on that airplane. Sufficient wing area must be installed outside the over-the-wing exits to demonstrate the evacuation. The device must be equipped with the same survival equipment as is installed on the airplane, to accommodate all persons participating in the demonstration.

APPENDIX C TO PART 125—ICE PROTECTION

If certification with ice protection provisions is desired, compliance with the following must be shown:

(a) The recommended procedures for the use of the ice protection equipment must be set forth in the Airplane Flight Manual.

(b) An analysis must be performed to establish, on the basis of the airplane's operational needs, the adequacy of the ice protection system for the various components of the airplane. In addition, tests of the ice protection system must be conducted to demonstrate that the airplane is capable of operating safely in continuous maximum and intermittent maximum icing conditions as described in appendix C of part 25 of this chapter.

(c) Compliance with all or portions of this section may be accomplished by reference, where applicable because of similarity of the designs, to analyses and tests performed by the applicant for a type certificated model.

APPENDIX D TO PART 125—AIRPLANE FLIGHT RECORDER SPECIFICATION

Parameters	Range	Accuracy sensor input to DFDR readout	Sampling interval (per second)	Resolution [4] read out
Time (GMT or Frame Counter) (range 0 to 4095, sampled 1 per frame).	24 Hrs	±0.125% Per Hrs	0.25 (1 per 4 seconds).	1 sec.
Altitude	−1,000 ft to max certificated altitude of aircraft.	±100 to ±700 ft (See Table 1, TSO-C51a).	1	5′ to 35′ [1]
Airspeed	50 KIAS to V_{so}, and V_{so} to 1.2 V_D.	±5%, ±3%	1	1 kt.
Heading	360°	±2°	1	0.5°
Normal Acceleration (Vertical)	−3g to +6g	±1% of max range excluding datum error of ±5%.	8	0.01g.
Pitch Attitude	±75°	±2°	1	0.5°.
Roll Attitude	±180°	±2°	1	0.5°.
Radio Transmitter Keying	On-Off (Discrete)		1	
Thrust/Power on Each Engine	Full range forward	±2%	1	0.2% [2]
Trailing Edge Flap or Cockpit Control Selection.	Full range or each discrete position.	±3° or as pilot's Indicator	0.5	0.5% [2]
Leading Edge Flap or Cockpit Control Selection.	Full range or each discrete position.	±3° or as pilot's indicator	0.5	0.5% [2]
Thrust Reverser Position	Stowed, in transit, and reverse (Discrete).		1 (per 4 seconds per engine).	
Ground Spoiler Position/Speed Brake Selection.	Full range or each discrete position.	±2% unless higher accuracy uniquely required.	1	0.2% [2].
Marker Beacon Passage	Discrete		1	
Autopilot Engagement	Discrete		1	
Longitudinal Acceleration	±1g	±1.5% max range excluding datum error of ±5%.	4	0.01g
Pilot Input and/or Surface Position-Primary Controls (Pitch, Roll, Yaw) [3].	Full range	±2° unless higher accuracy uniquely required.	1	0.2% [2].
Lateral Acceleration	±1g	±1.5% max range excluding datum error of ±5%.	4	0.01g.
Pitch Trim Position	Full range	±3% unless higher accuracy uniquely required.	1	0.3% [2]
Glideslope Deviation	±400 Microamps	±3%	1	0.3% [2]
Localizer Deviation	±400 Microamps	±3%	1	0.3% [2].
AFCS Mode and Engagement Status.	Discrete		1	
Radio Altitude	−20 ft to 2,500 ft	±2 Ft or ±3% Whichever is Greater Below 500 Ft and ±5% Above 500 Ft.		1 ft + 5% [2] above 500′.
Master Warning	Discrete		1	
Main Gear Squat Switch Status	Discrete		1	
Angle of Attack (if recorded directly).	As installed	As installed	2	0.3% [2].
Outside Air Temperature or Total Air Temperature.	−50° C to +90° C	±2° C	0.5	0.3° C
Hydraulics, Each System Low Pressure.	Discrete		0.5	or 0.5% [2].
Groundspeed	As Installed	Most Accurate Systems Installed (IMS Equipped Aircraft Only).	1	0.2% [2].
If additional recording capacity is available, recording of the following parameters is recommended. The parameters are listed in order of significance:				
Drift Angle	When available. As installed.	As installed	4	
Wind Speed and Direction	When available. As installed.	As installed	4	
Latitude and Longitude	When available. As installed.	As installed	4	
Brake pressure/Brake pedal position.	As installed	As installed	1	
Additional engine parameters:				
EPR	As installed	As installed	1 (per engine)	
N_1	As installed	As installed	1 (per engine)	
N_2	As installed	As installed	1 (per engine)	
EGT	As installed	As installed	1 (per engine)	
Throttle Lever Position	As installed	As installed	1 (per engine)	

Parameters	Range	Accuracy sensor input to DFDR readout	Sampling interval (per second)	Resolution [4] read out
Fuel Flow	As installed	As installed	1 (per engine)	
TCAS:				
TA	As installed	As installed	1	
RA	As installed	As installed	1	
Sensitivity level (as selected by crew).	As installed	As installed	2	
GPWS (ground proximity warning system).	Discrete		1	
Landing gear or gear selector position.	Discrete		0.25 (1 per 4 seconds).	
DME 1 and 2 Distance	0–200 NM;	As installed	0.25	1 mi.
Nav 1 and 2 Frequency Selection.	Full range	As installed	0.25	

[1] When altitude rate is recorded. Altitude rate must have sufficient resolution and sampling to permit the derivation of altitude to 5 feet.

[2] Percent of full range.

[3] For airplanes that can demonstrate the capability of deriving either the control input on control movement (one from the other) for all modes of operation and flight regimes, the ''or'' applies. For airplanes with non-mechanical control systems (fly-by-wire) the ''and'' applies. In airplanes with split surfaces, suitable combination of inputs is acceptable in lieu of recording each surface separately.

[4] This column applies to aircraft manufactured after October 11, 1991.

[Doc. No. 25530, 53 FR 26150, July 11, 1988; 53 FR 30906, Aug. 16, 1988]

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
1. Time or Relative Times Counts.[1].	24 Hrs, 0 to 4095.	±0.125% Per Hour.	4	1 sec	UTC time preferred when available. Count increments each 4 seconds of system operation.
2. Pressure Altitude.	−1000 ft to max certificated altitude of aircraft. +5000 ft.	±100 to ±700 ft (see table, TSO C124a or TSO C51a).	1	5′ to 35′	Data should be obtained from the air data computer when practicable.
3. Indicated airspeed or Calibrated airspeed.	50 KIAS or minimum value to Max V_{so}, to 1.2 $V_{.D}$.	±5% and ±3%	1	1 kt	Data should be obtained from the air data computer when practicable.
4, Heading (Primary flight crew reference).	0–360° and Discrete ''true'' or ''mag''.	±2°	1	0.5°	When true or magnetic heading can be selected as the primary heading reference, a discrete indicating selection must be recorded.
5. Normal Acceleration (Vertical) [9].	−3g to +6g	±1% of max range excluding datum error of ±5%.	0.125	0.004g.	
6. Pitch Attitude	±75°	±2°	1 or 0.25 for airplanes operated under §125.226(f).	0.5°	A sampling rate of 0.25 is recommended.
7. Roll Attitude [2]	±180°	±2°	1 or 0.5 for airplanes operated under §121.344(f).	0.5°	A sampling rate of 0.5 is recommended.
8. Manual Radio Transmitter Keying or CVR/DFDR synchronization reference	On-Off (Discrete) None.		1		Preferably each crew member but one discrete acceptable for all transmission provided the CVR/FDR system complies with TSO C124a CVR synchronization requirements (paragraph 4.2.1 ED–55).

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
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.
10. Autopilot Engagement.	Discrete "on" or "off".		1.		
11. Longitudinal Acceleration.	±1g	±1.5% max. range excluding datum error of ±5%.	0.25	0.004g.	
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.
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 §121.344(f).	0.2% of full range.	
13a. Lateral Control position(s) (non-fly-by-wire).	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5 or 0.25 for airplanes operated under §125.226(f).	0.2% 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.
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 §121.344(f).	0.2% of full range.	
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.
14b. Yaw Control position(s) (fly-by-wire).	Full Range	±2° Unless Higher Accuracy Uniquely Required.	0.5	0.2% of full range.	
15. Pitch Control Surface(s) Position.[6].	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..	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.

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
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.
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 sapling interval of 0.5.
18. Lateral Acceleration.	±1g	±1.5% max. range excluding datum error of ±5%.	0.25	0.004g.	
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 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, or flap position and cockpit control may each be sampled at 4 second intervals, so as to give a data point every 2 seconds.
22. Each Thrust Reverser Position (or equivalent for propeller airplane).	Stowed, In Transit, and Reverse (Discrete).	.....	1 (per engine). ..	.....	Turbo-jet—2 discretes enable the 3 states to be determined. Turbo-prop—1 discrete.
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	
24. Outside Air Temperature or Total Air Temperature.[13].	−50 °C to +90 °C.	±2 °C	2	0.3 °C..	
25. Autopilot/ Autothrottle/ AFCS Mode and Engagement Status.	A suitable combination of discretes.	.....	1	.....	Discretes should show which systems are engaged and which primary modes are controlling the flight path and speed of the aircraft.
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.

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
27. Localizer Deviation, MLS Azimuth, or GPS Lateral Deviation.	±400 Microamps or available sensor range as installed ±62°.	As installed. ±3% recommended ...	1	0.3% of full range.	For autoland/category 3 operations. each system should be recorded but arranged so that at least one is recorded each second. It is not necessary to record ILS and MLS at the same time, only the approach aid in use need be recorded.
28. Glideslope Deviation, MLS Elevation, or GPS Vertical Deviation.	±400 Microamps or available sensor range as installed. 0.9 to + 30°	As installed ±3% recommended ...	1	0.3% of full range.	For autoland/category 3 operations. each system should be recorded but arranged so that at least one is recorded each second. It is not necessary to record ILS and MLS at the same time, only the approach aid in use need be recorded.
29. Marker Beacon Passage.	Discrete ''on'' or ''off''.	.....	1	.....	A single discrete is acceptable for all markers.
30. Master Warning.	Discrete	.....	1	.....	Record the master warning and record each 'red' warning that cannot be determined from other parameters or from the cockpit voice recorder.
31. Air/ground sensor (primary airplane system reference nose or main gear).	Discrete ''air'' or ''ground''.	.....	1 (0.25 recommended).		
32. Angle of Attack (If measured directly).	As installed	As Installed	2 or 0.5 for airplanes operated under §125.226(f).	0.3% of full range.	If left and right sensors are available, each may be recorded at 4 or 1 second intervals, as appropriate, so as to give a data point at 2 seconds or 0.5 second, as required.
33. Hydraulic Pressure Low, Each System.	Discrete or available sensor range, ''low'' or ''normal''.	±5%	2	0.5% of full range.	
34. Groundspeed	As Installed	Most Accurate Systems Installed.	1	0.2% of full range.	
35. GPWS (ground proximity warning system).	Discrete ''warning'' or ''off''.	.....	1	.....	A suitable combination of discretes unless recorder capacity is limited in which case a single discrete for all modes is acceptable.
36. Landing Gear Position or Landing gear cockpit control selection.	Discrete	.....	4	.....	A suitable combination of discretes should be recorded.
37. Drift Angle.[15]	As installed	As installed	4	0.1%.	
38. Wind Speed and Direction.	As installed	As installed	4	1 knot, and 1.0°.	
39. Latitude and Longitude.	As installed	As installed	4	0.002°, or as installed.	Provided by the Primary Navigation System Reference. Where capacity permits Latitude/longtitude resolution should be 0.0002°.
40. Stick shaker and pusher activation.	Discrete(s) ''on'' or ''off''.	.....	1	.....	A suitable combination of discretes to determine activation.
41. WIndshear Detection.	Discrete ''warning'' or ''off''.	.....	1		

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
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.
43. Additional Engine Parameters.	As installed	As installed	Each engine each second.	2% of full range	Where capacity permits, the preferred priority is indicated vibration level, N2, EGT, Fuel Flow, Fuel Cutoff lever position and N3, unless engine manufacturer recommends otherwise.
44. Traffic Alert and Collision Avoidance System (TCAS).	Discretes	As installed	1	.....	A suitable combination of discretes should be recorded to determine the status of-Combined Control, Vertical Control, Up Advisory, and Down Advisory. (ref. ARINC Characteristic 735 Attachment 6E, TCAS VERTICAL RA DATA OUTPUT WORD.)
45. DME 1 and 2 Distance.	0–200 NM	As installed	4	1 NM	1 mile.
46. Nav 1 and 2 Selected Frequency.	Full range	As installed	4	.....	Sufficient to determine selected frequency
47. Selected barometric setting.	Full range	±5%	(1 per 64 sec.) ..	0.2% of full range.	
48. Selected Altitude.	Full range	±5%	1	100 ft.	
49. Selected speed.	Full range	±5%	1	1 knot.	
50. Selected Mach.	Full range	±5%	1	.01.	
51. Selected vertical speed.	Full range	±5%	1	100 ft/min.	
52. Selected heading.	Full range	±5%	1	1°.	
53. Selected flight path.	Full range	±5%	1	1°.	
54. Selected decision height.	Full range	±5%	64	1 ft.	
55. EFIS display format.	Discrete(s)	.....	4	.....	Discretes should show the display system status (e.g., off, normal, fail, composite, sector, plan, nav aids, weather radar, range, copy).
56. Multi-function/ Engine Alerts Display format.	Discrete(s)	.....	4	.....	Discretes should show the display system status (e.g., off, normal, fail, and the identity of display pages for emergency procedures, need not be recorded).
57. Thrust command.[17].	Full Range	±2%	2	2% of full range	
58. Thrust target	Full range	±2%	4	2% of full range.	
59. Fuel quantity in CG trim tank.	Full range	±5%	(1 per 64 sec.) ..	1% of full range.	
60. Primary Navigation System Reference.	Discrete GPS, INS, VOR/ DME, MLS, Loran C, Omega, Localizer Glideslope.	.....	4	.....	A suitable combination of discrete to determine the Primary Navigation System reference.
61. Ice Detection	Discrete ''ice'' or ''no ice''.	.....	4		
62. Engine warning each engine vibration.	Discrete	.....	1		

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
63. Engine warning each engine over temp.	Discrete		1		
64. Engine warning each engine oil pressure low.	Discrete		1		
65. Engine warning each engine over speed.	Discrete		1		
66. Yaw Trim Surface Position.	Full Range	±3% Unless Higher Accuracy Uniquely Required.	2	0.3% of full range..	
67. Roll Trim Surface Position.	Full Range	±3% Unless Higher Accuracy Uniquely Required.	2	0.3% of full range..	
68. Brake Pressure (left and right).	As installed	±5%	1		To determine braking effort applied by pilots or by autobrakes.
69. Brake Pedal Application (left and right).	Discrete or Analog ''applied'' or ''off''.	±5% (Analog)	1		To determine braking applied by pilots.
70. Yaw or sideslip angle.	Full Range	±5%	1	0,5°.	
71. Engine bleed valve position.	Decrete ''open'' or ''closed''.		4		
72. De-icing or anti-icing system selection.	Discrete ''on'' or ''off''.		4		
73. Computed center of gravity.	Full Range	±5%	(1 per 64 sec.)	1% of full range.	
74. AC electrical bus status.	Discrete ''power'' or ''off''.		4		Each bus.
75. DC electrical bus status.	Discrete ''power'' or ''off''.		4		Each bus.
76. APU bleed valve position.	Discrete ''open'' or ''closed.		4.		
77. Hydraulic Pressure (each system).	Full range	±5%	2	100 psi.	
78. Loss of cabin pressure.	Discrete ''loss'' or ''normal''.		1.		
79. Computer failure (critical flight and engine control systems).	Discrete ''fail'' or ''normal''.		4.		
80. Heads-up display (when an information source is installed).	Discrete(s) ''on'' or ''off''.		4.		
81. Para-visual display (when an information source is installed).	Discrete(s) ''on'' or ''off''.		1.		
82. Cockpit trim control input position—pitch.	Full Range	±5%	1	0.2% of full range.	Where mechanical means for control inputs are not available, cockpit display trim positions should be recorded.
83. Cockpit trim control input position—roll.	Full Range	±5%	1	0.7% of full range.	Where mechanical means for control inputs are not available, cockpit display trim position should be recorded.

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
84. Cockpit trim control input position—yaw.	Full Range	±5%	1	0.3% of full range.	Where mechanical means for control input are not available, cockpit display trim positions should be recorded.
85. Trailing edge flap and cockpit flap control position.	Full Range	±5%	2	0.5% of full range.	Trailing edge flaps and cockpit flap control position may each be sampled alternately at 4 second intervals to provide a sample each 0.5 second.
86. Leading edge flap and cockpit flap control position.	Full Range or Discrete.	±5%	1	0.5% 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 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.

[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 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°).
[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%.

[Doc. No. 28109, 62 FR 38390, July 17, 1997; 62 FR 48135, Sept. 12, 1997, as amended by Amdt. 125–32, 64 FR 46121, Aug. 24, 1999; 65 FR 2295, Jan. 14, 2000; Amdt. 125–32, 65 FR 2295, Jan. 14, 2000; Amdt. 125–34, 65 FR 51745, Aug. 24, 2000; 65 FR 81735, Dec. 27, 2000; Amdt. 125–39, 67 FR 54323, Aug. 21, 2002; Amdt. 125–42, 68 FR 42937, July 18, 2003; 68 FR 50069, Aug. 20, 2003; 68 FR 53877, Sept. 15, 2003]