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**THE CIVIL AVIATION REGULATIONS – PART VII-  
INSTRUMENTS AND EQUIPMENT**

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**SUBSIDIARY LEGISLATION****THE CIVIL AVIATION REGULATIONS – PART VII-  
INSTRUMENTS AND EQUIPMENT**

MADE BY THE MINISTER IN ACCORDANCE WITH  
SECTION 104 OF THE CIVIL AVIATION ACT

Citation.                   **1.** These Regulations may be cited as the Civil Aviation  
Regulations -Part VII- Instruments and Equipment.

Interpretation.           **2.** (1) In these Regulations—

- (a) “Act” means the Civil Aviation Act;
- (b) “air operator” means any person, organisation or enterprise which undertake to engage in domestic commercial air transport or international commercial air transport, whether directly or indirectly or by a lease or any other arrangement;
- (c) “airworthy” means the status of an aircraft, engine, propeller or part when it conforms to its approved design and is in a condition for safe operation;
- (d) “Automatic Emergency Locator Transmitter” means an Emergency Locator Transmitter, attached to the aircraft, which is automatically deployed and activated by impact, and in some cases, also by hydrostatic sensors;
- (e) “class C cargo compartment” means a cargo compartment on an aircraft in which—
  - (i) the presence of fire would not be easily discovered nor is the compartment accessible by the flight crew;

- (ii) there is a separate approved fire detector or fire detector system to give warning in the cockpit;
  - (iii) there is an approved built-in fire extinguishing or suppression system to give warning in the cockpit;
  - (iv) there are means to exclude hazardous quantities of smoke, flames or extinguishing agent from any compartment occupied by crew or passengers; and
  - (v) there are means to control ventilation and drafts within the compartment so that extinguishing agent used can control any fire that may start within the compartment;
- (f) “class E cargo compartment” means a cargo compartment on an aircraft, in which—
- (i) there is a separate approved fire detector system to give warning in the cockpit;
  - (ii) there are means to shut off ventilation airflow to or within the cargo compartment, and the controls for these means are accessible to the flight crew in the cockpit;
  - (iii) there are means to exclude hazardous quantities of smoke, flames or noxious gasses from the cockpit; and
  - (iv) the required crew emergency exits are accessible under any cargo loading condition;

- (g) “continuing airworthiness” means the set of processes by which all aircraft comply with the applicable airworthiness requirements and remain in a condition for safe operations throughout their operating life;
- (h) “cosmic radiation” means the total ionizing and neutron radiation of galactic and cosmic origin;
- (i) “data link communication” means all data link communications including but not limited to automatic dependent surveillance, controller-pilot data link communication, data link flight information services and aeronautical operational control messages;
- (j) “emergency exit” means—
  - (i) a Type I exit in an aeroplane which is at floor level with a rectangular opening of not less than twenty-four inches wide by forty-eight inches high with corner radii not greater than eight inches;
  - (ii) a Type II exit in an aeroplane which is a rectangular opening of not less than twenty inches wide by forty-four inches high with corner radii not greater than seven inches located at floor level except over the wing in which case a step up inside the aeroplane of more than ten inches or a step down outside the aeroplane of more than seventeen inches shall not exist;
  - (iii) a Type III exit in an aeroplane which is a rectangular opening of not less than twenty inches

wide by thirty-six inches high with corners radii not greater than seven inches and with a step up inside the aeroplane of not more than twenty inches and where located over the wing, the step down outside the aeroplane of not more than twenty-seven inches;

- (iv) a Type IV exit in an aeroplane which is rectangular opening of not less than nineteen inches wide by twenty-six inches high with corner radii of not greater than six and three tenths inches located over the wing with a step up inside the aeroplane of not more than twenty-nine inches and a step down outside the aeroplane of not more than thirty-six inches;
  - (v) a Ventral exit in an aeroplane which is an exit from the passenger compartment through the pressure shell and the bottom fuselage skin of dimensions and physical configuration as the Type I exit; or
  - (vi) a tail cone emergency exit in an aeroplane which is an exit from the passenger compartment through the pressure shell and through an openable cone of the fuselage aft of the pressure shell with simple and obvious single operation means of opening the tail cone;
- (k) “Emergency Locator Transmitter” means a generic term used to describe equipment which broadcast distinctive signals on designated frequencies;

- (l) “engine” means a unit used or intended to be used for aircraft propulsion consisting of at least those components and equipment necessary for functioning and control, but excludes propellers and rotors;
- (m) “enhanced vision system (EVS)” means a system to display electronic real-time images of the external scene achieved through the use of image sensors;
- (n) “equipment” means an article, item, component, unit, product or part, including first-aid and survival equipment and commissary supplies being an integral part of an aircraft or required to be carried on board an aircraft for use during flight but does not include spare parts or stores;
- (o) “extended overwater operation” means—
  - (i) an operation conducted a distance of more than one hundred (100) nautical miles from land which is suitable for making an emergency landing in a single-engine landplane or a twin-engine landplane which is incapable of continuing flight with one engine inoperative;
  - (ii) an operation conducted at a distance of more than two hundred (200) nautical miles from land which is suitable for making an emergency landing in a multi-engine landplane with the capability of continuing flight with one engine inoperative;
- (p) “head-up display system” means a display system that presents flight infor-

mation into the pilot's forward external field of view;

- (q) "instrument" means calibrated displays, gauges and signs used to present information in analog, digital or pictorial presentation to flight crew for use in the navigation and operations of an aircraft;
- (r) "liner" means all materials including any designed feature such as a joint or fastener, which would affect the capability of the liner to safely contain fire;
- (s) "long-range over-water flight" means a flight in which an aeroplane may be over water more than a distance corresponding to one hundred and twenty (120) minutes at cruising speed or four hundred (400) nautical miles, whichever is the lesser, away from land suitable for making an emergency landing operating under *en route* limitations of the Civil Aviation Operations Regulations;
- (t) "national air operator" means a person, organisation or enterprise who has been issued an air operator certificate in accordance with the Civil Aviation Air Operator Certification and Administration Regulations;
- (u) "navigation equipment" means aircraft components consisting of radio equipment, computers, instruments and equipment used in the navigation of an aircraft;
- (v) "operator" means—
  - (i) a person, organisation or enterprise, engaged in or offering to engage in, aircraft operations, and any person who causes or authorises the operation of aircraft, in the capacity as owner,

lessee or otherwise, whether with or without the control of the aircraft; and

- (ii) a person who or which is deemed to be engaged in the operation of aircraft within the meaning of the Act;
- (w) “operations in performance Class 1” means a helicopter operations with performance such that, in the event of a critical power unit failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, unless the failure occurs prior to reaching the Take-off Decision Point (TDP) or after passing the Landing Decision Point (LDP), in which cases the helicopter must be able to land within the rejected take-off or landing area;
- (x) “operations in performance Class 2” means a helicopter operations with performance such that, in the event of critical power unit failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, except when the failure occurs early during the take-off manoeuvre or late in the landing manoeuvre, in which cases a forced landing may be required;
- (y) “operations in performance Class 3” means a helicopter operations with performance such that, in the event of a power unit failure at any time during the flight, a forced landing will be required;
- (z) “required communication performance” means a statement of performance requirements for operational communication in support of specific air traffic management functions;

- (aa) “RCP type” is a label that represents the values assigned to Required Communication Performance parameters for communication transaction time, continuity, availability and integrity;
- (bb) “Survival Emergency Locator Transmitter” means an Emergency Locator Transmitter which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors;
- (cc) “VHF Omni-range” means a radio navigation signal, operating in the frequency band of 108 to 116.99 Megahertz, emanating from a ground navigation base and which is transmitted in all directions.

(2) In these Regulations –

“LDP” means landing decision point;

“TDP” means take-off decision point;

“RCP means required communication performance.

General  
Applicability  
of these  
Regulations.

**3.** These Regulations shall apply to all aircraft operating in Guyana in respect to the minimum requirements for such aircraft to have instrument and equipment of such aircraft.

## PART I GENERAL REQUIREMENTS

General  
Applicability  
of Part I.

**4.** This Part prescribes the general instrument and equipment requirements which are on board aircraft operating in Guyana.

General  
Requirements  
for  
Instruments  
and  
Equipment on

**5.** (1) Notwithstanding the minimum equipment specified in the Type Certificate of an aircraft and required for the issuance of an Airworthiness Certificate under Civil Aviation Airworthiness Regulations, an operator shall ensure that additional instruments, equipment and flight documents are

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[Subsidiary]

*Civil Aviation Regulations- Part VII - Instruments and Equipment*

Board Aircraft. installed or carried, as appropriate, in such aircraft according to the circumstances under which the flight is to be conducted.

(2) The prescribed instruments and equipment, including their installation, shall be approved or accepted by the State of Registry of the aircraft.

(3) An operator shall ensure that the additional instrument and equipment referred to in sub-regulation (1) are installed in accordance with the applicable airworthiness requirements approved by the State of Design of the aircraft and installed in accordance with the instructions of such State of Design to meet the airworthiness requirements.

(4) An operator shall ensure that a flight is not commenced unless all required instruments and equipment required on board an aircraft for flight—

- (a) *is* installed in accordance with the instructions of such State of Design to meet the airworthiness requirements;
- (b) meets the minimum performance standard and the operational and airworthiness requirements prescribed by the Authority;
- (c) is installed in such a manner that the failure of any single unit required for either communication or navigational purposes, or both, shall not result in the inability of the flight crew to communicate and navigate safely on the route being flown; and
- (d) is in an operable condition for the kind of operation being conducted, except as provided in the Minimum Equipment List.

(5) Prior to operation in Guyana of any civil aircraft not registered in Guyana that uses an airworthiness inspection programme approved or accepted by another State, the operator of such aircraft shall ensure that all instruments and equipment required by the Authority are properly installed

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and inspected in accordance with the requirements of the State of Registry.

(6) An operator shall ensure that where equipment is to be used by one flight crew member at his station during flight, it shall be installed so as to be readily operable from his station.

(7) An operator shall ensure that when a single item of equipment is required to be operated by more than one flight crew member, it shall be installed so that the equipment is readily operable from any station at which the equipment is required to be operated.

## PART II FLIGHT AND NAVIGATIONAL INSTRUMENTS

General  
Applicability  
of Part II.

**6.** This Part prescribes the minimum requirements for flight and navigational instruments for aircraft operating in Guyana.

General  
Requirements  
for Flight and  
Navigational  
Instrument.

**7. (1)** An operator of an aircraft shall ensure that such aircraft is equipped with flight and navigational instruments which shall enable—

- (a) the flight crew to—
  - (i) control the flight path of the aircraft;
  - (ii) carry out any required procedural manoeuvres;
  - (iii) observe the operating limitations of the aircraft in the expected operating conditions; and
- (b) the aircraft to proceed in accordance with—
  - (i) its operational flight plan; and
  - (ii) the requirements of AirTraffic Control, except when, if not prescribed by the Authority,

navigation for flights under the visual flight rules is accomplished by visual reference to land marks at least every sixty (60) nautical miles.

(2) The sixty (60) nautical miles distance prescribed in sub-regulation (1) does not apply to air operators.

(3) An operator shall ensure that when a means is provided for transferring an instrument from its primary operating system to an alternative system, such means includes a positive positioning control and it shall be marked to indicate clearly which system is being used.

(4) An operator shall ensure that instruments used by a flight crew member are arranged in such a manner that would allow such flight crew member to see the indications readily from his station, with the minimum practicable deviation from the position and line of vision which he normally assumes when looking forward along the flight path.

(5) An operator shall ensure that all equipment is installed on an aircraft in such a manner that the failure of any single unit required either for communication or navigational purposes or both shall not result in the failure of another unit required for communication or navigational purposes.

(6) An operator shall ensure that his aircraft is equipped with the necessary instruments and equipment to ensure that in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment shall enable the aircraft to be navigated in accordance with the—

- (a) general, Minimum Navigation Performance Specifications; and
- (b) Reduced Vertical Separation Minimum; and
- (c) RNP type, requirements of these Regulations where applicable.

Minimum  
Flight and  
Navigational  
Instrument.

**8.** (1) An operator shall not operate an aircraft under Visual Flight Rules unless it is equipped with the following flight and navigational instruments:

- (a) an airspeed indicating system calibrated in knots;
- (b) a sensitive pressure altimeter calibrated in feet with a subscale setting calibrated in hectopascals or millibars, adjustable for any barometric pressure likely to be set during flight;
- (c) an accurate timepiece indicating the time in hours minutes and seconds;
- (d) a magnetic compass; and
- (e) such additional instruments or equipment as may be required by the Authority.

(2) Where an operator intends to conduct operations in an aircraft under Visual Flight Rules as a controlled flight, he shall ensure that such aircraft is equipped with instruments specified under Regulation 10.

Specific  
Instrument  
Required for  
Operation  
Requiring Two  
Pilots.

**9.** (1) An operator shall ensure that, where two pilots are required to operate an aircraft, the stations of each pilot have separate flight instruments which include—

- (a) an airspeed indicator calibrated in knots;
- (b) a sensitive pressure altimeter calibrated in feet with a subscale setting calibrated in hectopascals or millibars, adjustable for any barometric pressure likely to be set during flight;
- (c) a vertical speed indicator;
- (d) a turn and slip indicator or a turn coordinator incorporating a slip indicator;
- (e) an attitude indicator; and
- (f) a stabilised direction indicator.

Instrument

**10.** (1) An operator shall not conduct operations in an

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**[Subsidiary]***Civil Aviation Regulations- Part VII - Instruments and Equipment*Flight Rating  
Instruments.

aircraft under Instrument Flight Rules, at night or when the aircraft cannot be maintained in a desired attitude without reference to one or more flight instruments, unless such aircraft is equipped with—

- (a) a magnetic compass;
- (b) an accurate timepiece indicating the time in hours, minutes and seconds;
- (c) a sensitive pressure altimeter calibrated in feet with a subscale setting calibrated in hectopascals or millibars, adjustable for any barometric pressure likely to be set during flight, with counterdrum pointer or equivalent presentation;
- (d) an airspeed indicating system calibrated in knots with a means of preventing malfunctioning due to either condensation or icing;
- (e) a turn and slip indicator for an aeroplane and a slip indicator for a helicopter;
- (f) an attitude indicator for an aeroplane and two attitude indicators for a helicopter, one of which may be replaced by a turn indicator;
- (g) a heading indicator;
- (h) a means of indicating whether the supply of power to the gyroscopic instruments is adequate;
- (i) a means of indicating in the flight crew compartment the outside air temperature;
- (j) a rate-of-climb and descent indicator; and
- (k) such additional instruments or equipment as may be required by the Autho-

rity.

(2) The requirements of (e), (f) and (g) may be met by combination of instruments or by integrated flight director system provided that the safeguards against total failure, inherent in the three (3) separate instruments, are retained.

(3) An air operator shall not operate an aeroplane under Instrument Flight Rules, or at night or when the aircraft cannot be maintained in a desired attitude without reference to one (1) or more flight instruments, unless such aircraft is equipped with—

- (a) the instruments required under sub-regulation (1); and
- (b) a sensitive pressure altimeter calibrated in feet with a subscale setting calibrated in hectopascals or millibars, adjustable for any barometric pressure likely to be set during flight, with counterdrum pointer or equivalent presentation.

(4) An air operator shall not operate a helicopter under Instrument Flight Rules, or at night or when the aircraft cannot be maintained in a desired attitude without reference to one or more flight instruments, unless such helicopter is equipped with—

- (a) the instrument required under sub-regulation (1);
- (b) an attitude indicator; and
- (c) a stabilising system.

(5) A stabilising system under sub-regulation (4)(c), may not be required where it was demonstrated to the satisfaction of the State of Design that the helicopter possesses, by nature of its design, adequate stability without such stabilising system.

(6) An air operator shall not operate an aeroplane under Instrument Flight Rules, or under Visual Flight Rules over routes that cannot be navigated by reference to visual landmarks, unless such aeroplane is equipped with naviga-

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[Subsidiary]

Civil Aviation Regulations- Part VII - Instruments and Equipment

tional equipment in accordance with the requirements of Air Traffic Control in the area of operations, that includes—

- (a) one (1) VHF Omni-Range receiving system, one (1) Automatic Direction Finder system, one (1) Distance Measuring Equipment and one (1) Marker Beacon receiving system;
- (b) one (1) Instrument Landing System or Microwave Landing System where Instrument Landing System or Microwave Landing System is required for approach navigation purposes;
- (c) an Area Navigational System when area navigation is required for the route being flown;
- (d) an additional VHF Omni-Range receiving system to the requirements of paragraph (a), on any route, or part thereof, where navigation is based only on VHF Omni-Range signals; and
- (e) an additional Automatic Direction Finder (ADF) system to the requirements of paragraph (a), on any route, or part thereof, where navigation is based only on non-directional beacon signals.

(7) An operator shall ensure that an aircraft intended to land in Instrument Meteorological Conditions or at night is provided with radio navigation equipment capable of receiving signals that provide guidance to—

- (a) a point from which a visual landing can be effected; or
- (b) each aerodrome at which it is intended to land in Instrument Meteorological Conditions; and
- (c) any designated alternate aerodrome.

(8) An air operator shall not conduct single-pilot

Instrument Flight Rules operations unless the aeroplane is equipped with an automatic pilot with at least an altitude hold mode and a heading mode.

Standby  
Attitude  
Indicator.

**11.** (1) An operator shall not operate—

- (a) an aeroplane with a maximum certified take-off mass exceeding five thousand, seven hundred kilogrammes (5,700 kg);
- (b) an aircraft having a maximum approved passenger seating configuration of more than nine (9) seats; or
- (c) a Performance Class 1 helicopter or a Performance Class 2 helicopter, unless it is equipped with a single stand-by altitude indicator or artificial horizon indicator that—
  - (d) is operated and illuminated independently of any other attitude indicating system;
  - (e) is powered continuously during normal operations; and
  - (f) is automatically powered for a minimum of thirty (30) minutes from a source independent of the normal electrical generating system, after a total failure of the normal electrical generating system.

(2) When the stand-by attitude indicator is operating on emergency power, such emergency power operation, shall be clearly indicated to the flight crew.

(3) When the stand-by attitude indicator is operating on its own power supply, there shall be an associated indication, either on the instrument or on the instrument panel that such power supply is in use.

(4) Where the stand-by attitude instrument system is installed and usable through flight attitudes of 360° of pitch and roll, the turn and slip indicator may be replaced by slip indi-

[Subsidiary]

Civil Aviation Regulations- Part VII - Instruments and Equipment

cators.

Instruments  
and  
Equipment for  
Category II  
Operations.

**12.** An operator shall ensure that his aircraft engaged in Category II operations is installed with the instruments and equipment listed in Schedule 1 appropriate to its group.

Navigation  
Equipment for  
Operations in  
Minimum  
Navigational  
Performance  
Specifications  
Airspace.

**13.** (1) An air operator shall not operate an aeroplane in Minimum Navigation Performance Specifications airspace unless it is equipped with navigation equipment that—

- (a) continuously provides indications to the flight crew of adherence to or departure from the defined track to the required degree of accuracy at any point along such track; and
- (b) has been authorised by the Authority for Minimum Navigation Performance Specifications operations.

(2) An air operator shall ensure that—

- (a) navigation equipment required for operations in Minimum Navigation Performance Specifications airspace are visible and usable by each pilot seated at his duty station;
- (b) an aeroplane operating unrestricted in Minimum Navigation Performance Specifications airspace is equipped with two independent Long Range Navigation Systems; and
- (c) an aeroplane operating in Minimum Navigation Performance Specifications airspace along notified special routes is equipped with one (1) Long Range Navigation System, unless otherwise specified by the Authority.

(3) Where an operator is conducting operations in an aircraft in which a navigation specification for performance-based navigation has been prescribed, he shall ensure that the—

- (a) aircraft is equipped with navigation equipment that will enable it to operate in accordance with the prescribed navigation specifications; and
- (b) operations of the aircraft are approved by the Authority.

(4) Where an operator is conducting operations in an aeroplane in defined portions of airspace based on a Regional Air Navigation Agreement and where a Reduced Vertical Separation Minimum of one thousand feet (1,000 ft) is applied between FL 290 and FL 410 inclusive, the operator shall ensure that the aeroplane-

- (a) has the required equipment that is capable of—
  - (i) indicating to the flight crew the flight level being flown;
  - (ii) automatically maintaining a selected flight level;
  - (iii) automatically reporting pressure altitude;
  - (iv) providing an alert at a maximum threshold of plus or minus three hundred feet (300 ft) to the flight crew when a deviation occurs from the selected flight level;
- (b) is authorised by the Authority for the operations in the airspace concerned; and
- (c) has demonstrated a vertical navigation performance in accordance with Regulation 148 of the Civil Aviation Operations Regulations, Schedule 13 -Implementing Standards.

**PART III**  
**COMMUNICATION EQUIPMENT**

General  
Applicability  
of Part III.

**14.** This Part prescribes the minimum radio equipment requirements for aircraft operating in Guyana.

Radio  
Equipment  
Requirements.

**15.** (1) An operator shall not operate an aircraft unless it is equipped with the required radio equipment for the type of operation being conducted.

(2) An operator shall ensure that an aeroplane or helicopter engaged in commercial air transport operations is provided with radio communication equipment capable of –

- (a) conducting two-way communication for aerodrome control purposes;
- (b) receiving meteorological information at any time during the flight;
- (c) conducting two-way communication at any time during the flight with at least one (1) aeronautical station and with such aeronautical stations and on such frequencies prescribed by the Authority; and
- (d) conducting two-way communication on the aeronautical emergency frequency 121.5 megahertz.

(3) An operator shall ensure that an aeroplane not engaged in commercial air transport operations, operating –

- (a) in accordance with the Instrument Flight Rules or at night is equipped with radio communication equipment capable of conducting two-way communication with such aeronautical stations and on such frequencies as prescribed by the Authority;
- (b) in accordance with the visual flight rules as a controlled flight is equipped with radio communication equipment capable of conducting two-way communication

at any time during the flight with such aeronautical stations and such frequencies prescribed by the Authority; and

- (c) on flights over water –
  - (i) at a distance of more than 93 kilometres (50 nautical miles) away from land suitable for making an emergency landing; or
  - (ii) away from land suitable for making an emergency landing at a distance of more than 185 kilometres (100 nautical miles), in the case of single-engine aeroplanes, and more than 370 kilometres (200 nautical miles), in the case of multi-engine aeroplanes capable of continuing flight with one engine inoperative, is equipped with radio communication equipment capable of conducting two-way communication at any time during the flight with such aeronautical stations and such frequencies prescribed by the Authority.

(4) An operator shall ensure that a helicopter that is not engaged in commercial air transport operations, operating

–

- (a) in accordance with the Instrument Flight Rules or at night is equipped with radio communication equipment that is capable of conducting two-way communication with such aeronautical stations and on such frequencies as prescribed by the Authority;
- (b) in accordance with the visual flight rules as a controlled flight is equipped with

radio communication equipment capable of conducting two-way communication at any time during the flight with such aeronautical stations and such frequencies as prescribed by the Authority; and

- (c) on flights over –
- (i) water; or
  - (ii) land areas, which have been designated by the State concerned as areas in which search and rescue would be especially difficult, is equipped with radio communication equipment capable of conducting two-way communication at any time during the flight with such aeronautical stations and such frequencies prescribed by the Authority.

(5) An operator of an aeroplane or helicopter shall ensure that the radio communication equipment under sub-regulations (2), (3) or (4) provides for communication on the aeronautical emergency frequency 406 megahertz .

(6) An operator of an aeroplane or helicopter shall ensure when operating in defined portions of airspace or on routes where an RCP types have been prescribed, in addition to the requirements of sub-regulations (2), (3), (4) and (5), the aeroplane or helicopter is –

- (a) provided with communication equipment which will enable it to operate in accordance with –
- (i) the prescribed requirements for flights in the defined portions of airspace; or
  - (ii) the prescribed RCP types; and
- (b) authorised by the Authority for operations in such airspace.

(7) An air operator shall not conduct operations in an aircraft—

- (a) under Instrument Flight Rules; or
- (b) in Visual Flight Rules over routes that cannot be navigated by reference to visual landmarks, unless such aircraft is equipped with communication and navigation equipment in accordance with the requirements of Air Traffic Control in the area of operations.

(8) The communication and navigational equipment under sub-regulation (7) shall comprise—

- (a) two independent radio communication systems under normal operating conditions to communicate with an appropriate ground station from any point on the route including diversions with each system having—
  - (i) an independent antenna installation; or
  - (ii) where rigidly supported non-wire antennae or other antenna installations are used, only one (1) antenna is required; and
- (b) a Secondary Surveillance Radar Transponder equipment required for the route flown.

(9) An operator shall ensure that where the route of the aircraft or area of operations to be flown requires more than one (1) communications equipment unit, each unit shall be independent of the other to the extent that a failure in any one will not result in failure of any other.

(10) An operator shall not conduct operations in an aircraft under Instrument Flight Rules unless it is equipped with an audio selector panel accessible to each required flight

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crew member.

(11) An operator shall not conduct operations in an aircraft at night or conduct single-pilot Instrument Flight Rules unless the aircraft is equipped with a headset with boom microphone or equivalent and a transmit button on the control wheel.

(12) An operator of an aeroplane shall ensure that each flight crew member required to be on flight deck duty communicates through boom or throat microphones below the transition level or transition altitude.

(13) An operator of a helicopter engaged in commercial air transport operations shall ensure that each flight crew member required to be on flight deck duty communicates through boom or throat microphones.

Crew Member  
Interphone  
System.

**16.** (1) An air operator shall not conduct operations in an aircraft on which more than one member of a flight crew is required, unless such aircraft is equipped with a flight crew interphone system, including headsets and microphones, not of a handheld type, for use by members of the flight crew.

(2) An air operator shall not conduct operations in an aircraft with a maximum certified take-off mass exceeding fifteen thousand kilogrammes (15,000 kg) or having a maximum approved passenger seating configuration of more than nineteen (19), unless such aircraft is equipped with a crew member interphone system that—

- (a) operates independently of the public-address system except for handsets, headsets, microphones, selector switches and signaling devices;
- (b) provides a two-way means of communication between the flight crew compartment and each—
  - (i) passenger compartment;
  - (ii) galley location other than on a passenger deck level; and

- (iii) remote crew compartment that is not on the passenger deck and is not easily accessible from a passenger compartment;
- (c) is readily accessible for use—
  - (i) in the flight crew compartment, from each of the required flight crew stations; and
  - (ii) at required cabin crew member stations close to each separate or pair of floor level emergency exits;
- (d) has an alerting system incorporating aural or visual signals for use by flight crew members to alert the cabin crew and for use by cabin crew members to alert the flight crew;
- (e) has a mechanism through which a recipient of a call can determine whether it is a normal call or an emergency call; and
- (f) provides on the ground, a means of two-way communication between ground personnel and at least two (2) flight crew members.

**PART IV  
AIRCRAFT LIGHTS AND INSTRUMENT  
ILLUMINATION**

Applicability  
of Part IV.

**17.** This Part prescribes the minimum aircraft lights and instrument illuminations for aircraft operating in Guyana.

Aircraft Lights  
and  
Instrument  
Illumination.

**18.** (1) An operator shall not conduct operations in an aircraft at night unless such aircraft is equipped with the following lights—

- (a) a landing light

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- (b) anti-collision and position lights;
- (c) illumination for all flight instruments and equipment that are essential for the safe operation of such aircraft that are used by the flight crew;
- (d) lights in all passenger compartments; and
- (e) a flashlight for each crew member station, acceptable to the Authority.

(2) An air operator shall not conduct operations in an aircraft by day or night unless, such aircraft is equipped with the following lights—

- (a) the lights required by sub-regulation (1)(b) through (e); and
- (b) in the case of an aeroplane two landing lights or a single landing light having two separately energised filaments; or
- (c) in the case of a helicopter two landing lights of which at least one is adjustable in the vertical plane; and
- (d) lights that conform to international regulations for prevention of collisions at sea where the aircraft is a seaplane or an amphibian aircraft.

## PART V ENGINE INSTRUMENTS

Applicability  
of Part V.

**19.** This Part prescribes the minimum engine instruments requirement for aircraft operating in Guyana.

Engine  
Instruments  
Requirements.

**20.** (1) An air operator shall not conduct commercial air transport operations without the following engine instruments installed in his aircraft where such instrument is required to be installed by the applicable airworthiness code of the State of Design of the aircraft or engine-

- (a) a fuel pressure indicator for each engine;
- (b) a fuel flow meter;
- (c) a means for indicating fuel quantity in each fuel tank to be used;
- (d) an oil pressure indicator for each engine;
- (e) an oil quantity indicator for each oil-tank when a transfer or separate oil reserve supply is used;
- (f) an oil-in temperature indicator for each engine;
- (g) a tachometer for each engine; and
- (h) an independent fuel pressure warning device for each engine or a master warning device for all engines with a means for isolating the individual warning circuits from the master warning device.

(2) Notwithstanding sub-regulation (1), the Authority may require an air operator to have different instrumentation for turbine engine powered aeroplanes, which provides for an equivalent level of safety.

(3) In addition to the required engine instruments listed in sub-regulation (1), an air operator shall ensure that a reciprocating engine aircraft is operated with the following engine instruments installed in his aircraft where such instrument is required to be installed by the applicable airworthiness code of the State of Design of the aircraft or engine:

- (a) a carburetor air temperature indicator for each engine;
- (b) a cylinder head temperature indicator for each air-cooled engine;
- (c) a manifold pressure indicator for each engine; and

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- (d) a device for each reversible propeller, to indicate to the pilot when the propeller is in reverse pitch, that complies with the following:
- (i) the device shall be capable of being actuated at any point in the reversing cycle between the normal low pitch stop position and full reverse pitch, but it shall not give an indication at or above the normal low pitch stop position; and
  - (ii) the source of the indication system shall be actuated by the propeller blade angle or be directly responsive to it.

## PART VI

### WARNING INSTRUMENTS AND SYSTEMS

Applicability of Part VI.

**21.** This Part prescribes the minimum warning instruments and systems requirements for aircraft operating in Guyana.

Mach Number Indicator.

**22.** An operator shall ensure that his aircraft which has speed limitations expressed in terms of mach number in the Aircraft Flight Manual is equipped with a mach number indicator.

Loss of Pressurisation Indicator.

**23.** An operator shall ensure that a pressurised aircraft intended to be operated at flight altitudes at which the atmospheric pressure is less than three hundred and seventy- six hectopascals (376 hPa) or twenty-five thousand feet (25,000 ft) or more shall be equipped with a device to provide an aural or distinct visual warning to the flight crew of any dangerous loss of pressurisation.

Landing Gear Aural Warning Device.

**24.** (1) An air operator shall ensure that an aeroplane in which he conducts operations and which has a retractable landing gear also has a landing gear aural warning system that gives continuous aural warning under the following conditions:

- (a) for aeroplanes with an established approach wing-flap position, whenever the wing flaps are extended beyond the maximum certified approach climb configuration position in the Aeroplane Flight Manual and the landing gear is not fully extended and locked; and
- (b) for aeroplanes without an established approach climb wing flap position, whenever the wing flaps are extended beyond the position at which landing gear extension is normally performed and the landing gear is not fully extended and locked.

(2) A flap position-sensing unit utilised under sub-regulation (1) may be installed at any suitable place on the aeroplane.

(3) The landing gear aural warning system required under sub-regulation (1) shall not be capable of manual shut-off.

(4) Where an aeroplane has a throttle activated device installed, the air operator of such aeroplane shall ensure that it has a landing gear aural warning system, which meets the requirements of this Regulation.

(5) The landing gear aural warning system of an aeroplane under sub-regulation (4) may utilise any part of the throttle-actuated system as part of the landing gear aural warning system.

(6) Each aeroplane with retractable landing gear shall have a landing gear position indicator.

Altitude  
Alerting  
System.

**25.** (1) An air operator shall not operate—

- (a) a turbine propeller powered aeroplane with a maximum certified take-off mass in excess of five thousand, seven hundred kilogrammes (5,700 kg) or having a maximum approved passenger seating configuration of more than nine (9) seats;

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or

- (b) a turbojet powered aeroplane, unless it is equipped with an alerting system capable of alerting the flight crew—
- (c) upon approaching pre-selected altitude in either ascent or descent; and
- (d) by at least an aural signal, when deviating above or below a pre-selected altitude.

(2) The equipment on an aeroplane that operates in defined portions of airspace where a Reduced Vertical Separation Minimum of one thousand feet (1,000 ft) is applied above FL 290 under regulation 13, shall be capable of—

- (a) indicating to the flight crew the flight level being flown; and
- (b) providing an alert at a maximum threshold of plus or minus three hundred feet (300 ft) to the flight crew when a deviation occurs from the selected flight level.

Ground  
Proximity  
Warning  
System.

**26.** (1) An operator shall not conduct operations in a turbine-engined aeroplane having a maximum certified take-off mass in excess of five thousand, seven hundred kilograms (5,700 kg) or having a maximum approved passenger seating configuration of more than nine (9) seats for which a Certificate of Airworthiness was first issued after 31st December, 2003 and all such aeroplanes after 31st December, 2006, unless it is equipped with a ground proximity warning system which has a forward looking terrain avoidance function.

(2) An operator shall not conduct operations unless his aircraft ground proximity warning system automatically provides as a minimum, by means of aural signals, which may be supplemented by visual signals, timely and distinctive warning to the flight crew when the aircraft is in potentially hazardous proximity to the surface of the earth in the following circumstances:

- (a) excessive descent rate;
- (b) excessive altitude loss after take-off or go-around; and
- (c) unsafe terrain clearance.

(3) An air operator shall not conduct operations in a turbine-engined aeroplane with a maximum certified take-off mass in excess of five thousand, seven hundred kilogrammes (5,700 kg) or having a maximum approved passenger seating configuration of more than nine (9) seats, unless it is equipped with a ground proximity warning system.

(4) An air operator shall not conduct operations in a turbine-engined aeroplane with a maximum certified take-off mass in excess of fifteen thousand kilogrammes (15,000 kg) or having a maximum approved passenger seating configuration of more than thirty (30) seats, unless it is equipped with a ground proximity warning system which has a forward looking terrain avoidance function.

(5) An air operator shall not conduct operations in a piston-engined aeroplane of a maximum certified take-off mass in excess of five thousand, seven hundred kilogrammes (5,700 kg) or having a maximum approved passenger seating configuration of more than nine (9) passengers, unless it is equipped with a ground proximity warning system which provides the warnings specified in sub-regulation (6) (a) and (c), warning of unsafe terrain clearance and a forward looking terrain avoidance function.

(6) An air operator shall not conduct operations unless his aircraft ground proximity warning system automatically provides, as a minimum, by means of aural signals, which may be supplemented by visual signals, timely and distinctive warning to the flight crew when the aircraft is in potentially hazardous proximity to the surface of the earth in the following circumstances:

- (a) excessive descent rate;
- (b) excessive terrain closure rate;
- (c) excessive altitude loss after take-off or go-around; and

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- (d) unsafe terrain clearance while the aircraft is not in landing configuration where—
- (i) gear is not down and locked;
  - (ii) flaps not in a landing position; and
- (e) excessive descent below the instrument glide path.

Airborne  
Weather Radar  
Equipment.

**27.** An air operator shall not operate an aircraft in commercial air transport operations whenever such an aircraft is being operated at night or in instrument meteorological conditions in an area where a thunderstorm or other potentially hazardous weather condition, which may be detectable with an airborne weather radar, may be expected to occur along the route, unless such aircraft is equipped with airborne weather radar equipment.

## PART VII FLIGHT RECORDERS

Applicability  
of Part VII.

**28.** This Part prescribes the minimum requirements for flight recorder systems installed on aircraft operating in Guyana.

Flight  
Recorders –  
General.

**29.** (1) Flight recorders under this Part comprise the following four systems:

- (a) a flight data recorder;
- (b) a cockpit voice recorder;
- (c) an airborne image recorder; and
- (d) a data link recorder.

(2) Image and data link information may be recorded on either the cockpit voice recorder or the flight data recorder.

Flight

**30.** An operator of an aeroplane engaged in commercial

Recorders for  
Aeroplane  
Engaged in  
Commercial  
Air Transport  
Operations.

air transport operations under this regulation shall ensure such aeroplane meets the following requirements and the standards set out in Part A of Schedule 2, applicable to the aeroplane, for flight recorders:

(1) Types 1 and 1A flight data recorders shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power, configuration and operation as set out in Part A of Schedule 2.

(2) Types II and IIA flight data recorders shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power and configuration of lift and drag devices as set out in Part A of Schedule 2.

(3) A turbine-engined aeroplane of a maximum certified take-off mass of five thousand, seven hundred kilogrammes (5,700 kg) or less for which a type certificate is first issued after 31<sup>st</sup> December 2015 shall be equipped with –

- (a) a Type II flight data recorder;
- (b) a Class ‘C’ airborne image recorder capable of recording flight path and speed parameters displayed to the pilot; or
- (c) an aircraft data recording system capable of recording the essential parameters as set out in Table 1 of Part A of Schedule 2.

Part A  
Schedule 2.

(4) An aeroplane of a maximum certified take-off mass of over twenty-seven thousand kilogrammes (27,000 kg) for which the certificate of airworthiness is first issued after 31<sup>st</sup> December 1988 shall be equipped with a Type I flight data recorder.

(5) An aeroplane of maximum certified take-off mass of over five thousand, seven hundred kilogrammes (5,700 kg), up to and including twenty-seven thousand kilogrammes (27,000 kg) for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 1988 shall be equipped with a Type II flight data recorder.

(6) A turbine-engined aeroplane for which the individual certificate of airworthiness was first issued after 31<sup>st</sup> December 1986 but before 1<sup>st</sup> January 1989, with a maximum

certified take-off mass of over five thousand, seven hundred kilogrammes (5,700 kg), except an aircraft specified in sub-regulation (7), shall be equipped with a flight data recorder which shall record time, altitude, airspeed, normal acceleration and heading.

(7) A turbine-engined aeroplane for which the individual certificate of airworthiness was first issued after 31<sup>st</sup> December 1986 but before 1<sup>st</sup> January 1989, with a maximum certified take-off mass of over twenty-seven thousand kilogrammes (27,000 kg) that is of the type for which the prototype was certified by the appropriate national authority after 30<sup>th</sup> September 1969 shall be equipped with a Type II flight data recorder.

(8) A turbine-engined aeroplane, for which the individual certificate of airworthiness was first issued before 1<sup>st</sup> January 1987, with a maximum certificated take-off mass of over five thousand, seven hundred kilogrammes (5,700 kg) shall be equipped with a flight data recorder which shall record time, altitude, airspeed, normal acceleration and heading.

(9) An aeroplane of a maximum certificated take-off mass of over five thousand, seven hundred kilogrammes (5,700 kg) for which the individual certificate of airworthiness is first issued after 1 January 2005 shall be equipped with a Type IA flight data recorder.

(10) An aeroplane which is required to record normal acceleration, lateral acceleration and longitudinal acceleration for which a type certificate is first issued after 31<sup>st</sup> December 2015 and which is required to be fitted with a flight data recorder shall record those parameters at a maximum sampling and recording interval of 0.0625 seconds.

(11) An aeroplane which is required to record pilot input or control surface position of primary controls for pitch, roll and yaw, for which a type certificate is first issued after 31<sup>st</sup> December 2015 and which is required to be fitted with a flight data recorder shall record those parameters at a maximum sampling and recording interval of 0.125 seconds.

(12) A flight data recorder system shall not use –

(a) engraving metal foil;

- (b) photographic film;
- (c) analogue frequency modulation after 31<sup>st</sup> December, 2011; and
- (d) magnetic tape after 31<sup>st</sup> December 2015.

(13) All flight data recorders shall be capable of retaining the information recorded during at least the last twenty-five (25) hours of their operation, except for the Type IIA flight data recorder which shall be capable of retaining the information recorded during at least the last thirty (30) minutes of its operation.

(14) A turbine-engined aeroplane for which a type certificate is first issued after 31<sup>st</sup> December 2015 and required to be operated by more than one (1) pilot shall be equipped with either –

- (a) a cockpit voice recorder; or
- (b) cockpit audio recording system.

(15) Notwithstanding sub-regulation (19), an aeroplane of a maximum certificated take-off mass of over five thousand, seven hundred kilogrammes (5,700 kg) for which the individual certificate of airworthiness is first issued on or after 1<sup>st</sup> January 2003, shall be equipped with a cockpit voice recorder capable of retaining the information recorded during at least the last two (2) hours of its operation.

(16) An aeroplane of a maximum certificated take-off mass of over five thousand, seven hundred kilogrammes (5,700 kg) for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 1986 shall be equipped with a cockpit voice recorder.

(17) A turbine-engined aeroplane, for which the individual certificate of airworthiness was first issued before 1<sup>st</sup> January 1987, with a maximum certificated take-off mass of over twenty-seven thousand kilogrammes (27,000 kg) that is of a type for which the prototype was certificated by the appropriate national authority after 30<sup>th</sup> September 1969 shall be equipped with a cockpit voice recorder.

[Subsidiary]

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(18) A cockpit voice recorder system shall not use magnetic tape and wire after 31<sup>st</sup> December 2015.

(19) A cockpit voice recorder shall be capable of retaining the information recorded during at least the last thirty (30) minutes of operation.

(20) Notwithstanding sub-regulation (19), from 1<sup>st</sup> January 2016, a cockpit voice recorder shall be capable of retaining the information recorded during at least the last two (2) hours of operation.

(21) An aeroplane for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 2015, which utilise any of the data link communications applications listed in Clause 5(b) of Part A of Schedule 2 and is required to carry a cockpit voice recorder, shall record on a flight recorder the data link communications messages.

Part A  
Schedule 2.

(22) An aeroplane which is modified after 31<sup>st</sup> December 2015 to install and utilise any of the data link communications applications listed in Clause 5(b) of Part A of Schedule 2 and is required to carry a cockpit voice recorder shall record on a flight recorder the data link communications messages.

(23) The minimum data link recording duration shall be equal to the recording duration of the cockpit voice recorder.

(24) Data link recording shall be able to be correlated to the recorded cockpit audio.

(25) All flight recorders shall be constructed to meet crashworthiness and fire protection specifications, located and installed so as to provide maximum practical protection for the recordings in order that the recorded information may be preserved, recovered and transcribed.

(26) A flight recorder shall not be switched off during flight time.

(27) To preserve the flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident and shall not be reactivated before their disposition as determined in accordance with the Civil Aviation Aircraft Accident and Incident Investigations Regulations.

(28) Operational checks and evaluations of recordings from the flight recorder systems shall be conducted to ensure the continued serviceability of the recorders.

(29) An aeroplane of a maximum certificated take-off mass of over fifteen thousand kilogrammes (15,000 kg) for which the type certificate is first issued after 31st December 2015 and which is required to be equipped with both a cockpit voice recorder and flight data recorder, shall be equipped with two (2) cockpit voice recorder/flight data recorder combination recorders, one located as close to the cockpit as practicable and the other recorder located as far aft as practicable.

Flight  
Recorders for  
Aeroplane not  
Engaged in  
Commercial  
Air Transport  
Operations.

**31.** An operator of an aeroplane not engaged in commercial air transport operations under this regulation, shall ensure such aeroplane meets the following requirements and the standards set out in Part A of Schedule 2, applicable to the aeroplane, for flight recorders:

(1) Types I and IA flight data recorders shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power, configuration and operation as set out in Part A of Schedule 2.

(2) Type II flight data recorders shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power and configuration of lift and drag devices as set out in Part A of Schedule 2.

(3) An aeroplane of a maximum certificated take-off mass of over five thousand, seven hundred kilogrammes (5,700 kg) for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 2004 shall be equipped with a Type IA flight data recorder.

(4) An aeroplane of a maximum certificated take-off mass of over twenty-seven thousand kilogrammes (27,000 kg) for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 1988 shall be equipped with a Type I flight data recorder.

(5) An aeroplane for which a type certificate is first issued after 31<sup>st</sup> December 2015 and which is required to be fitted with a flight data recorder, shall record the following

Schedule 2  
Part A.

parameters at a maximum recording interval of 0.125 seconds:

- (a) Pilot input or control surface position;  
and
  - (b) primary controls for pitch, roll, yaw.
- (6) A flight data recorder system shall not use –
- (a) engraving metal foil;
  - (b) photographic film;
  - (c) analogue frequency modulation after 31<sup>st</sup> December 2011; and
  - (d) magnetic tape after 31<sup>st</sup> December 2015.

(7) All flight data recorders shall be capable of retaining the information recorded during at least the last twenty-five (25) hours of their operation.

(8) A turbine-engined aeroplane for which a type certificate is first issued after 31<sup>st</sup> December 2015 and is required to be operated by more than one (1) pilot shall be equipped with either –

- (a) a cockpit voice recorder; or
- (b) cockpit audio recording system.

(9) An aeroplane of a maximum certificated take-off mass of over twenty-seven thousand kilogrammes (27,000 kg) for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 1986 shall be equipped with a cockpit voice recorder.

(10) A cockpit voice recorder system shall not use magnetic tape and wire after 31<sup>st</sup> December 2015.

(11) A cockpit voice recorder shall be capable of retaining the information recorded during at least the last thirty (30) minutes of their operation.

(12) Notwithstanding sub-regulations (11), from 1<sup>st</sup> January 2016, all cockpit voice recorders shall be capable of

retaining the information recorded during at least the last two (2) hours of their operation.

Schedule 2  
Part A.

(13) An aeroplane for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 2015, which utilise any of the data link communications applications listed in Clause 5(b) of Part A of Schedule 2 and is required to carry a cockpit voice recorder, shall record on a flight recorder all data link communications messages.

(14) An aeroplane which is modified after 31<sup>st</sup> December 2015 to install and utilise any of the data link communications applications listed in Clause 5(b) of Part A of Schedule 2 and is required to carry a cockpit voice recorder, shall record on a flight recorder the data link communications messages.

(15) The minimum recording duration for data link information shall be equal to the duration of the cockpit voice recorder.

(16) Data link recording shall be able to be correlated to the recorded cockpit audio.

(17) Flight recorders shall be constructed to meet crashworthiness and fire protection specifications, located and installed so as to provide maximum practical protection for the recordings in order that the recorded information may be preserved, recovered and transcribed.

(18) A flight recorder shall not be switched off during flight time.

(19) To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident and shall not be reactivated before their disposition as determined in accordance with the Civil Aviation Aircraft Accident and Incident Investigation Regulations.

(20) The pilot-in-command, the owner or operator, shall ensure, to the extent possible, in the event the aeroplane becomes involved in an accident or incident, the preservation of all related flight recorder records, and if necessary the associated flight recorders, and their retention in safe custody pending their disposition as determined in accordance with the

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**[Subsidiary]***Civil Aviation Regulations- Part VII - Instruments and Equipment***Civil Aviation Aircraft Accident and Incident Investigation Regulations.**

(21) Operational checks and evaluations of recordings from the flight recorder systems shall be conducted to ensure the continued serviceability of the recorders.

(22) An aeroplane of a maximum certificated take-off mass over five thousand, seven hundred kilogrammes (5,700 kg), required to have a flight data recorder and a cockpit voice recorder, may alternatively be equipped with two (2) flight data recorder/cockpit voice recorder combination recorders.

Flight  
Recorders for  
Helicopters.

**32.** An operator of a helicopter under this regulation shall ensure such helicopter meets the following requirements and the standards set out in Part B of Schedule 2, applicable to the helicopter, for flight recorders:

(1) A Type IV flight data recorder shall record the parameters required to determine accurately the helicopter flight path, speed, attitude, engine power and operation as set out in Part B of Schedule 2.

(2) A Type IVA flight data recorder shall record the parameters required to determine accurately the helicopter flight path, speed, attitude, engine power, operation and configuration as set out in Part B of Schedule 2.

(3) A Type V flight data recorder shall record the parameters required to determine accurately the helicopter flight path, speed, attitude and engine power as set out in Part B of Schedule 2.

Schedule 2  
Part B.

(4) A helicopter of a maximum certificated take-off mass of over three thousand, one hundred and seventy-five kilogrammes (3,175 kg) for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 2015 shall be equipped with a Type IVA flight data recorder.

(5) A helicopter of a maximum certificated take-off mass of over seven thousand kilogrammes (7,000 kg), or having a passenger seating configuration of more than nineteen (19), for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 1988 shall be equipped with a Type IV flight data recorder.

(6) A flight data recorder system shall not use –

- (a) engraving metal foil;
- (b) photographic film;
- (c) analogue frequency modulation after 31<sup>st</sup> December 2011; and
- (d) magnetic tape after 31<sup>st</sup> December 2015;

(7) Types IV, IVA and V flight data recorders shall be capable of retaining the information recorded during at least the last ten (10) hours of their operation.

(8) A helicopter of a maximum certificated take-off mass of over seven thousand kilogrammes (7,000 kg) for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 1986 shall be equipped with a cockpit voice recorder.

(9) A helicopter of a maximum certificated take-off mass of over seven thousand kilogrammes (7,000 kg) for which the individual certificate of airworthiness was first issued before 1<sup>st</sup> January 1987 shall be equipped with a cockpit voice recorder.

(10) A helicopter not required to be equipped with a flight data recorder, shall have recorded on the cockpit voice recorder, at least the main rotor speed.

(11) A cockpit voice recorder system shall not use magnetic tape and wire after 31<sup>st</sup> December 2015.

(12) A cockpit voice recorder shall be capable of retaining the information recorded during at least the last thirty (30) minutes of its operation.

(13) Notwithstanding sub-regulation (12), from 1 January 2016, a helicopter required to be equipped with a cockpit voice recorder shall be equipped with a cockpit voice recorder capable of retaining the information recorded during the last two (2) hours of its operation.

(14) A helicopter for which the individual certificate of airworthiness is first issued after 31<sup>st</sup> December 2015, which

utilise any of the data link communications applications listed in Clause 5(b) of Part B of Schedule 2, and is required to carry a cockpit voice recorder, shall record on a flight recorder, the data link communications messages.

Schedule 2  
Part B.

(15) A helicopter which is modified after 31<sup>st</sup> December 2015, to install and utilise any of the data link communications applications listed in Clause 5(b) of Part B of Schedule 2, and is required to carry a cockpit voice recorder, shall record on a flight recorder the data link communications messages.

(16) The minimum recording duration for data link information shall be equal to the recording duration of the cockpit voice recorder.

(17) Data link recording shall be able to be correlated to the recorded cockpit audio.

(18) All flight recorders shall be constructed to meet crashworthiness and fire protection specifications, located and installed so as to provide maximum practical protection for the recordings in order that the recorded information may be preserved, recovered and transcribed.

(19) All flight recorders shall not be switched off during flight time.

(20) To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident and not be reactivated before their disposition as determined in accordance with the Civil Aviation Aircraft Accident and Incident Investigation Regulations.

(21) Operational checks and evaluations of recordings from the flight recorder systems shall be conducted to ensure the continued serviceability of the recorders.

(22) A helicopter required to be equipped with a flight data recorder and a cockpit voice recorder, may alternatively be equipped with two flight data recorder/cockpit voice recorder, combination recorders.

**PART VIII  
EMERGENCY, RESCUE, AND SURVIVAL  
EQUIPMENT**

Applicability  
of Part VIII.

**33.** This Part prescribes the minimum requirements for emergency, rescue and survival equipment for aircraft operating in Guyana.

Emergency  
Equipment.

**34.** An operator shall ensure that emergency and flotation equipment on an aircraft on which he intends to or conducts operations is—

- (a) readily accessible to the crew and stored so as to facilitate easy access during emergencies;
- (b) clearly identified and marked to indicate the procedures for use;
- (c) marked with the date of its last and next inspection date; and
- (d) marked as to contents when carried in a compartment or container.

Emergency  
Exit  
Equipment.

**35.** (1) An air operator shall ensure that when conducting operations in a passenger carrying aeroplane—

- (a) each passenger emergency exit, its means of access and its means of opening are conspicuously marked by a sign visible to the crew and passengers approaching along the main passenger aisle; and
- (b) the means of opening each passenger emergency exit from the outside is marked on the outside of the aeroplane.

(2) An air operator shall ensure that a passenger carrying aeroplane in which he conducts or intends to conduct operations has an emergency lighting system, independent of the main lighting system that—

- (a) illuminates each passenger exit marking and locating sign;

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- (b) provides enough general lighting in the passenger cabin to allow vision during an emergency; and
- (c) includes floor proximity emergency escape path lighting systems.

(3) An air operator shall ensure that a passenger carrying aeroplane in which he conducts or intends to conduct operations is equipped with an escape route that is slip resistant and meets the requirements under which such aeroplane was type certified.

Visual  
Signalling  
Devices and  
Survival Kits.

**36.** (1) An operator shall not conduct operations in an aircraft over water or across land areas which have been designated by the civil aviation authority of the State being overflown as areas in which search and rescue would be especially difficult, unless such aircraft is equipped with signalling devices as may be appropriate to the area overflown and which include—

- (a) visual signals for use by intercepting and intercepted aircraft; and
- (b) at least one pyrotechnic signalling device for each life raft required for over water operations.

(2) An operator shall not conduct operations in an aircraft across land areas which have been designated by the civil aviation authority of the State being overflown as areas in which search and rescue would be especially difficult, unless such aircraft is—

- (a) equipped with enough survival kits for the number of occupants of the aircraft; and
- (b) appropriately equipped for the route to be flown.

Portable Fire  
Extinguishers.

**37.** (1) An air operator shall not conduct operations on an aircraft unless such aircraft is equipped with portable fire extinguishers of a type acceptable to the Authority and accessible for use in the crew, passenger and cargo compartments.

(2) A portable fire extinguisher under sub-regulation (1) shall—

- (a) have the type and quantity of extinguishing agent which is suitable for the kinds of fires likely to occur in the compartment where the extinguisher is intended to be used; and
- (b) be designed to minimise the hazard of toxic gas concentrations where used in an aircraft with passenger compartments.

(3) An air operator shall ensure that at least one (1) portable fire extinguisher required under sub-regulation (1), is provided and available on an aircraft he operates or intends to operate and positioned in the following manner:

- (a) conveniently located for use in each Class E cargo compartment in an aircraft which is easily accessible to crew members during flight;
- (b) located in each upper and lower lobe galley;
- (c) conveniently located on the flight deck for use by the flight crew; and
- (d) conveniently located in the passenger compartment of an aircraft having a passenger seating capacity of thirty (30) or less.

(4) An air operator shall ensure when conducting operations on an aeroplane having a passenger seating capacity of more than thirty (30), such aeroplane has a minimum number of portable fire extinguishers conveniently located and uniformly distributed throughout the compartment as specified in Part A of Schedule 3.

Schedule 3  
Part A.

(5) An operator shall ensure that the fire extinguishing agent used in a portable fire extinguisher in an aircraft

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for which the individual Certificate of Airworthiness is first issued after 31<sup>st</sup> December 2016 –

- (a) meet the applicable performance requirements of the Authority; and
- (b) is not to be of a type listed in Annex A, Group II of the *Montreal Protocol on Substances that Deplete the Ozone Layer*, 8<sup>th</sup> Edition, 2009 which are as follows:
  - (i) Halon 1211 – Chemical formula  $\text{CF}_2\text{BrCl}$ ;
  - (ii) Halon 1301 – Chemical formula  $\text{CF}_3\text{Br}$ ; and
  - (iii) Halon 2402 – Chemical formula  $\text{C}_2\text{F}_4\text{Br}_2$ .

Built-in Fire Extinguisher in Lavatory.

**38.** (1) An air operator shall not conduct passenger carrying operations on an aeroplane unless each lavatory in such aeroplane is equipped with a built-in fire extinguisher of a type approved by the Authority for each disposal receptacle for towels and paper within the lavatory.

(2) A built-in lavatory fire extinguisher under sub-regulation (1) shall be designed to discharge automatically into each disposal receptacle upon occurrence of a fire in such receptacle.

(3) An operator shall ensure that the fire extinguishing agent used in lavatory built-in fire extinguishers in an aircraft for which the individual Certificate of Airworthiness is first issued after 31<sup>st</sup> December 2011 –

- (a) meet the applicable performance requirements of the Authority; and
- (b) not be of a type listed in Annex A, Group II of the *Montreal Protocol on Substance that Deplete the Ozone Layer*, 8<sup>th</sup> Edition, 2009 and are listed as follows:
  - (i) Halon 1211 – Chemical formula  $\text{CF}_2\text{BrCl}$ ;

(ii) Halon 1301 – Chemical formula  $CF_3Br$ ; and

(iii) Halon 2402 – Chemical formula  $C_2F_4Br_2$ .

Requirement for Lavatory Smoke Detector.

**39.** An air operator shall not conduct passenger carrying operations on an aeroplane unless each lavatory on such aeroplane is equipped with a smoke detector system or equivalent system that provides—

(a) a warning light in the cockpit; or

(b) a warning light or aural warning in the passenger cabin, which would be readily, detected by a cabin attendant, taking into consideration the positioning of flight attendants throughout the passenger compartment during various phases of flight.

Requirement to Have Crash Axe on Board an Aeroplane.

**40.** An air operator shall not conduct operations on an aeroplane with a maximum certified take-off mass in excess of five thousand, seven hundred kilogrammes (5,700 kg) unless such aeroplane is equipped with a crash axe appropriate to effective use in that type of aeroplane, stored in a place not visible to passengers on the aeroplane.

Requirement for Break-in Points Markings.

**41.** (1) Where an operator installs break-in markings on the fuselage of an aeroplane suitable for break-in by rescue crews in an emergency, such markings shall be either red or yellow and where necessary, outlined in white to contrast with the background.

(2) Where the corner markings of the break-in markings are more than two metres (2 m) apart, intermediate lines 9cm x 3cm shall be inserted so that there is no more than two metres (2 m) between adjacent markings.

Requirement to Have First-Aid and Emergency Medical Kit on Board an Aircraft.

**42.** (1) An air operator shall not conduct passenger carrying operations on an aircraft unless such aircraft is equipped with accessible first-aid kits and where an aircraft is authorised to carry more than two hundred and fifty passengers (250), an approved emergency medical kit for treatment of injuries or medical emergencies that might occur during flight time or in

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minor accidents.

Schedule 3  
Part B.

(2) The number of first-aid kits required on an aircraft under sub-regulation (1), shall be in proportion to the number of passenger seats on an aircraft as outlined in Part B of Schedule 3.

Oxygen  
Storage and  
Dispensing  
Apparatus.

**43.** (1) An operator shall ensure that where his aircraft operates at altitudes requiring the use of supplemental oxygen or where the atmospheric pressure is greater than ten thousand feet in the cabin area, such aircraft shall have adequate oxygen supply and dispensing apparatus stored.

(2) An operator shall ensure that the minimum rate of flow of oxygen supply and the oxygen apparatus under sub-regulation (1) shall meet applicable airworthiness standards for the type certification in the transport category of such aircraft as specified by the Authority.

(3) An air operator shall not conduct passenger carrying operations on—

(a) an aircraft at altitudes above ten thousand feet (10,000 ft) unless such aircraft is equipped with oxygen masks, located within the immediate reach of flight crew members while at their assigned duty station.

(b) a pressurised aircraft at altitudes above twenty-five thousand feet (25,000 ft) unless—

(i) the flight crew members have oxygen masks which are of a quick donning type and will readily supply oxygen when required;

(ii) sufficient spare outlets and masks or sufficient portable oxygen units with masks are distributed evenly throughout the cabin area to ensure immediate availability of oxygen to cabin crew members regard-

less of their location where a cabin pressurisation failure occurs; and

- (i) there are oxygen-dispensing units connected to oxygen supply terminals that are immediately available to each occupant, wherever seated.

(4) The number of dispensing units and outlets under sub-regulation (3)(b)(iii) shall exceed the number of seats on such aircraft by at least ten percent (10%) and the extra units shall be evenly distributed throughout the cabin area of the personnel compartments.

(5) The supplemental oxygen required to sustain a particular operation shall be determined on the basis of flight altitudes and flight duration, consistent with the operating procedures established for each operation, the emergency procedures specified in the Operations Manual of the aircraft and with the routes to be flown.

(6) An operator shall not conduct passenger carrying operations on an aircraft at flight altitudes where the atmospheric pressure in the personnel compartments of such aircraft will be greater than ten thousand feet (10,000 ft), unless sufficient breathing oxygen is stored on such an aircraft to supply—

- (a) all crew members and ten percent (10%) of the passengers for any period in excess of thirty (30) minutes where the pressure in compartments occupied by crew members and passengers will be between ten thousand (10,000 ft) and thirteen thousand (13,000) feet; and
- (b) the crew and passengers of such aircraft for any period, where the atmospheric pressure in such compartments occupied by crew members and passengers will be greater than thirteen thousand feet (13,000 ft).

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(7) An air operator shall ensure that where a flight to be operated in a pressurised aircraft such flight shall not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply all the crew members and passengers, as is appropriate to the circumstances of the flight being undertaken, in the event of loss of pressurisation, for any period where the cabin altitude in any compartment occupied by them would be greater than ten thousand feet (10,000 ft).

(8) When a pressurised aircraft is on a flight under sub-regulation (7), where the flight altitude is more than twenty five thousand feet (25,000 ft) and such pressurised aircraft cannot descend safely within four (4) minutes to a flight altitude of thirteen thousand feet (13,000 ft) there shall be on board no less than a ten (10) minute supply of breathing oxygen for the occupants of the passenger compartment.

Protective  
Breathing  
Equipment.

**44.** (1) An air operator shall not conduct passenger carrying operations on an aeroplane with a maximum certified take-off mass exceeding five thousand, seven hundred kilogrammes (5,700 kg) or having a maximum approved seating configuration of more than nineteen (19) seats unless such aeroplane—

- (a) has sufficient protective breathing equipment to protect the eyes, nose and mouth of flight crew members while on flight deck duty and to provide oxygen for a period of not less than fifteen (15) minutes; and
- (b) has sufficient portable protective breathing equipment to protect the eyes, nose and mouth of all required cabin crew members on board the aircraft to provide breathing gas for such cabin crew members for a period of not less than fifteen (15) minutes.

(2) An air operator, when providing oxygen for the protective breathing equipment under sub-regulation (1) on an aeroplane on which he conducts or intends to conduct operations, may provide such oxygen from the required supplemental oxygen system.

(3) An air operator shall ensure that the protective breathing equipment intended for the use of the flight crew under sub-regulation (1), is conveniently located on the flight deck and easily accessible for immediate use by each required flight crew member at his assigned duty station.

(4) An air operator shall ensure that the protective breathing equipment intended for cabin crew use is installed adjacent to each cabin crew member duty station.

(5) An air operator shall ensure that portable breathing equipment is installed, provided or located at or adjacent to each required hand fire extinguisher.

(6) An air operator shall ensure that portable breathing equipment is stowed outside and adjacent to the entrance to a cargo compartment in which a hand fire extinguisher is located.

(7) An air operator shall ensure that the portable breathing equipment required under this regulation shall not prevent required communication.

First Aid  
Oxygen  
Dispensing  
Units.

**45.** (1) An air operator shall not conduct passenger carrying operations on a pressurised aeroplane at altitudes above twenty-five thousand feet (25,000 ft), where a cabin crew member is required to be carried on board unless such aeroplane is equipped with—

- (a) undiluted first-aid oxygen for passengers who may require, undiluted first-aid oxygen for physiological reasons following a cabin depressurisation; and
- (b) a sufficient number of oxygen dispensing units but in no case less than two (2), for cabin crew to have access and use of the oxygen supply.

(2) An air operator shall ensure that the amount of first-aid oxygen required under regulation (1), for a particular operation and route is determined on the basis of—

- (a) flight duration after cabin depressurisation at cabin altitudes of more than eight thousand feet (8,000 ft);

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- (b) an average flow rate of at least three litres (3L) per minute per person at standard temperature pressure; and
- (c) at least two percent (2%) of the passengers carried on board such aeroplane, but in no case for less than one (1) person.

Requirement  
for  
Megaphones  
on Board an  
Aeroplane.

**46.** (1) An air operator shall not conduct passenger-carrying operations on an aeroplane unless such aeroplane has a portable battery-powered megaphone or a megaphone approved by the Authority readily accessible to all crew members assigned to direct emergency evacuation.

(2) An air operator shall ensure that the number and location of megaphones required under sub-regulation (1) is determined as follows:

- (a) on an aeroplane with a seating capacity of more than sixty (60) and less than one hundred (100) passengers, one megaphone shall be located at the most rearward location in the passenger cabin where it would be readily accessible to a normal flight attendant seat; and
- (b) on an aeroplane with a seating capacity of more than ninety nine (99) passengers, two (2) megaphones in the passenger cabin on each aeroplane with one (1) installed at the forward end and the other at the most rearward location where it would be readily accessible to a normal flight attendant seat.

(3) The Director General may grant a deviation from the requirements under sub-regulation (2), where the Director General finds that a different location for the megaphone would be more effective in aiding the evacuation of persons on board such aeroplane during an emergency situation.

Requirement

**47.** (1) An air operator shall not conduct operations on an

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for Individual  
Flotation  
Devices on  
Board an  
Aircraft.

aeroplane unless such aeroplane is equipped with one (1) life jacket or equivalent individual floatation device for each person on board the aeroplane, when—

- (a) operated on flights over water at a distance of more than fifty (50) nautical miles from land suitable for making an emergency landing, or beyond gliding distance from the shore; or
- (b) taking off or landing at an aerodrome where, in the opinion of the Director General, the take-off or approach path is so disposed over water that in the event of a mishap there would be a likelihood of a ditching.

(2) An operator of a helicopter operating in performance Class 1, 2 and 3 in accordance with the provisions of regulation 53, shall be equipped with one (1) life jacket, or equivalent individual floatation device for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided.

(3) The life jacket referred to in sub-regulation (2) shall be worn constantly during offshore operations, unless the occupant is wearing an integrated survival suit that includes the functionality of the life jacket.

(4) An operator of a helicopter operating in performance Class 2 and 3 taking off or landing at a heliport where in the opinion of the Authority, the take-off or approach path is so disposed over water that in the event of a mishap there would be likelihood of a ditching, such helicopter shall be equipped with one (1) life jacket, or equivalent individual floatation device for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided.

(5) An air operator shall ensure that all life jackets or equivalent individual floatation devices under this regulation are stowed on an aircraft in which he conducts or intends to conduct operations, in such a manner to ensure that it is easily accessible to a person to whom by seating assignment such device is assigned, from his seat or berth.

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(6) An air operator shall ensure that on his aircraft used in extended over water operations, is fitted on each individual flotation device on board such aircraft a survivor locator light acceptable to the Authority.

(7) Notwithstanding sub-regulation (6) the Authority may approve operations of an aircraft over extended water operations without individual flotation devices, where the air operator proves to the satisfaction of the Authority that the water over which the aircraft is to be operated is not of such size and depth that individual flotation devices are necessary to ensure the safety of each person on board the aircraft.

(8) An operator shall not operate a seaplane unless such seaplane is equipped with one (1) life jacket, or equivalent individual flotation device, for each person on board that seaplane, and that the life jacket or individual flotation device is stowed in such a manner that it is easily accessible from the seat or berth of such person on board the seaplane.

Requirement  
to Have Life  
Raft on Board  
an Aircraft.

**48.** (1) An air operator shall not conduct commercial air transport extended over-water operations unless the aeroplane in which he conducts or intends to conduct operations is equipped with sufficient number of life rafts with rated capacity and buoyancy to accommodate the total number of persons on board such aeroplane.

(2) An operator of a helicopter operating in—

- (a) performance Class 1 or 2 on flights over water at a distance from land corresponding to more than ten (10) minutes flying time at normal cruising speed; or
- (b) performance Class 3 on flights over water beyond auto-rotational or safe forced landing distance from land, unless it is equipped with sufficient number of life rafts with rated capacity and buoyancy to accommodate the total number of persons aboard that helicopter.”.

(3) Where excess rafts specified in sub-regulation (1), with adequate capacity are not available on board an aircraft, the buoyancy and seating capacity of such available rafts on board the aircraft shall be capable of accommodating all

persons on board the aircraft in the event that a raft with the largest seating capacity is lost.

(4) A life raft specified in sub-regulation (1), on board an aircraft shall be stowed in such a manner that it can be readily available for use in an emergency situation.

(5) All life rafts under this regulation shall be equipped with—

- (a) a survivor locator light;
- (b) a survival kit; and
- (c) a pyrotechnic signalling device.

Emergency  
Locator  
Transmitter.

**49.** (1) An operator of —

- (a) an aeroplane authorised to carry nineteen passengers or less and engaged in commercial air transport operations shall ensure that the aeroplane is equipped with at least one —
  - (i) Emergency Locator Transmitter of any type; or
  - (ii) automatic Emergency Locator Transmitter where the individual certificate of airworthiness is first issued after 1<sup>st</sup> July 2008;
- (b) an aeroplane authorised to carry more than nineteen passengers and engaged in commercial air transport operations shall ensure that the aeroplane is equipped with at least —
  - (i) one Automatic Emergency Locator Transmitter; or
  - (ii) two Emergency Locator Transmitter of any type; or

- (iii) two Emergency Locator Transmitter, one of which shall be automatic when operating on flights over water beyond auto-rotational or safe forced where the individual certificate of airworthiness is first issued after 1<sup>st</sup> July 2008;
- (c) an aeroplane not engaged in commercial air transport operations shall ensure that the aeroplane is equipped with at least one –
  - (i) Emergency Locator Transmitter of any type; or
  - (ii) automatic Emergency Locator Transmitter where the individual certificate of airworthiness is first issued after 1<sup>st</sup> July 2008;
- (d) a helicopter shall ensure when operating in –
  - (i) performance Class 1 or Class 2 –
    - (A) that the helicopter is equipped with at least one Automatic Emergency Locator Transmitter; and
    - (B) on flight over water at a distance from land corresponding to more than ten minutes at normal cruise speed that the helicopter is equipped with at least one Automatic Emergency Locator Transmitter and one Emergency Locator Tr-

transmitter in a raft or life jacket;

(ii) performance Class 3 –

(A) that the helicopter is equipped with at least one Automatic Emergency Locator Transmitter; and

(B) on flight over water beyond auto-rotational or safe forced landing distance from land that the helicopter is equipped with at least one Automatic Emergency Locator Transmitter and one Emergency Locator Transmitter in a raft or life jackets on flights.

(2) An operator of an aeroplane or helicopter shall ensure that each Emergency Locator Transmitter installed on the aeroplane or helicopter operates on 121.5 megahertz and 406 megahertz frequencies and meets the technical standards prescribed in Volume III of Annex 10 of the Convention on International Civil Aviation.

(3) An operator shall not conduct operations in an aeroplane or helicopter, unless all batteries used in an Emergency Locator Transmitter on the aeroplane or helicopter are replaced or recharged where applicable when –

- (a) the Emergency Locator Transmitter has been in use for more than one cumulative hour; or
- (b) fifty per cent of the useful life of the batteries has expired or where the batteries are rechargeable, fifty per cent of the useful life of charge has expired.

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(4) An operator shall ensure that the expiration date of the batteries for an Emergency Locator Transmitter is legibly marked on the outside of the Emergency Locator Transmitter.

(5) An operator shall take into consideration when making determination under sub-regulation (3), the useful life of a battery or charge requirements of an Emergency Locator Transmitter does not apply to batteries such as water-activated batteries that are likely to be affected during probable storage intervals.

Flotation  
Device for  
Helicopter  
Ditching.

**50.** An operator shall ensure that all helicopters intended to be flown over water shall be fitted with a permanent or rapidly deployable means of flotation so as to ensure a safe ditching of the helicopter when—

- (a) engaged in offshore operations, or other over water operations specified by the Authority;
- (b) flying over water in a hostile environment at a distance from land corresponding to more than ten (10) minutes at normal cruise speed when operating in performance Class 1 or 2;
- (c) flying over water in a non-hostile environment at a distance from land specified by the appropriate authority of the responsible State when operating in performance Class 1; or
- (d) flying over water beyond auto-rotational or safe forced landing distance from land when operating in performance Class 3.

Life-Saving  
Equipment  
Requirement  
for Search and  
Rescue over  
Sea Area.

**51.** An air operator of a helicopter operating over sea areas which have been designated by the State concerned as areas in which search and rescue would be especially difficult, shall ensure that such helicopter is equipped with life-saving equipment including means of sustaining life as may be appropriate to the area over-flown.

## PART IX MISCELLANEOUS SYSTEMS AND EQUIPMENT

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Applicability  
of Part IX.

**52.** This Part prescribes the minimum requirements for miscellaneous systems and equipment on aircraft in Guyana.

Seats, Safety  
Belts and  
Shoulder  
Harnesses.

**53.** (1) An air operator shall not conduct passenger carrying operations on an aircraft unless such aircraft is equipped with the following seats, safety belts and shoulder harness that meet the airworthiness requirements for type certification of that aircraft:

- (a) a seat or berth for each person on board such aircraft over the age of two (2) years;
- (b) a seat belt for each seat and a restraining belt for each berth;
- (c) an approved safety belt for use by two (2) occupants during en route flight only for a berth designed to be occupied by two (2) persons, such as a multiple lounge or divan seat;
- (d) a combination safety belt and shoulder harness, for each flight crew seat which shall incorporate a device that will automatically restrain the torso of the occupant to prevent interference with the flight controls in the event of rapid decompression and sudden incapacitation of the pilot; and
- (e) forward or rearward-facing seat, fitted with a safety harness for the use of each cabin crew required to be carried on board.

(2) The cabin crew seats referred to in sub-regulation (1)(e), shall be located near floor level and at different emergency exits to facilitate evacuation as required by the Authority.

Passenger and  
Pilot  
Compartment  
Doors Safety  
Requirement.

**54.** (1) An air operator shall not conduct passenger-carrying operations in an aeroplane unless such aeroplane has a—

- (a) key for each door that separates a passenger compartment from another com-

partment that has emergency exit provisions;

- (b) means for the crew, in an emergency situation, to unlock each door that leads to a compartment that is normally accessible to passengers that can be locked by passengers; and
- (c) placard on each door used to access a required passenger emergency exit, indicating that such door shall be opened during take-off and landing.

(2) Where an aeroplane is equipped with a flight crew compartment door, an air operator shall ensure that such door is capable of being locked and that there is a means by which cabin crew can discretely notify the flight crew in the event of suspicious activity or security breaches in the cabin.

(3) An air operator shall ensure that when conducting passenger-carrying operations with an aeroplane of a maximum certified take-off mass in excess of forty-five thousand five hundred kilogrammes (45,500 kg) or with a seating capacity greater than sixty (60), such aeroplane is equipped with an approved flight crew compartment door that is designed to resist penetration by small arms fire and grenade shrapnel and to resist forcible intrusion by unauthorised persons.

(4) An air operator conducting passenger carrying operations under sub-regulation (3), shall provide a means for monitoring from the station of each pilot, the entire door area outside the flight crew compartment to identify persons requesting entry and detect suspicious behaviour or potential threat.

(5) An air operator shall ensure that an aeroplane in which he conducts or intends to conduct operations, which is equipped with a flight crew compartment door required under sub-regulation (2), shall be capable of being locked and unlocked from the station of each pilot.

**55.** (1) An air operator shall not conduct passenger carrying operations on an aircraft, unless such aircraft is equipped with passenger information signs using either letters or symbol

displays to ensure that the following information and instructions are conveyed to passengers:

- (a) when seatbelts or harnesses are to be fastened;
- (b) when and how oxygen is to be used where the carriage of oxygen is required to be carried on such aircraft;
- (c) restriction on smoking;
- (d) location and use of life jackets or equivalent individual flotation devices where their carriage is required; and
- (e) location and method of opening emergency exits.

(2) An air operator shall ensure that passenger information sign under sub-regulation (1), when illuminated, is legible to each person seated in the passenger cabin under all probable conditions of cabin illumination.

(3) An air operator shall ensure that illuminated “No Smoking” and “Fasten Seatbelt” signs can be turned on and off by the crew.

(4) An air operator shall ensure that a sign or placard that reads “Fasten Seat Belt While Seated” shall be affixed to each forward bulkhead and each passenger seat back.

Public  
Address  
System  
Requirement.

**56.** (1) An air operator shall not conduct passenger carrying operations on an aeroplane with a maximum approved passenger seating configuration of more than nineteen (19) or a helicopter with an approved passenger seating configuration of more than nine (9), unless a public address system is installed—

(a) which operates independently of the interphone systems except for handsets, microphones and the selector switch signalling devices;

(b) for each required floor level passenger emergency exit that has an adjacent cabin

crew seat, has a microphone which is readily accessible to seated cabin crew member, except where one (1) microphone serves more than one (1) exit, and the proximity of the exits allows unassisted verbal communication between seated cabin crew members;

- (c) that is capable of operating within ten (10) seconds of being selected on by a cabin crew member at each of those stations in the compartment from which its use is accessible; and
- (d) that is audible and intelligible from all passenger seats, toilets, cabin crew seats and workstations.

(2) Notwithstanding sub-regulation (1), in the case of a helicopter with a maximum approved passenger seating configuration of more than nine (9) but less than nineteen (19), a public address system is not required where-

- (a) the helicopter is designed without a bulkhead between the pilot and passengers; and
- (b) the operator is able to demonstrate that when in flight the voice of the pilot is audible and intelligible at all passengers seats.

Airworthiness  
Requirement  
for Materials  
for Cabin  
Interiors.

**57.** (1) An air operator shall ensure that where materials in each compartment of an aeroplane in which he conducts or intends to conduct operations, used by the crew or passengers do not meet the current airworthiness requirements of materials to be used in the interior of cabin, for the applicable airworthiness requirements for the aeroplane type in the transport category, such materials are replaced with materials that meet the airworthiness requirements of such aeroplane type, upon the first major overhaul of such aeroplane or refurbishment of such cabin interior.

(2) An air operator shall ensure that all seat cushions, except those of flight crew member seats, in any compartment of an aeroplane on which he conducts or intends to conduct

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operations, which is occupied by crew or passengers meets the requirements pertaining to fire protection as specified by the airworthiness requirements for the aeroplane type.

Ceiling and  
Liner  
Materials for  
Cargo and  
Baggage  
Compartments

**58.** (1) Where an air operator conducts operations in a transport category aeroplane type certified after 1st January, 1958, with a Class C or D cargo compartment greater than two hundred cubic feet (200 cu ft) in volume, he shall ensure that such aeroplane has ceiling and sidewall liner panels that are constructed of—

- (a) glass fiber reinforced resin;
- (b) materials which meet the test requirements for flame resistance of cargo compartment liners required for the applicable type certificate; or
- (c) aluminum, where the installations were approved prior to 20th March, 1989.

(2) The term “liners” referred to in this regulation, includes any design feature, such as joint or fastener, which would affect the capability of the liner to safely contain a fire.

Power Supply,  
Distribution  
and Indication  
System.

**59.** (1) An air operator shall not conduct passenger carrying operations on an aeroplane unless such aeroplane is equipped with—

- (a) a power supply and distribution system that meets the airworthiness requirements for certification of an aeroplane in the transport category, as specified by the Authority; or
- (b) a power supply and distribution system that has the capability to produce and distribute the power supply to the required instruments and equipment, with use of an external power supply if any one (1) power source or component of the power distribution system fails; and
- (c) a means for indicating the adequacy of the power being supplied to required flight instruments.

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(2) An air operator shall ensure that when engine-driven sources of energy are used for the power supply required in sub-regulation (1), they shall be on separate engines.

Spare  
Protective  
Circuit Fuses.

**60.** An air operator shall not conduct passenger carrying operations on an aircraft on which protective fuses are installed, unless such aircraft has spare fuses available for use in flight equal to at least ten percent (10%) of the number of fuses for each rating or three (3) of each rating, whichever is the greater.

Icing  
Protection  
Equipment.

**61.** (1) An operator shall not operate an aircraft in icing conditions unless such aircraft—

(a) is certified by the State of Design in respect of the airworthiness requirements for ice protection for transport category aircraft; and

(b) is equipped for the prevention or removal of ice on the windshields, wings, empennage, propellers, and other parts of the aircraft where ice formation will adversely affect the safe operation of the aircraft.

(2) An air operator shall not operate an aircraft in expected or actual icing conditions at night, unless such aircraft is equipped with a means to illuminate or detect the formation of ice.

(3) Where illumination is used under sub-regulation (2) such illumination shall be of a type that will not cause glare or reflection that would hamper a crew member in the performance of his duties.

Pitot Heat  
Indicator  
System.

**62.** An air operator shall not operate an aircraft equipped with a flight instrument pitot heating system, unless such aircraft is equipped with an operable pitot heat indication system except where such pitot heat indication system is not required to be installed by the applicable airworthiness code of the State of Design of the aircraft that complies with the following requirements:

- (a) the indication system provided shall incorporate an amber light that is in clear view of the flight crew; and
- (b) the indication system provided shall be designed to alert the flight crew if either—
  - (i) the pitot heat system is switched off; or
  - (ii) the pitot heat system is switched on and any pitot heater tube heating elements is inoperative.

Independent  
Static Pressure  
System.

**63.** An air operator shall not operate an aircraft unless such aircraft has two (2) independent static pressure systems—

- (a) vented to the outside atmospheric pressure to ensure that the effect on such static pressure systems by airflow variation or moisture or other foreign matter is minimal; and
- (b) installed so as to be airtight except for the vent.

Windshield  
Wipers.

**64.** An air operator shall not operate an aircraft unless such aircraft is equipped with—

- (a) a windshield wiper on the windshield of such aircraft which corresponds to each pilot station; or
- (b) an equivalent means, to maintain a clear portion of the windshield during precipitation to allow for clear forward vision a clear portion of the windshield during precipitation.

Chart Holder.

**65.** An air operator shall not conduct operations on an aeroplane unless such aeroplane has a chart holder installed in an easily readable position, which can be illuminated for night operations.

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Cosmic  
Radiation  
Measuring  
Equipment.

**66.** (1) An air operator shall not conduct operations in an aeroplane above forty-nine thousand feet (49,000 ft) unless such aeroplane is equipped with an instrument to continuously measure and indicate to flight crew the dose rate of total cosmic radiation being received and the cumulative dose on each flight.

(2) The display of instrument under sub-regulation (1) shall be readily visible to members of the flight crew.

Maritime  
Sound  
Signalling  
Device.

**67.** An operator shall not conducted operations in a seaplane unless such seaplane is equipped with equipment for making the sound signals prescribed by the International Regulations for Preventing Collisions at Sea or the Shipping (Distress signals and Prevention of Collision) Regulations.

Anchors.

**68.** An operator shall not conduct operations in a seaplane or an amphibian, unless such seaplane or amphibian is equipped with a sea anchor and other equipment necessary to facilitate mooring, anchoring or manoeuvring the aircraft on water, appropriate to its size, weight and handling characteristics.

Airborne  
Collision  
Avoidance  
System.

**69.** (1) An operator of a turbine-engined aeroplane engage in commercial air transport operations, of a maximum certified take-off mass in excess of five thousand and seven hundred kilogrammes (5,700 kg) or authorised to carry more than 19 passengers shall ensure that such aircraft is equipped with an airborne collision avoidance system (ACAS II).

(2) An operator of a turbine-engined aeroplane not engaged in commercial air transport operations, of a maximum certified take-off mass in excess of fifteen thousand kilogrammes (15,000 kg) or authorised to carry more than thirty (30) passengers, for which the individual airworthiness certificate is first issued after 1st January, 2007, shall be equipped with an Airborne Collision Avoidance System (ACAS II).

(3) An operator of a turbine-engined aeroplane under sub-regulation (1) shall ensure that the Airborne Collision Avoidance System (ACAS II) operates in accordance with the relevant provisions of Volume IV of Annex 10 to the Chicago Convention.

Pressure

**70.** (1) An operator of an aeroplane or helicopter engaged

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Altitude  
Reporting  
Transponder.

in commercial air transport operations shall ensure that the aeroplane or helicopter is equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provision of Volume IV of Annex 10 to the Convention on International Civil Aviation.

(2) Aeroplanes specified under sub-regulation (1) for which the individual certificate of airworthiness is first issued after 1st January 2009, shall be equipped with a data source that provides pressure-altitude information with a resolution no greater than 7.62 metres or twenty-five feet (25 ft).

(3) An operator of an aero-plane engaged in commercial air transport operations shall ensure that the aeroplane is equipped with a data source that provides pressure-altitude information with a resolution no greater than 7.62 metres or twenty-five feet (25 ft).

(4) An operator of an aircraft or helicopter not engaged in commercial air transport operations shall ensure that the aeroplane or helicopter is equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provision of Volume IV of Annex 10 to the Convention on International Civil Aviation.

(5) Where the situation warrants such action, the Director General may exempt an operator from the requirements of sub-regulation (4).

Aircraft  
Equipped with  
Head-up  
Displays or  
Enhanced  
Vision  
Systems.

**71.** An operator of an aircraft shall not install or use a head-up display or an enhanced vision system on his aircraft to gain operational benefits unless the installations and their use have been accepted or approved by the Authority.

Automatic  
Dependent  
Surveillance-  
Broadcast.

**72.** (1) Unless otherwise authorized by ATC, no person shall operate an aircraft in Class A airspace unless the aircraft has equipment installed that—

(a) Meets the performance requirements in TSO-C166b, Extended Squitter Automatic Dependent Surveillance-Broadcast and Traffic Information Service-Broadcast (TIS-B)

(b) Meets the requirements of Schedule 5.

(2) Unless otherwise authorized by ATC, no person shall operate an aircraft in airspace described in paragraph (4) of this section unless the aircraft has equipment installed that—

- (a) Meets the performance requirements in TSO-C166b; or
- (b) Meets the requirements of Schedule 5.

(3) Operators with alternate equipment installed that has been approved by the Authority are in compliance with this section.

(4) Unless otherwise authorized by ATC, no person shall operate an aircraft in the following areas unless the aircraft has equipment installed that meets the requirements in paragraph (2) of this section –

- (a) in Class A and C airspace areas;
- (b) Class E airspace at and above 3,000 feet MSL

(5) The requirements of paragraph (2) of this section do not apply to any aircraft that was not originally certificated with an electrical system, or that has not subsequently been certified with such a system installed, including balloons and gliders. These aircraft may conduct operations without ADS-B Out in the airspace specified in paragraphs (4) of this section. Operations authorized by this paragraph must be conducted outside any Class A or Class C airspace area.

(6) Each person operating an aircraft equipped with ADS-B Out shall operate this equipment in the transmit mode at all times.

(7) Requests for ATC authorized deviations from the requirements of this section shall be made to the ATC facility having jurisdiction over the concerned airspace within the time periods specified as follows:

- (a) for operation of an aircraft with an inoperative ADS-B Out, to the airport of ultimate destination, including any intermediate stops, or to proceed to a place where suitable repairs can be made or both, the request may be made at any time;

(b) for operation of an aircraft that is not equipped with ADS-B Out, the request shall be made at least 1 hour before the proposed operation.

(8) The TSO Standards specified in this section are hereby incorporated into these Regulations.

Implementing  
Standards  
Schedule 4.

**73.** An air operator in meeting the requirements of Regulations 12, 38 and 46, shall ensure that he complies with the minimum implementing standards set out in Schedule 4.

Director  
General  
Amend  
Schedules.

**74.** The Director General may by Order amend any of the Schedules.

Commence-  
ment

**75.** The requirements of these Regulations shall come into effect ten (10) months from the date of publication of these Regulations.

**SCHEDULE 1***(Regulation 12)*

The following instruments and equipment shall be installed on an aircraft engaged in Category II operations in accordance with its aircraft group—

(a) Group I. Aircraft

- (i) two localizer and glide slope receiving systems in which—
  - (A) each system shall provide a basic Instrument Landing System display; and
  - (B) each side of the instrument panel must have a basic Instrument Landing System display;
- (ii) a communication system that does not affect the operation of at least one of the Instrumental Landing System;
- (iii) a marker beacon receiver that provides distinctive aural and visual indications of the outer and the middle markers;
- (iv) two gyroscopic pitch and bank indicating systems;
- (v) two gyroscopic direction indicating systems;
- (vi) two airspeed indicators;
- (vii) two sensitive altimeters adjustable for barometric pressure, having markings at 20-foot intervals and each having a placarded correction for altimeter scale error and for the wheel height of the aircraft;
- (viii) two vertical speed indicators; and
- (ix) a flight control guidance system that consists of—
  - (A) either an automatic approach coupler; or
  - (B) a flight director system.

Note: A flight director system must display computed information as steering command in relation to an Instrument Landing System localizer and, on the same instrument, either computed information as pitch command in relation to an Instrument Landing System glide slope or basic Instrument Landing System glide slope information. An automatic approach coupler must provide at least automatic steering in relation to an Instrument Landing System localizer. The flight control guidance system may be operated from one of the receiving systems required by paragraph (1)(a)(i).

- (x) for Category II operations with decision heights below one hundred and fifty feet (150 ft) either a marker beacon receiver providing aural and visual indications of the inner marker or a radio altimeter.

(b) Group II. Aircraft

- (i) all the items under paragraph (1);
- (ii) warning systems for immediate detection by the pilot of system faults in paragraphs (1)(a), (d), (e) and (i) of Group I and, if installed for use in Category III operations—
  - (A) the Radio Altimeter system; and
  - (B) auto-throttle system;
- (iii) dual controls;
- (iv) an externally vented static pressure system with an alternate static pressure source;
- (v) a windshield wiper or equivalent means of providing adequate cockpit visibility for a safe visual transition by either pilot to touchdown and rollout; and
- (vi) a heat source for each airspeed system pitot tube installed or an equivalent means of preventing malfunctioning due to icing of the pitot system.

Note: for the purpose of Schedule 1

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[Subsidiary]

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- (a) *“Group I” means propeller-driven aircraft; and*
- (b) *“Group II” means turbo – jet powered aircraft.*

**SCHEDULE 2****PART A***[Regulation 30 &31]***FLIGHT RECORDERS**

The following are the flight recorders standards for aeroplane under Regulations 30 and 31:

**1. General Requirements**

- (a) A flight recorder systems containers shall:
- (i) be painted a distinctive orange or yellow colour;
  - (ii) carry reflective material to facilitate their location; and
  - (iii) have securely attached an automatically activated underwater locating device.
- (b) A flight recorder systems shall be installed so that:
- (i) the probability of damage to the recordings is minimised;
  - (ii) they receive electrical power from a bus that provides the maximum reliability for operation of the flight recorder systems without jeopardising service to essential or emergency loads;
  - (iii) there is an aural or visual means for pre-flight checking that the flight recorder systems are operating properly; and
  - (iv) if the flight recorder systems have a bulk erasure device, the installation shall be designed to prevent operation of the device during flight time or crash impact.
- (c) A flight recorder system, when tested by methods approved by the appropriate certificating authority, shall be demonstrated to be suitable for the environmental extremes over which they are designed to operate.
- (d) Means shall be provided for an accurate time correlation between the flight recorder systems recordings.

- (e) The manufacturer shall provide the appropriate certificating authority with the following information in respect of the flight recording systems:
- (i) manufacturer's operating instructions, equipment limitations and installation procedures;
  - (ii) parameter origin or source and equations which relate counts to units of measurement; and
  - (iii) manufacturer's test reports.

## 2. Flight Data Recorder

- (a) The flight data recorder shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power.
- (b) Flight data recorders shall be classified as Type I, Type IA, Type II and Type IIA depending upon the number of parameters to be recorded and the duration required for retention of the recorded information.
- (c) The parameters that satisfy the requirements for flight data recorders are listed in the paragraphs below. The number of parameters to be recorded shall depend on aeroplane complexity. The parameters without an asterisk (\*) are mandatory parameters which shall be recorded regardless of aeroplane complexity. In addition, the parameters designated by an asterisk (\*) shall be recorded if an information data source for the parameter is used by aeroplane systems or the flight crew to operate the aeroplane. However, other parameters may be substituted with due regard to the aeroplane type and the characteristics of the recording equipment.
- (d) The following parameters shall satisfy the requirements for flight path and speed:
- (i) Pressure altitude;
  - (ii) Indicated airspeed or calibrated airspeed;
  - (iii) Air-ground status and each landing gear airground sensor when practicable;
  - (iv) Total or outside air temperature;
  - (v) Heading such as primary flight crew reference;
  - (vi) Normal acceleration;
  - (vii) Lateral acceleration;

- (viii) Longitudinal acceleration;
- (ix) Time or relative time count;
- (x) Navigation data\* such as drift angle, wind speed, wind direction, and latitude and longitude;
- (xi) Groundspeed\*;
- (xii) Radio altitude\*;

(e) The following parameters shall satisfy the requirements for attitude:

- (i) Pitch attitude;
- (ii) Roll attitude;
- (iii) Yaw or sideslip angle\*;
- (iv) Angle of attack\*;

(f) The following parameters shall satisfy the requirements for engine power:

- (i) Engine thrust or power such as propulsive thrust or power on each engine and cockpit thrust/power lever position;
- (ii) Thrust reverse status\*;
- (iii) Engine thrust command\*;
- (iv) Engine thrust target\*;
- (v) Engine bleed valve position\*; and
- (vi) Additional engine parameters\* such as EPR, N1, indicated vibration level, N2, EGT, TLA, fuel flow, fuel cut-off lever position and N<sub>3</sub>;

(g) The following parameters shall satisfy the requirements for configuration:

- (i) Pitch trim surface position;
- (ii) Flaps\* such as trailing edge flap position, cockpit control selection;
- (iii) Slats\* such as leading edge flap (slat) position, cockpit control selection;
- (iv) Landing gear\* such as landing gear, gear selector position;
- (v) Yaw trim surface position\*;
- (vi) Roll trim surface position\*;
- (vii) Cockpit trim control input position pitch\*;
- (viii) Cockpit trim control input position roll\*;
- (ix) Cockpit trim control input position yaw\*;
- (x) Ground spoiler and speed brake\* such as Ground spoiler position, ground spoiler selection, speed brake position, and speed brake selection;
- (xi) De-icing or anti-icing systems selection\*;
- (xii) Hydraulic pressure (each system)\*;

- (xiii) Fuel quantity in CG trim tank\*;
- (xiv) AC electrical bus status\*;
- (xv) DC electrical bus status\*;
- (xvi) APU bleed valve position\*;
- (xvii) Computed centre of gravity\*;

(h) The following parameters shall satisfy the requirements for operation:

- (i) Warnings;
- (ii) Primary flight control surface and primary flight control pilot input for pitch axis, roll axis, yaw axis;
- (iii) Marker beacon passage;
- (iv) Each navigation receiver frequency selection;
- (v) Manual radio transmission keying and cockpit voice recorders and flight data recorders synchronisation reference;
- (vi) Autopilot and auto throttle and auto flight control system mode and engagement status\*;
- (vii) Selected barometric setting\* for pilot and first officer;
- (viii) Selected altitude for all pilot selectable modes of operation\*;
- (ix) Selected speed for all pilot selectable modes of operation\*;
- (x) Selected Mach for all pilot selectable modes of operation\*;
- (xi) Selected vertical speed for all pilot selectable modes of operation\*;
- (xii) Selected heading for all pilot selectable modes of operation\*;
- (xiii) Selected flight path for all pilot selectable modes of operation\* such as course/desired track and path angle;
- (xiv) Selected decision height\*;
- (xv) EFIS display format\* for pilot and first officer;
- (xvi) Multi-function/engine/alerts display format\*;
- (xvii) Ground Proximity Warning System, Terrain Awareness Warning System and Ground Collision Avoidance System status\* such as selection of terrain display mode including popup display status terrain alerts, both cautions and warnings, and advisories, on/off switch position;
- (xviii) Low pressure warning\* for hydraulic pressure, pneumatic pressure;
- (xix) Computer failure\*;
- (xx) Loss of cabin pressure\*;
- (xxi) Traffic Collision Avoidance System and Air-borne Collision Avoidance System\*;
- (xxii) Ice detection\*;
- (xxiii) Engine warning each engine vibration\*;
- (xxiv) Engine warning each engine over temperature\*;
- (xxv) Engine warning each engine oil pressure low\*;
- (xxvi) Engine warning each engine over speed\*;

- (xxvii) Wind shear warning\*;
  - (xxviii) Operational stall protection, stick shaker and pusher activation\*;
  - (xxix) All cockpit flight control input forces\* such as control wheel, control column, rudder pedal cock-pit input forces;
  - (xxx) Vertical deviation\* such as Instruments Landing System glide path, Microwave Landing System elevation, Global Navigation Satellite System approach path;
  - (xxxi) Horizontal deviation\* such as Instruments Landing System localizer, Microwave Landing System azimuth, Global Navigation Satellite approach path;
  - (xxxii) DME 1 and 2 distances\*;
  - (xxxiii) Primary navigation system reference\* such as Global Navigation Satellite, Inertial Navigation System, Very High Frequency Omni-Range and Distance Measuring Equipment, Instruments Landing System and Microwave Landing System;
  - (xxxiv) Brakes\*such as left and right brake pressure and left and right brake pedal position;
  - (xxxv) Date\*;
  - (xxxvi) Event marker\*;
  - (xxxvii) Head up display in use\*;
  - (xxxviii) Parameter visual display on\*;
- (i) Type IA flight data recorder shall be capable of recording, as appropriate to the aeroplane, at least the 78 parameters in Table 1.
- (j) Type I flight data recorder shall be capable of recording, as appropriate to the aeroplane, at least the first 32 parameters in Table 1.
- (k) Types II and IIA flight data recorders shall be capable of recording, as appropriate to the aeroplane, at least the first 16 parameters in Table 1.
- (l) The parameters that satisfy the requirements for flight path and speed as displayed to the pilots are listed below.

The parameters without an (\*) are mandatory parameters which shall be recorded. In addition, the parameters designated by an (\*) shall be recorded if an information source for the parameter is displayed to the pilot and is practicable to record:

- (i) Pressure altitude;
- (ii) Indicated airspeed or calibrated airspeed;
- (iii) Heading from primary flight crew reference;

- (iv) Pitch attitude;
  - (v) Roll attitude;
  - (vi) Engine thrust/power;
  - (vii) Landing-gear status\*;
  - (viii) Total or outside air temperature\*;
  - (ix) Time\*;
  - (x) Navigation data\* such as drift angle, wind speed, wind direction, latitude and longitude; and
  - (xi) Radio altitude\*;
- (m) Type IIA flight data recorder, in addition to a 30-minute recording duration, shall retain sufficient information from the preceding take-off for calibration purposes.
- (n) The measurement range, recording interval and accuracy of parameters on installed equipment shall be verified by methods approved by the appropriate certificating authority.
- (o) Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability and maintenance information shall be maintained by the operator. The documentation needs to be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

### 3. Cockpit Voice Recorder and Cockpit Audio Recording System

- (a) Signals to be recorded
- The cockpit voice recorder and cockpit audio recording system shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the CVR and CARS shall start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.
- (b) A cockpit voice recorder shall record on four (4) separate channels, or more, at least the following:
- (i) voice communication transmitted from or received in the aeroplane by radio;
  - (ii) aural environment on the flight deck;
  - (iii) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed;

- (iv) voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and
  - (v) voice communication of flight crew members using the passenger address system, if installed
- (c) A cockpit audio recording system shall record on two (2) separate channels, or more, at least the following:
- (i) voice communication transmitted from or received in the aeroplane by radio;
  - (ii) aural environment on the flight deck; and
  - (iii) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed.
- (d) A cockpit voice recorder shall be capable of recording on at least four (4) channels simultaneously. For tape-based cockpit voice recorder, to ensure accurate time correlation between channels, the cockpit voice recorder is to record in an inline format. Where a bi-directional configuration is used, the inline format and channel allocation shall be retained in both directions.
- (e) The preferred channel allocation shall be as follows:
- (i) Channel 1 — co-pilot headphones and live boom microphone;
  - (ii) Channel 2 — pilot headphones and live boom microphone;
  - (iii) Channel 3 — area microphone; and
  - (iv) Channel 4 — time reference plus the third and fourth crew members' headphone and live microphone, if applicable.

#### **4. Airborne Image Recorder (AIR)**

- (a) A Class A airborne image recorder captures the general cockpit area in order to provide data supplemental to conventional flight recorders.
- (b) A Class B airborne image recorder captures data link message displays.
- (c) A Class C airborne image recorder captures instruments and control panels.
- (d) The airborne image recorder must start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on the availa-

bility of electrical power, the Airborne Image Recorder (AIR) must start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

## 5. Data Link Recorder (DLR)

- (a) Where the aircraft flight path is authorised or controlled through the use of data link messages, all data link messages, both uplinks (to the aircraft) and downlinks (from the aircraft), shall be recorded on the aircraft. As far as practicable, the time the messages were displayed to the flight crew and the time of the responses shall be recorded.
- (b) Messages applying to the applications listed below shall be recorded. Applications without the asterisk (\*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (\*) shall be recorded only as far as is practicable given the architecture of the system.
  - (i) Data link initiation capability;
  - (ii) Controller–pilot data link communications;
  - (iii) Data link – flight information services;
  - (iv) Automatic dependent surveillance – contract;
  - (v) Automatic dependent surveillance – broadcast\*;
  - (vi) Aeronautical operational control\*.
- (c) Description of the data link recorder applications is contained in Table 2.

## 6. Aircraft Data Recording Systems

- (a) Aircraft data recording system shall be capable of recording, as appropriate to the aeroplane, at least the essential (E) parameters in Table 3.
- (b) The measurement range, recording interval and accuracy of parameters on installed equipment is usually verified by methods approved by the appropriate certificating authority.

## 7. Inspections of Flight Recorder Systems

- (a) Prior to the first flight of the day, the built-in test features for the flight recorders and flight data acquisition unit, when installed, shall be monitored by manual or automatic checks.

(b) Annual inspections shall be carried out as follows:

- (i) an analysis of the recorded data from the flight recorders shall ensure that the recorder operates correctly for the nominal duration of the recording;
- (ii) the analysis of the flight data recorder shall evaluate the quality of the recorded data to determine if the bit error rate (including those errors introduced by recorder, the acquisition unit, the source of the data on the aeroplane and by the tools used to extract the data from the recorder) is within acceptable limits and to determine the nature and distribution of the errors;
- (iii) a complete flight from the flight data recorder shall be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention shall be given to parameters from sensors dedicated to the flight data recorder. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems;
- (iv) the readout facility shall have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals;
- (v) an annual examination of the recorded signal on the cockpit voice recorder shall be carried out by replay of the cockpit voice recorder recording. When installed in the aircraft, the cockpit voice recorder shall record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards;
- (vi) where practicable, during the annual examination, a sample of inflight recordings of the cockpit voice recorder shall be examined for evidence that the intelligibility of the signal is acceptable; and
- (vii) an annual examination of the recorded images on the airborne image recorder shall be carried out by replay of the airborne image recorder recording. While installed in the aircraft, the airborne image recorder shall record test images from each aircraft source and from relevant external sources to ensure that all required images meet recording quality standards.

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- (c) Flight recorder systems shall be considered unserviceable if there is a significant period of poor quality data, unintelligible signals, or if one (1) or more of the mandatory parameters is not recorded correctly.
- (d) A report of the annual inspection shall be made available on request to regulatory authorities for monitoring purposes.
- (e) Calibration of the flight data recorder system:
- (i) for those parameters which have sensors dedicated only to the flight data recorder and are not checked by other means, recalibration shall be carried out at least every five years or in accordance with the recommendations of the sensor manufacturer to determine any discrepancies in the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; and
  - (ii) when the parameters of altitude and airspeed are provided by sensors that are dedicated to the flight data recorder system, there shall be a recalibration performed as recommended by the sensor manufacturer, or at least every two (2) years.

**Table 1**  
**Parameter Standards for Flight Data Recorders**

<i>Serial number</i>	<i>Parameter</i>	<i>Measurement range</i>	<i>Maximum sampling and recording interval (seconds)</i>	<i>Accuracy limits (sensor input compared to FDR read-out)</i>	<i>Recording resolution</i>
1	Time (UTC when available, otherwise relative time count or GPS time sync)	24 hours	4	±0.125% per hour	1 second
2	Pressure-altitude	-300 m (-1 000 ft) to maximum certificated altitude of aircraft +1 500 m (+5 000 ft)	1	±30 m to ±200 m (±100 ft to ±700 ft)	1.5 m (5 ft)

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3	Indicated airspeed or calibrated airspeed	95 km/h (50 kt) to max V <sub>So</sub> (Note 1) V <sub>So</sub> to 1.2 VD (Note 2)	1	±5% ±3%	1 kt (0.5 kt recommended)
4	Heading (primary flight crew reference)	360°	1	±2°	0.5°
5	Normal acceleration (Note 3)	-3 g to +6 g	0.125	±1% of maximum range excluding datum error of ±5%	0.004 g
6	Pitch attitude	±75° or usable range whichever is greater	+0.25	±2°	0.5°
7	Roll attitude	±180°	+0.25	±2°	0.5°
8	Radio transmission keying	On-off (one discrete)	1	±2%	
9	Power on each engine (Note 4)	Full range	1 (per engine)		0.2% of full range or the resolution required to operate the aircraft
10*	Trailing edge flap or and cockpit control selection	Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
11*	Leading edge flap or and cockpit control selection	Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
12*	Thrust reverser position	Stowed, in transit, and reverse	1 (per engine)		
13*	Ground spoiler/speed brake	Full range or each	1	±2% unless	0.2% of full range

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	selection (selection and position)	discrete position		higher accuracy uniquely required	
14	Outside air temperature	Sensor range	2	±2°C	0.3°C
15*	Autopilot/auto throttle/AFCS mode and engagement status	A suitable combination of discrettes	1		
16	Longitudinal acceleration (Note 3)	±1 g	0.25	±0.015 g excluding a datum error of 0.05 g	0.004 g
<i>Note.— The preceding 16 parameters satisfy the requirements for a Type II FDR.</i>					
17	Lateral acceleration (Note 3)	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
18	Pilot input and/or control surface position-primary controls (pitch, roll, yaw) (Note 5)	Full range	+0.25	±2° unless higher accuracy uniquely required	0.2% of full range or as installed
18	Pilot input and/or control surface position-primary controls (pitch, roll, yaw) (Note 5)	Full range	+0.25	±2° unless higher accuracy uniquely required	0.2% of full range or as installed
19	Pitch trim position	Full range	1	±3% unless higher accuracy uniquely required	0.3% of full range or as installed
20*	Radio altitude	−6 m to 750 m (−20 ft to 2 500 ft)	1	±0.6 m (±2 ft) or ±3% whichever is greater below 150 m (500 ft) and ±5% above 150 m	0.3 m (1 ft) below 150 m (500 ft.) 0.3 m (1 ft) + 0.5% of full range above 150m (500)

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				(500 ft)	ft)
21*	Vertical beam deviation (ILS/GPS/GLS glide path, MLS elevation, IRNAV/IAN vertical deviation)	Signal range	1	±3%	0.3% of full range
22*	Horizontal beam deviation (ILS/GPS/GLS localizer, MLS azimuth, IRNAV/IAN lateral deviation)	Signal range	1	±3%	0.3% of full range
23	Marker beacon passage	Discrete	1		
24	Master warning	Discrete	1		
25	Each NAV frequency selection ( <i>Note 6</i> )	Full range	4	As installed	25
26*	DME 1 and 2 distance (includes Distance to runway threshold (GLS) and Distance to missed approach point (IRNAV/IAN)) ( <i>Notes 5 and 6 and 7</i> )	0 – 370 km (0 – 200 NM)	4	As installed	1852 m (1 NM)
27	Air/ground status	Discrete	1		
28*	GPWS (ground proximity warning system) /TAWS/GCAS status (selection of terrain display mode including pop-up display status) and (terrain alerts, both cautions and warnings, and advisories) and (on/off switch position)	Discrete	1		
29*	Angle of attack	Full range	0.5	As installed	0.3 % of full range
30*	Hydraulics, each system (low pressure)	Discrete	2		0.5% of full range

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31*	Navigation data (latitude/longitude, ground speed and drift angle) (Note 8)	As installed	1	As installed	
32*	Landing gear and gear selector position	Discrete	4	As installed	
<i>Note.— The preceding 32 parameters satisfy the requirements for a Type I FDR.</i>					
33*	Groundspeed	As installed	1	Data should be obtained from the most accurate system	1 kt
34	Brakes (left and right brake pressure, left and right brake pedal position)	(Maximum metered brake range, discrettes or full range)	1	± 5%	2% of full range
35*	Additional engine parameters (EPR, N1, indicated vibration level, N2, EGT, fuel flow, fuel cut-off lever position, N3)	As installed	Each engine each second	As installed	2% of full range
36*	TCAS/ACAS (traffic alert and collision avoidance system)	Discrete	1	As installed	
37*	Windshear warning	Discrete	1	As installed	
38*	Selected barometric setting (pilot, co-pilot)	As installed	64	As installed	0.1 mb (0.01 in-Hg)
39*	Selected altitude (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all pilot)	As installed	1	As installed	Sufficient to determine crew

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	selectable modes of operation)				selection
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
44*	Selected flight path (all pilot selectable modes of operation) (course/DSTRK, path angle, final approach path (IRNAV/IAN))		1	As installed	
45*	Selected Decision Height	As installed	64	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot, co-pilot)	Discrete(s)	4	As installed	
47*	Multi-function/engine/alerts display format	Discrete(s)	4	As installed	
48*	AC electrical bus status	Discrete(s)	4	As installed	
49*	DC electrical bus status	Discrete (s)	4	As installed	
50*	Engine bleed valve position	Discrete(s)	4	As installed	
51*	APU bleed valve position	Discrete(s)	4	As installed	
52*	Computer failure		Discrete(s)	As installed	
53*	Engine thrust command	As installed	2	As installed	
54*	Engine thrust target	As installed	4	As installed	2% of full range
55*	Computed centre of gravity	As installed	64	As installed 1	% of full range
56*	Fuel quantity in CG trim tank	As installed	64	As installed	1% of full range
57*	Head up display in use	As installed	4	As installed	

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58*	Para visual display on/off	As installed	1	As installed	
59*	Operational stall protection, stick shaker and pusher activation	As installed	1	As installed	
60*	Primary navigation system reference (GNSS, INS, VOR/DME, MLS, Loran C, localizer glideslope)	As installed	4	As installed	
61*	Ice detection	As installed	4	As installed	
62*	Engine warning each engine vibration	As installed	1	As installed	
63*	Engine warning each engine over temperature	As installed	1	As installed	
64*	Engine warning each engine oil pressure low	As installed	1	As installed	
65*	Engine warning each engine over speed	As installed	1	As installed	
66*	Yaw Trim Surface Position	Full range	2	± 3% unless higher accuracy uniquely required	0.3% of full range
67*	Roll Trim Surface Position	Full range	2	± 3% unless higher accuracy uniquely required	0.3% of full range
68*	Yaw or sideslip angle	Full range	1	± 5%	0.5°
69*	De-icing and/or anti-icing systems selection	Discrete(s)	4		
70*	Hydraulic pressure (each system)	Full range	2	± 5%	100 psi
71*	Loss of cabin pressure	Discrete	1		
72*	Cockpit trim control input Position Pitch	Full range	1	± 5%	0.2% of full range or as installed
73*	Cockpit trim control input	Full range	1	± 5%	0.2% of full range or as

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	Position Roll				installed
74*	Cockpit trim control input position Yaw	Full range	1	± 5%	0.2% of full range or as installed
75*	All cockpit flight control input forces (control wheel, control column, rudder pedal)	Full range (±311 N (±70 lbf), ± 378 N (±85 lbf), ± 734 N (±165 lbf))	1	± 5	% 0.2% of full range or as installed
76*	Event marker	Discrete	1		
77*	Date	365 days	64		
78*	ANP or EPE or EPU	As installed	4	As installed	
<i>Note.— The preceding 78 parameters satisfy the requirements for a Type IA FDR.</i>					

Notes.—

1. V<sub>So</sub> stalling speed or minimum steady flight speed in the landing configuration is in Section “Abbreviations and Symbols”.
2. V<sub>D</sub> design diving speed.
3. Refer to 6.3.1.2.11 for increased recording requirements.
4. Record sufficient inputs to determine power.
5. For aeroplanes with conventional control systems in which movement of a control surface will back drive the pilot’s control, “or” applies. For aeroplanes with non-mechanical control systems in which movement of a control surface will not back drive the pilot’s control, “and” applies. In aeroplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately.
6. If signal available in digital form.
7. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.
8. If signals readily available.

If further recording capacity is available, recording of the following additional information should be considered:

- (a) operational information from electronic display systems, such as electronic flight instrument systems (EFIS), electronic centralised aircraft monitor

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(ECAM) and engine indication and crew alerting system (EICAS). Use the following order of priority:

- (i) parameters selected by the flight crew relating to the desired flight path, e.g. barometric pressure setting, selected altitude, selected airspeed, decision height, and auto-flight system engagement and mode indications if not recorded from another source;
  - (ii) display system selection/status, e.g. SECTOR, PLAN, ROSE, NAV, WXR, COMPOSITE, COPY, ETC.;
  - (iii) warnings and alerts;
  - (iv) the identity of displayed pages for emergency procedures and check-lists;
- (b) retardation information including brake application for use in the investigation of landing overruns and rejected take-offs; and
- (c) additional engine parameters (EPR, N1, EGT, fuel flow, etc.).

**Table 2**  
**Description of Applications for Data Link Recorders**

Item No.	Application Type	Application Description	Recording Content
1	Data link Initiation	This includes any applications used to logon to or initiate data link service. In FANS-1/A and ATN, these are ATS Facilities Notification (AFN) and Context Management (CM) respectively.	C
2	Controller/Pilot Communication	This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the CPDLC application. It also includes applications used for the exchange of oceanic (OCL) and departure clearances (DCL) as well as data link delivery of taxi clearances.	C
3	Addressed Surveillance	This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A and ATN, this includes the Automatic Dependent Surveillance (ADS-C) application. Where parametric data are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	C
4	Flight Information	This includes any service used for delivery of flight information to specific aircraft. This includes, for	C

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		example, D-METAR, D-ATIS, D-NOTAM and other textual data link services.	
5	Aircraft Broadcast Surveillance	This includes Elementary and Enhanced Surveillance Systems, as well as ADS-B output data. Where parametric data sent by the aeroplane are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	M *
6	Aeronautical Operational Control Data	This includes any application transmitting or receiving data used for AOC purposes (per the ICAO definition of AOC).	M *
<p>Key:</p> <p>C: Complete contents recorded.</p> <p>M: Information that enables correlation to any associated records stored separately from the aeroplane.</p> <p>*: Applications to be recorded only as far as is practicable given the architecture of the system.</p>			

**Table 3**  
**Parameter Standards for Aircraft Data Recording Systems**

N°	Parameter name	Parameter Category	Minimum Recording Range	Maximum recording interval in seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
1	Heading (Magnetic or True)	R*	±180 degrees	1	±2 degrees	0.5 degree	*If not available, record rates
2	Pitch attitude	E*	±90 degrees	0.25	±2 degrees	0.5 degree	* If not available, record rates
3	Roll attitude	E*	±180 degrees	0.25	±2 degrees	0.5 degree	* If not available, record rates
4	Yaw rate	E*	±300 degrees/s	0.25	±1% + drift of 360°/hr	2 degree/s	* Essential if no heading available
5	Pitch rate	E*	±300 degrees/s	0.25	±1% + drift of 360°/hr	2 degree/s	* Essential if no pitch attitude available
6	Roll rate	E*	±300 degrees/s	0.25	±1% + drift of 360°/hr	2 degree/s	* Essential if no roll

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							attitude available
7	Positioning system: latitude/longitude	E	Latitude:± 90 degrees Longitude:± 180 Degrees	<b>2 (1 if available)</b>	As installed (0.00015 degree recommended)	0.00005 degree	
8	Positioning system estimated error	E*	Available range	<b>2 (1 if available)</b>	As installed	As installed	* If available
9	Positioning system: altitude	E	-300 m (-1 000 ft) to maximum certificated altitude of aeroplane + 1 500 m (5 000 ft)	<b>2 (1 if available)</b>	As installed (±15 m (±50 ft) recommended)	1.5 m (5 ft)	
10	Positioning system: time*	E	24 hours	<b>1</b>	±0.5 second	0.1 second	* UTC time preferred where available.
11	Positioning system: ground speed	E	0 - 1000 kt 2 (1 if available)	<b>As installed (±5kt recommended)</b>	1 kt		
12	Positioning system: channel	E	0 - 360 degrees	<b>2 (1 if available)</b>	As installed (± 2 degrees recommended)	0.5 degrees	
13	Normal acceleration	E	- 3 g to + 6 g (*)	<b>0.25 (0.125 if available)</b>	As installed (± 0.09 g excluding a datum error of ±0.45 g recommended)	0.004 g	
14	Longitudinal acceleration	E	±1 g (*)	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
15	Lateral acceleration	E	±1 g (*)	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
16	External static pressure (or pressure altitude)	R	34.4 mb (3.44 in-Hg) to 310.2 mb (31.02 in-Hg) or available sensor range	<b>1</b>	As installed (±1 mb (0.1 in-Hg) or ±30 m (±100 ft) to ±210 m (±700 ft) recommended - refer to table IIA. 2)	0.1 mb (0.01 in-Hg) or 1.5 m (5 ft)	

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17	Outside air temperature (or total air temperature)	R	-50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
18	Indicated air speed	R	As the installed Pilot display measuring system or available sensor range	1	As installed (±3 % recommended)	1 kt (0.5 kt recommended)	
19	Engine RPM	R	Full range including overspeed condition	Each engine Each second	As installed	0.2% of full range	
20	Engine oil pressure	R	Full range	Each engine Each second	As installed (5% of full range recommended)	2% of full range	
21	Engine oil temperature	R	Full range	Each engine Each second	As installed (5% of full range recommended)	2% of full range	
22	Fuel flow or pressure	R	Full range	Each engine Each second	As installed	2% of full range	
23	Manifold pressure	R	Full range	Each engine Each second	As installed	0.2% of full range	
24	Engine thrust/power/torque parameters required to determine propulsive thrust/power*	R	Full range	Each engine Each second	As installed	0.1% of full range	* Sufficient parameters e.g. EPR/N1 or torque / Np as appropriate to the particular engine shall be recorded to determine power in both normal and reverse thrust. A margin for possible over speed should be provided.
25	Engine gas generator speed (Ng)	R	0-150%	Each engine Each second	As installed	0.2% of full range	

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26	Free power turbine speed (Nf)	R	0-150%	Each engine Each second	As installed	0.2% of full range	
27	Coolant temperature	R	Full range	1	As installed ( $\pm 5^{\circ}\text{C}$ recommended)	1 degree Celsius	
28	Main voltage	R	Full range	Each engine Each second	As installed	1 Volt	
29	Cylinder head temperature	R	Full range	Each cylinder Each second	As installed	2% of full range	
30	Flaps position	R	Full range or each discrete position	2	As installed	0.5 degree	
31	Primary flight control surface position	R	Full range	0.25	As installed	0.2 % of full range	
32	Fuel quantity	R	Full range	4	As installed	1% of full Range	
33	Exhaust gas temperature	R	Full range	Each engine Each second	As installed	2% of full Range	
34	Emergency voltage	R	Full range	Each engine Each second	As installed	1 Volt	
35	Trim surface position	R	Full range or each discrete position	1	As installed	0.3 % of full range	
36	Landing gear position	R	Each discrete position*	Each gear every two seconds	As installed	* Where available, record up-and locked and down and-locked position	
37	Novel/unique aircraft features	R	As required	As required	As required	As required	
Key: E: Essential parameters. R: Recommended parameters							

**PART B***[Regulation 32]*

The following are the flight recorders standards for helicopters under regulation 32.

**1. General requirements**

- (a) The flight recorder systems containers shall:
  - (i) be painted a distinctive orange or yellow colour;
  - (ii) carry reflective material to facilitate their location; and
  - (iii) have securely attached an automatically activated under-water locating device.
  
- (b) The flight recorder systems shall be installed so that:
  - (i) the probability of damage to the recordings is minimised;
  - (ii) they receive electrical power from a bus that provides the maximum reliability for operation of the flight recorder systems without jeopardising service to essential or emergency loads;
  - (iii) there is an aural or visual means for pre-flight checking that the flight recorder systems are operating properly; and
  - (iv) if the flight recorder systems have a bulk erasure device, the installation shall be designed to prevent operation of the device during flight time or crash impact.
  
- (c) The flight recorder systems, when tested by methods approved by the appropriate certificating authority, shall be demonstrated to be suitable for the environmental extremes over which they are designed to operate.
  
- (d) Means shall be provided for an accurate time correlation between the flight recorder systems functions.
  
- (e) The manufacturer usually provides the appropriate certificating authority with the following information in respect of the flight recorder systems:
  - (i) manufacturer's operating instructions, equipment limitations and installation procedures; and
  - (ii) manufacturer's test reports.

## 2. Flight data recorder

- (a) The flight data recorder shall start to record prior to the helicopter moving under its own power and record continuously until the termination of the flight when the helicopter is no longer capable of moving under its own power.
- (b) Flight data recorders for helicopters shall be classified as Type IV, IVA and V depending upon the number of parameters to be recorded.
- (c) The parameters that satisfy the requirements for Types IV, IVA and V flight data recorders, are listed in the paragraphs below.
- (d) The number of parameters to be recorded shall depend on helicopter complexity. The parameters without an asterisk (\*) are mandatory parameters which shall be recorded regardless of helicopter complexity. In addition, the parameters designated by an asterisk (\*) shall be recorded if an information data source for the parameter is used by helicopter systems or the flight crew to operate the helicopter. However, other parameters may be substituted with due regard to the helicopter type and the characteristics of the recording equipment.
- (e) The following parameters shall satisfy the requirements for flight path and speed:
  - (i) Pressure altitude;
  - (ii) Indicated airspeed;
  - (iii) Outside air temperature;
  - (iv) Heading;
  - (v) Normal acceleration;
  - (vi) Lateral acceleration;
  - (vii) Longitudinal acceleration (body axis);
  - (viii) Time or relative time count;
  - (ix) Navigation data\* such as drift angle, wind speed, wind direction, latitude and longitude; and
  - (x) Radio altitude\*.
- (f) The following parameters shall satisfy the requirements for attitude:
  - (i) Pitch attitude;
  - (ii) Roll attitude; and
  - (iii) Yaw rate.
- (g) The following parameters shall satisfy the requirements for engine power:

- (i) Power on each engine such as free power turbine speed (Nf), engine torque, engine gas generator speed (Ng), cockpit power control position;
  - (ii) Rotor such as main rotor speed, rotor brake;
  - (iii) Main gearbox oil pressure\*;
  - (iv) Gearbox oil temperature\*such as main gearbox oil temperature, intermediate gearbox oil temperature, tail rotor gearbox oil temperature;
  - (v) Engine exhaust gas temperature (T4)\*;
  - (vi) Turbine inlet temperature (TIT)\*.
- (h) The following parameters shall satisfy the requirements for operation:
- (i) Hydraulics low pressure;
  - (ii) Warnings;
  - (iii) Primary flight controls such as pilot input and/or control output position: collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal, controllable stabilator and hydraulic selection;
  - (iv) Marker beacon passage;
  - (v) Each navigation receiver frequency selection;
  - (vi) Auto flight control systems mode and engagement status\*;
  - (vii) Stability augmentation system engagement\*;
  - (viii) Indicated sling load force\*;
  - (ix) Vertical deviation\* such as instruments landing system glide path, microwave landing system elevation, global navigation system approach path;
  - (x) Horizontal deviation\* such as instrument landing system localizer, microwave landing system azimuth, global navigation satellite system approach path;
  - (xi) Distance measuring equipment 1 and 2 distances\*;
  - (xii) Altitude rate\*;
  - (xiii) Ice detector liquid water content\*;
  - (xiv) Helicopter health and usage monitor system\* such as engine data, chip detectors, channel timing, exceedance discretets, broadband average engine vibration.
- (i) The following parameters shall satisfy the requirements for configuration:
- (i) Landing gear or gear selector position\*;
  - (ii) Fuel contents\*;
  - (iii) Ice detector liquid water content\*.

*Note.* — *Parameter guidance for range, sampling, accuracy and resolution are as contained in the EUROCAE ED-112, Minimum Operational Performance Specifications (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.*

- (j) A Type IVA flight data recorder shall be capable of recording, as appropriate to the helicopter, at least the 48 parameters in Table 1.
- (k) A Type IV flight data recorder shall be capable of recording, as appropriate to the helicopter, at least the first 30 parameters in Table 1.
- (l) A Type V flight data recorder shall be capable of recording, as appropriate to the helicopter, at least the first 15 parameters in Table 1.
- (m) If further recording capacity is available, recording of the following additional information shall be considered -
  - (i) additional operational information from electronic displays, such as Electronic Flight Instrument Systems (EFIS); Electronic Centralised Aircraft Monitor (ECAM) and Engine Indication and Crew Alerting System (EICAS); and
  - (ii) additional engine parameters (EPR, N1, fuel flow, etc.).
- (n) The measurement range, recording interval and accuracy of parameters on installed equipment is usually verified by methods approved by the appropriate certificating authority.
- (o) Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability and maintenance information shall be maintained by the operator/owner. The documentation shall be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

### **3. Cockpit Voice Recorder**

- (a) The cockpit voice recorder shall start to record prior to the helicopter moving under its own power and record continuously until the termination of the flight when the helicopter is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the CVR shall start to record as early as possible during the cockpit checks prior to engine start at the

beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

- (b) A cockpit voice recorder shall record on four (4) separate channels, or more, at least the following:
- (i) voice communication transmitted from or received in the aircraft by radio;
  - (ii) aural environment on the flight deck;
  - (iii) voice communication of flight crew members on the flight deck using the interphone system, if installed;
  - (iv) voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and
  - (v) voice communication of flight crew members using the passenger address system, if installed.
- (c) A cockpit voice recorder shall be capable of recording on at least four channels simultaneously. For tape-based cockpit voice recorder, to ensure accurate time correlation between channels, the cockpit voice recorder shall record in an in-line format. If a bi-directional configuration is used, the inline format and channel allocation shall be retained in both directions.
- (d) The preferred channel allocation shall be as follows:
- (i) Channel 1 — co-pilot headphones and live boom microphone;
  - (ii) Channel 2 — pilot headphones and live boom microphone;
  - (iii) Channel 3 — area microphone; and
  - (iv) Channel 4 — time reference, main rotor speed or the flight deck vibration environment, the third and fourth crew member's headphone and live microphone, if applicable.

*Note 1. — Channel 1 is located closest to the base of the recording head.*

*Note 2.— The preferred channel allocation presumes use of current conventional magnetic tape transport mechanisms and is specified because the outer edges of the tape have a higher risk of damage than the middle. It is not intended to preclude use of alternative recording media where such constraints may not apply.*

#### 4. Airborne Image Recorder (AIR)

- (a) A Class 'A' airborne image recorder captures the general cockpit area in order to provide data supplemental to conventional flight recorders.

*Note 1.— To respect crew privacy, the cockpit area view may be designed as far as practical to exclude the head and shoulders of crew members whilst seated in their normal operating position.*

*Note 2. — There are no provisions for Class A AIRs in this document.*

- (b) A Class 'B' airborne image recorder captures data link message displays.
- (c) A Class 'C' airborne image recorder captures instruments and control panels.

*Note. — It may be considered as a means for recording flight data where it is not practical or prohibitively expensive to record on an FDR, or where an FDR is not required.*

- (d) An airborne image recorder will start to record prior to the helicopter moving under its own power and record continuously until the termination of the flight when the helicopter is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the AIR will start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

#### 5. Data Link Recorder (DLR)

- (a) Where the helicopter flight path is authorised or controlled through the use of data link messages, all data link messages, both uplinks (to the helicopter) and downlinks (from the helicopter), shall be recorded on the helicopter. As far as practicable, the time the messages were displayed to the flight crew and the time of the responses shall be recorded.

*Note. — Sufficient information to derive the content of the data link communications message and the time the messages were displayed to the flight crew is needed to determine an accurate sequence of events on board the aircraft.*

- (b) Messages applying to the applications listed below shall be recorded. Applications without the asterisk (\*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (\*) are to be recorded only as far as is practicable given the architecture of the system.
- (i) Data link initiation capability;
  - (ii) Controller – pilot data link communications;
  - (iii) Data link – flight information services;
  - (iv) Automatic dependent surveillance – contract;
  - (v) Automatic dependent surveillance – broadcast\*;
  - (vi) Aeronautical operational control\*.
- (c) Descriptions of the data link recorders applications are contained in Table 2.

## 6. Inspections of Flight Recorder Systems

- (a) Prior to the first flight of the day, the built-in test features for the flight recorders and flight data acquisition unit, when installed, shall be monitored by manual and/or automatic checks.
- (b) Annual inspections shall be carried out as follows:
- (i) an analysis of the recorded data from the flight recorders shall ensure that the recorder operates correctly for the nominal duration of the recording;
  - (ii) the analysis of the flight data recorder shall evaluate the quality of the recorded data to determine if the bit error rate (including those errors introduced by recorder, the acquisition unit, the source of the data on the helicopter and by the tools used to extract the data from the recorder) is within acceptable limits and to determine the nature and distribution of the errors;
  - (iii) a complete flight from the flight data recorder shall be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention shall be given to parameters from sensors dedicated to the flight data recorder. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems;

- (iv) the readout facility shall have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals;
  - (v) an annual examination of the recorded signal on the cockpit voice recorder shall be carried out by replay of the cockpit voice recorder recording. While installed in the aircraft, the cockpit voice recorder shall record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards;
  - (vi) where practicable, during the annual examination, a sample of inflight recordings of the cockpit voice recorder shall be examined for evidence that the intelligibility of the signal is acceptable; and
  - (vii) an annual examination of the recorded images on the airborne image recorder shall be carried out by replay of the airborne image recorder recording. While installed in the aircraft, the airborne image recorder shall record test images from each aircraft source and from relevant external sources to ensure that all required images meet recording quality standards.
- (c) Flight recorder systems shall be considered unserviceable if there is a significant period of poor quality data, unintelligible signals, or if one or more of the mandatory parameters is not recorded correctly.
- (d) A report of the annual inspection shall be made available on request to regulatory authorities for monitoring purposes.
- (e) Calibration of the flight data recorder system:
- (i) for those parameters which have sensors dedicated only to the flight data recorder and are not checked by other means, recalibration shall be carried out at least every five (5) years or in accordance with the recommendations of the sensor manufacturer to determine any discrepancies in the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; and
  - (ii) when the parameters of altitude and airspeed are provided by sensors that are dedicated to the flight data recorder system, there shall be a recalibration performed as recom-

mended by the sensor manufacturer, or at least every two (2) years.

**Table 1**  
**Parameter Standards for Flight Data Recorders**

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
1	Time (UTC when available, otherwise relative time count or GPS time sync)	24 hours	4	±0.125% per hour	1 second
2	Pressure-altitude	-300 m (-1 000 ft) to maximum certificated altitude of aircraft +1 500 m (+5 000 ft)	1	±30 m to ±200 m (±100 ft to ±700 ft)	1.5 m (5 ft)
3	Indicated airspeed	As the installed pilot display measuring system	1	±3%	1 kt
4	Heading	360°	1	±2°	0.5°
5	Normal acceleration	-3 g to +6 g	0.125	±0.09 g excluding a datum error of ±0.045 g	0.004 g
6	Pitch attitude	±75° or 100% of useable range whichever is greater	0.5	±2°	0.5°
7	Roll attitude	±180°	0.5	±2°	0.5°
8	Radio transmission keying	On-off (one discrete)	1	—	—
9	Power on each engine	Full range	1 (per engine)	±2%	0.1% of full range
10*	Main rotor: Main rotor speed Rotor brake	50–130% Discrete	0.51	±2% —	0.3% of full range —
11*	Pilot input and/or control surface position — primary controls (collective pitch, longitudinal cyclic pitch,	Full range	0.5	(0.25 recommended) ±2% unless higher accuracy uniquely required	0.5% of operating range

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	lateral cyclic pitch, tail rotor pedal)				
12	Hydraulics, each system (low pressure and selection)	Discrete	1	—	—
13	Outside air temperature	Sensor range	2	±2°C	0.3°C
14*	Autopilot/ autothrottle/AFCS mode and engagement status	A suitable combination of discretes	1	—	—
15*	Stability augmentation system engagement	Discrete	1	—	—
<i>Note.— The preceding 15 parameters satisfy the requirements for a Type V FDR.</i>					
16*	Main gearbox oil pressure	As installed	1	As installed	6.895 kN/m <sup>2</sup> (1 psi)
17*	Main gearbox oil temperature	As installed	2	As installed	1°C
18	Yaw	±400°/second	0.25	rate ±1.5% maximum range excluding datum error of ±5%	±2°/s
19*	Sling load force	0 to 200% of certified load	0.5	±3% of maximum range	0.5% for maximum certified load
20	Longitudinal acceleration	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
21	Lateral acceleration	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
22*	Radio altitude	−6 m to 750 m (−20 ft to 2 500 ft)	1	±0.6 m (±2 ft) or ±3% whichever is greater below 150 m (500 ft) and ±5% above 150 m (500 ft)	0.3 m (1 ft) below 150 m (500 ft), 0.3 m (1 ft) + 0.5% of full range above 150 m (500 ft)
23*	Vertical beam deviation	Signal range	1	±3%	0.3% of full range
24*	Horizontal beam deviation	Signal range	1	±3%	0.3% of full range

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25	Marker beacon passage	Discrete	1	—	—
26	Warnings	Discrete(s)	1	—	—
27	Each navigation receiver frequency selection	Sufficient to determine selected frequency	4	As installed	—
28*	DME 1 and 2 distances	0–370 km(0–200 NM)	4	As installed	1 852 m (1 NM)
29*	Navigation data (latitude/longitude, ground speed, drift angle, wind speed, wind direction)	As installed	2	As installed	As installed
30*	Landing gear and gear selector position	Discrete	4	—	—
<i>Note.— The preceding 30 parameters satisfy the requirements for a Type IV FDR.</i>					
31*	Engine exhaust gas temperature (T4)	As installed	1	As installed	
32*	Turbine inlet temperature (TIT/ITT)	As installed	1	As installed	
33*	Fuel contents	As installed	4	As installed	
34*	Altitude rate	As installed	1	As installed	
35*	Ice detection	As installed	4	As installed	
36*	Helicopter health and usage monitor system	As installed	—	As installed	—
37	Engine control modes	Discrete	1	—	—
38*	Selected barometric setting (pilot and co-pilot)	As installed	64 (4 recommended)	As installed	0.1 mb (0.01 in Hg)
39*	Selected altitude (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine

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	operation)				crew selection
44*	Selected flight path (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
45*	Selected decision height	As installed	4	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot and co-pilot)	Discrete(s)	4	—	—
47*	Multi-function/ engine/alerts display format	Discrete(s)	4	—	—
48*	Event marker	Discrete	1	—	—
<i>Note.— The preceding 48 parameters satisfy the requirements for a Type IVA FDR.</i>					

**Table 2**  
**Description of Applications for Data Link Recorders**

Item No.	Application Type	Application Description	Recording Content
1	Data link Initiation	This includes any applications used to logon to or initiate data link service. In FANS-1/A and ATN, these are ATS Facilities Notification (AFN) and Context Management (CM) respectively.	C
2	Controller/Pilot Communication	This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the CPDLC application. It also includes applications used for the exchange of oceanic (OCL) and departure clearances (DCL) as well as data link delivery of taxi clearances.	C
3	Addressed Surveillance	This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A and ATN, this includes the Automatic Dependent Surveillance (ADS-C) application. Where parametric data are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	C
4	Flight Information	This includes any service used for delivery of flight information to specific aircraft. This includes, for example, D-METAR, D-ATIS, D-NOTAM and other textual data link services.	C

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5	Aircraft Broadcast Surveillance	This includes Elementary and Enhanced Surveillance Systems, as well as ADS-B output data. Where parametric data sent by the aeroplane are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	M *
6	Aeronautical Operational Control Data	This includes any application transmitting or receiving data used for AOC purposes (per the ICAO definition of AOC).	M *
<p>Key:  C: Complete contents recorded.  M: Information that enables correlation to any associated records stored separately from the aeroplane.  *: Applications to be recorded only as far as is practicable given the architecture of the system.”</p>			

### SCHEDULE 3

(Regulation 37)

#### PART A

Where an aeroplane has the seating capacity specification under column 1, it shall have the corresponding fire extinguisher under column 2 on board.

<b>Passenger Seating</b>	<b>Minimum Number of Hand Fire Extinguishers Capacity</b>
30 through 60	2
61 through 200	3
201 through 300	4
301 through 400	5
401 through 500	6
501 through 600	7
601 or more	8

(Regulation 42)

#### PART B

Where an aeroplane has the seating capacity specified under column 1, it shall have the corresponding first aid kits under column 2 on board.

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Number of passenger seats installed	Number of first-aid kits required
0 to 99	1
100 to 199	2
200 to 299	3
300 and more	4

#### SCHEDULE 4

(Regulation 71)

#### IMPLEMENTING STANDARDS

The following standards are numbered to correspond numerically to the relevant provisions in the regulations:

##### *Regulation 12*

#### **Category II: Instruments and Equipment Approval and Maintenance Requirements**

1. The instruments and equipment required by regulation 12 shall be approved as provided in this implementing standard before being used in Category II operations. Before presenting an aircraft for approval of the instruments and equipment, it must be shown that since the beginning of the 12th month before the date of submission—

- (a) the ILS localizer and glide slope equipment was bench checked according to the manufacturer's instructions and found to meet those standards specified in Radio Technical Commission for Aeronautics Paper 23-63/DO-177 dated March 14, 1963, "Standards Adjustment Criteria for Airborne Localizer and Glide slope Receivers."
- (b) the altimeters and the static pressure systems were tested and inspected; and
- (c) all other instruments and items of equipment specified in regulation 12 that are listed in the proposed maintenance programme were bench checked and found to meet the manufacturer's specifications.

2. All components of the flight control guidance system shall be approved as installed by the evaluation programme specified in paragraph 5 if they have not been approved for Category III operations under applicable type or supplemental type certification procedures. In addition, subsequent changes to make, model, or design of the components must be approved under this paragraph. Related systems or devices, such as the auto-throttle and computed missed approach guidance system, shall be approved in the same manner if they are to be used for Category II operations.

3. A radio altimeter must meet the following performance criteria of this paragraph for original approval and after each subsequent alteration—

- (a) it shall display to the flight crew clearly and positively the wheel height of the main landing gear above the terrain;
- (b) it shall display wheel height above the terrain to an accuracy of  $\pm 5$  feet or 5 percent, whichever is greater, under the following conditions:
  - (i) pitch angles of zero to  $\pm 5^\circ$  about the mean approach attitude;
  - (ii) all angles of zero to  $20^\circ$  in either direction;
  - (iii) forward velocities from minimum approach speed up to 200 knots; and
  - (iv) sink rates from zero to 15 feet per second at altitudes from 100 to 200 feet;
- (c) over level ground, it must track the actual altitude of the aircraft without significant lag or oscillation;
- (d) with the aircraft at an altitude of two hundred feet (200 ft) or less, any abrupt change in terrain representing no more than 10 percent (10%) of the aircraft's altitude must not cause the altimeter to unlock, and indicator response to such changes must not exceed 0.1 seconds and, in addition, if the system unlocks for greater changes, it must reacquire the signal in less than one (1) second;
- (e) systems that contain a push to test feature must test the entire system (with or without an antenna) at a simulated altitude of less than five hundred feet (500 ft); and
- (f) the system must provide to the flight crew a positive failure warning display any time there is a loss of power or an absence of ground return signals within the designed range of operating altitudes;

4. All other instruments and items of equipment required by regulation 12 shall be capable of performing as necessary for Category II operations. Approval is also required after each subsequent alteration to these instruments and items of equipment.

5. Evaluation programme.

- (a) approval by evaluation is requested as a part of the application for approval of the Category II manual;
- (b) unless otherwise authorised by the Authority, the evaluation programme for each

aircraft requires the demonstrations specified in this paragraph. At least 50 ILS approaches shall be flown with at least five (5) approaches on each of three different ILS facilities and no more than one half of the total approaches on any one ILS facility. All approaches shall be flown under simulated instrument conditions to a 100 foot decision height and 90 percent (90%) of the total approaches made shall be successful. A successful approach is one in which—

- (i) at the 100 foot decision height, the indicated airspeed and heading are satisfactory for a normal flare and landing (speed must be  $\pm 5$  knots of programmed airspeed, but may not be less than computed threshold speed if auto-throttles are used);
  - (ii) the aircraft at the 100 foot decision height, is positioned so that the cockpit is within, and tracking so as to remain within, the lateral confines of the runway extended;
  - (iii) deviation from glide slope after leaving the outer marker does not exceed 50 percent (50%) of full-scale deflection as displayed on the ILS indicator;
  - (iv) no unusual roughness or excessive attitude changes occur after leaving the middle marker; and
  - (v) in the case of an aircraft equipped with an approach coupler, the aircraft is sufficiently in trim when the approach coupler is disconnected at the decision height to allow for the continuation of a normal approach and landing;
- (c) during the evaluation programme the following records of information shall be maintained by the applicant for the aircraft with respect to each approach and made available to the Authority upon request:
- (i) each deficiency in airborne instruments and equipment that prevented the initiation of an approach;
  - (ii) the reasons for discontinuing an approach, including the altitude above the runway at which it was discontinued;
  - (iii) speed control at the 100 foot DH if auto throttles are used;
  - (iv) trim condition of the aircraft upon disconnecting the auto coupler with respect to continuation to flare and landing;
  - (v) position of the aircraft at the middle marker and at the decision height indicated both on a diagram of the basic ILS display and a diagram of the runway extended to the middle marker. Estimated touchdown point shall be indicated on the runway diagram;

- (vi) compatibility of flight director with the auto coupler, if applicable; and
  - (vii) quality of overall system performance;
- (d) a final evaluation of the flight control guidance system is made upon successful completion of the demonstrations. If no hazardous tendencies have been displayed or are otherwise known to exist, the system is approved as installed.

6. Each maintenance programme for Category II instruments and equipment shall contain the following:

- (a) a list of each instrument and item of equipment specified in regulation 12 that is installed in the aircraft and approved for Category II operations, including the make and model of those specified in regulation 12;
- (b) a schedule that provides for the performance of inspections under sub-paragraph (e) of this paragraph within three (3) months after the date of the previous inspection. The inspection shall be performed by a person authorised by the Civil Aviation Airworthiness Regulations, except that each alternate inspection may be replaced by a functional flight check. This functional flight check shall be performed by a pilot holding a Category II pilot authorisation for the type aircraft checked;
- (c) a schedule that provides for the performance of bench checks for each listed instrument and item of equipment that is specified in regulation 12 within twelve (12) months after the date of the previous bench check;
- (d) a schedule that provides for the performance of a test and inspection of each static pressure system within twelve (12) months after the date of the previous test and inspection;
- (e) the procedures for the performance of the periodic inspections and functional flight checks to determine the ability of each listed instrument and item of equipment specified in regulation 12 to perform as approved for Category II operations including a procedure for recording functional flight checks;
- (f) a procedure for assuring that the pilot is informed of all defects in listed instruments and items of equipment;
- (g) a procedure for assuring that the condition of each listed instrument and item of equipment upon which maintenance is performed is at least equal to its Category II approval condition before it is returned to service for Category II operations; and
- (h) a procedure for an entry in the maintenance records that shows the date, airport, and reasons for each discontinued Category II operation because of a malfunction of a listed instrument or item of equipment.

7. A bench check required by this section shall comply with the following paragraph:

- (a) except as specified in paragraph (b) of this sub-section, it shall be performed by a certified repair station holding one of the following ratings as appropriate to the equipment checked:
  - (i) an instrument rating; and
  - (ii) an avionics rating;
- (b) it shall be performed by a certified air operator on aircraft identified in its approved specific operating provisions with the approved authorisations to perform maintenance and approve for return to service its own aircraft maintained under a continuous maintenance programme under an equivalent system identified in the Civil Aviation Air Operator Certification and Administration Regulations;
- (c) it shall consist of removal of an instrument or item of equipment and performance of the following:
  - (i) a visual inspection for cleanliness, impending failure, and the need for lubrication, repair, or replacement of parts;
  - (ii) correction of items found by that visual inspection; and
  - (iii) calibration to at least the manufacturer's specifications unless otherwise specified in the approved Category II manual for the aircraft in which the instrument or item of equipment is installed.

8. After the completion of one maintenance cycle of twelve (12) months, a request to extend the period for checks, tests, and inspections is approved if it is shown that the performance of particular equipment justifies the requested extension.

### **Regulation 35**

#### **Emergency Exit Equipment**

1. The assisting means for a floor level emergency exit shall meet the requirements under which the aeroplane was type certified.

2. The location of each passenger emergency exit shall be—

- (a) recognisable from a distance equal to the width of the cabin; and
- (b) indicated by a sign visible to occupants approaching along the main passenger aisle.

**3.** There shall be an emergency exit locating sign—

- (a) 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;
- (b) next to each floor level passenger emergency exit, except that one (1) sign may serve two (2) such exits if they both can be seen readily from that sign; and
- (c) 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.

**4.** Each passenger emergency exit marking and each locating sign shall be manufactured to meet the interior emergency exit marking requirements under which the aeroplane was type certified, unless the Authority cites different requirements for compliance with this paragraph.

*Note: No sign may continue to be used if its luminescence or brightness decreases to below two hundred and fifty (250) microlamberts.*

**5.** Sources of general cabin illumination may be common to both the emergency and the main lighting systems if the power supply to the emergency light system is independent of the power supply to the main lighting system.

**6.** The emergency lighting system shall 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 footcandles.

**7.** Each emergency light shall—

- (a) be operable manually both from the flight crew station and from a point in the passenger compartment that is readily accessible to a normal flight attendant seat;
- (b) have a means to prevent inadvertent operation of the manual controls;
- (c) when armed or turned on at either station, remain lighted or become lighted upon interruption of the aeroplane's normal electric power; and
- (d) provide the required level of illumination for at least ten (10) minutes at the critical ambient conditions after emergency landing.

**8.** Have a cockpit control device that has an “on”, “off”, and “armed” position.

**9.** The location of each passenger emergency exit operating handle and instructions for opening the exit shall be shown in accordance with the requirements under which the aeroplane was type

certified, unless the Authority cites different requirements for compliance with this paragraph.

**10.** No operating handle or operating handle cover may continue to be used if its luminescence or brightness decreases to below one hundred (100) microlamberts.

**11.** Access to emergency exits shall be provided as follows for each passenger carrying aeroplane:

- (a) each passageway between individual passenger areas, or leading to a Type I or Type II emergency exit, shall be unobstructed and at least twenty (20) inches wide;
- (b) there shall be enough space next to each Type I or Type II emergency exit to allow a crew member to assist in the evacuation of passengers without reducing the unobstructed width of the passageway below that required in paragraph (a) of this section;
- (c) there shall be access from the main aisle to each Type III and Type IV exit. The access from the aisle to these exits shall not be obstructed by seats, berths, or other protrusions in a manner that would reduce the effectiveness of the exit. In addition, the access shall meet the emergency exit access requirements under which the aeroplane was type certified, unless the Authority cites different requirements for compliance with this paragraph;
- (d) 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 shall not be obstructed. However, curtains may be used if they allow free entry through the passageway;
- (e) no door may be installed in any partition between passenger compartments; and
- (f) 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 shall have a means to latch it in open position, and the door shall be latched open during each take-off and landing.
- (g) The latching means shall be able to withstand the loads imposed upon it when the door is subjected to the ultimate inertia forces, relative to the surrounding structure, prescribed in the airworthiness standards for type certification in the transport category as cited by the Authority.

**12.** Each passenger emergency exit and the means of opening that exit from the outside shall be marked on the outside of the aeroplane with a 2-inch coloured band outlining the exit on the side of the fuselage.

**13.** Each passenger emergency exit marking, including the band, shall be readily distinguishable from the surrounding fuselage area by contrast in colour and shall comply with the following:

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- (a) if the reflectance of the darker colour is 15 percent (15%) or less, the reflectance of the lighter colour shall be at least 45 percent (45%);
- (b) if the reflectance of the darker colour is greater than 15 percent (15%), at least a 30 percent (30%) difference between its reflectance and the reflectance of the lighter colour shall be provided; and

Note: *“Reflectance” is the ratio of the luminous flux reflected by a body to the luminous flux it receives.*

- (c) exits that are not in the side of the fuselage shall have external means of opening and applicable instructions marked conspicuously in red or, if red is inconspicuous against the background colour, 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 shall be provided on the other side.

**14.** Each passenger-carrying aeroplane shall be equipped with exterior lighting that meets the requirements under which that aeroplane was type certified, unless the Authority cites different requirement for compliance with this paragraph.

**15.** Each passenger-carrying aeroplane shall be equipped with a slip-resistant escape route that meets the requirements under which that aeroplane was type certified, unless the Authority cites different requirements for compliance with this paragraph.

**16.** 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 forty-four (44) or more inches high and twenty (20) or more inches wide, but not wider than forty-six (46) inches, each passenger ventral exit and each tail cone exit, shall meet the requirements of this section for floor level emergency exits.

Note 1. *The Authority may grant a deviation from this paragraph if he finds that circumstances make full compliance impractical and that an acceptable level of safety has been achieved.*

Note 2. *Approved emergency exits in the passenger compartments that are in excess of the minimum number of required emergency exits shall meet all of the applicable provisions of this subsection section and shall be readily accessible.*

**17.** On each large passenger-carrying turbojet powered aeroplane each ventral exit and tail cone exit shall be—

- (a) designed and constructed so that it cannot be opened during flight; and
- (b) marked with a placard readable from a distance of thirty (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.

**Regulation 43****Oxygen Storage and Dispensing Apparatus**

1. The supplemental oxygen supply requirements for non-pressurised aircraft are as follows:

- (a) each member of the flight crew on flight deck duty shall be supplied with supplemental oxygen in accordance with Table 1. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply then they shall be considered as flight crew on flight deck duty for the purpose of oxygen supply; and
- (b) cabin crew and passengers shall be supplied with oxygen in accordance with Table 1. Cabin crew carried in addition to the minimum number of cabin crew required, and additional crew, shall be considered as passengers for the purpose of oxygen supply.

**Table 1—Supplemental Oxygen for Non-Pressurised Aeroplanes**

SUPPLY FOR:	DURATION AND PRESSURE ALTITUDE
1. All occupants of flight deck seats on flight deck duty	Entire flight time at pressure altitudes above 10,000 feet
2. All required cabin crew members	Entire flight time at pressure altitudes above 13,000 feet and for any period exceeding 30 minutes at pressure altitudes above 10,000 feet but not exceeding 13,000 feet
3. 100% of passengers	Entire flight time at pressure altitudes above 13,000 feet
4. 10% of passengers	Entire flight time after 30 minutes at pressure altitudes greater than 10,000 feet but not exceeding 13,000 feet

2. The supplemental oxygen supply requirements for pressurised aircraft are as follows:

- (a) the amount of supplemental oxygen required shall be determined on the basis of cabin pressure altitude, flight duration and the assumption that a cabin

pressurisation failure will occur at the altitude or point of flight that is most critical from the standpoint of oxygen need, and that, after the failure, the aeroplane will descend in accordance with emergency procedures specified in the Aero-plane Flight Manual to a safe altitude for the route to be flown that will allow continued safe flight and landing;

- (b) following a cabin pressurisation failure, the cabin pressure altitude shall be considered the same as the aeroplane altitude, unless it is demonstrated to the Authority that no probable failure of the cabin or pressurisation system will result in a cabin pressure altitude equal to the aeroplane altitude. Under these circumstances, this lower cabin pressure altitude may be used as a basis for determination of oxygen supply;
- (c) each member of the flight crew on flight deck duty shall be supplied with supplemental oxygen in accordance with Table 2. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply then they shall be considered as flight crew on flight deck duty for the purpose of oxygen supply. Flight deck seat occupants, not supplied by the flight crew source, are to be considered as passengers for the purpose of oxygen supply; and
- (d) cabin crew, additional crew, and passengers:
  - (i) cabin crew and passengers shall be supplied with supplemental oxygen in accordance with Table 2. Cabin crew carried in addition to the minimum number of cabin crew required, and additional crew, shall be considered as passengers for the purpose of oxygen supply; and
  - (ii) the oxygen supply requirements, as specified in Table 2, for aeroplanes not certified to fly at altitudes above 25,000 feet, may be reduced to the entire flight time between 10,000 feet and 14,000 feet cabin pressure altitudes for all required cabin crew and for at least 10% of the passengers if, at all points along the route to be flown, the aeroplane is able to descend safely within 4 minutes to a cabin pressure altitude of 14,000 feet.

**Table 2—Requirements for Supplemental Oxygen-Pressurised Aeroplane During and Following Emergency Descent (Note 1)**

SUPPLY FOR:	DURATION AND CABIN PRESSURE ALTITUDE
1. All occupants of seats on flight deck duty flight	Entire flight time when the cabin pressure altitude exceeds 13,000 feet and entire time when the cabin pressure altitude exceeds 10,000 feet but does not exceed 13,000 feet after

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	<p>the first thirty minutes at those altitudes but in no case less than</p> <p>(a) thirty minutes for aeroplanes certified to fly at altitudes not exceeding 25,000 feet (Note 2); and</p> <p>(b) two hours for aeroplanes certified to fly at altitudes more than 25,000 feet (Note 3).</p>
2. All required cabin crew members	Entire flight time when cabin pressure altitude exceeds 13,000 feet but not less than 30 minutes and entire flight time when cabin pressure altitude is greater than 10,000 feet but does not exceed 13,000 feet after the first thirty minute at these altitudes (Note 2).
3. 100% of passengers	10 minutes or the entire flight time when the cabin pressure altitude exceeds 15,000 feet whichever is the greater (Note 4).
4. 30% of passengers	Entire flight time when the cabin pressure altitude exceeds 14,000 feet but does not exceed 15,000 feet.
5. 10% of passengers	Entire flight time when the cabin pressure altitude exceeds 10,000 feet but does not exceed 14,000 feet after the first 30 minutes at these altitudes.

Note 1: *The supply provided shall take account of the cabin pressure altitude and descent profile for the routes concerned.*

Note 2: *The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aeroplane's maximum certified operating altitude to 10,000 feet in 10 minutes and followed by 20 minutes at 10,000 feet.*

Note 3: *The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aeroplane's*

*maximum certified operating altitude to 10,000 feet in 10 minutes and followed by 110 minutes at 10,000 feet. The oxygen required to meet the Crew Protective Breathing Equipment provisions of this Part may be included in determining the supply required.*

Note 4: *The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aeroplane's maximum certified operating altitude to 15,000 feet.*

**SCHEDULE 5****Regulation 73**

(1) this schedule:

“ADS-B Out” means a function of an aircraft's onboard avionics that periodically broadcasts the aircraft's state vector (3-dimensional position and 3-dimensional velocity) and other required information as described in this section;

“Navigation Accuracy Category for Position (NAC<sub>P</sub>)” specifies the accuracy of a reported aircraft's position, as defined in TSO-C166b and TSO-C154c;

“Navigation Accuracy Category for Velocity (NAC<sub>V</sub>)” specifies the accuracy of a reported aircraft's velocity, as defined in TSO-C166b and TSO-C154c;

“Navigation Integrity Category (NIC)” specifies an integrity containment radius around an aircraft's reported position, as defined in TSO-C166b and TSO-C154c.

“Position Source” means the equipment installed onboard an aircraft used to process and provide aircraft position (for example, latitude, longitude, and velocity) information.

“Source Integrity Level (SIL)” means the probability of the reported horizontal position exceeding the containment radius defined by the NIC on a per sample or per hour basis, as defined in TSO-C166b and TSO-C154c.

“System Design Assurance (SDA)” indicates the probability of an aircraft malfunction causing false or misleading information to be transmitted, as defined in TSO-C166b and TSO-C154c;

“TSO” means Technical Standards Order as published by the Federal Aviation Administration;

“Total latency” is the total time between when the position is measured and

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when the position is transmitted by the aircraft;

“Uncompensated latency” is the time for which the aircraft does not compensate for latency.

(2) 1090 MHz ES and UAT Broadcast Links and Power Requirements—

- (a) Aircraft operating in Class A airspace must have equipment installed that meets the antenna and power output requirements of Class A1, A1S, A2, A3, B1S, or B1 equipment as defined in TSO-C166b, Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS-B) and Traffic Information Service-Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz).
  
- (b) Aircraft operating in airspace designated for ADS-B Out, but outside of Class A airspace, must have equipment installed that meets the antenna and output power requirements of either Class A1, A1S, A2, A3, B1S, or B1 as defined in TSO-C166b.

(3) ADS-B Out Performance Requirements for NACP, NACV, NIC, SDA, and SIL—

- (a) For aircraft broadcasting ADS-B Out as required per GCAR 001 (1) and (2)—
  - (i) The aircraft's NACP must be less than 0.05 nautical miles;
  - (ii) The aircraft's NACV must be less than 10 meters per second;
  - (iii) The aircraft's NIC must be less than 0.2 nautical miles;
  - (iv) The aircraft's SDA must be 2; and
  - (v) The aircraft's SIL must be 3.
  
- (b) Changes in NACP, NACV, SDA, and SIL must be broadcast within 10 seconds.
  
- (c) Changes in NIC must be broadcast within 12 seconds.

(4) Minimum Broadcast Message Element Set for ADS-B Out. Each aircraft must broadcast the following information, as defined in TSO-C166b or TSO-C154c. The pilot must enter information for message elements listed in paragraphs (i) through (g) of this section during the appropriate phase of flight.

- (a) The length and width of the aircraft;
  
- (b) An indication of the aircraft's latitude and longitude;
  
- (c) An indication of the aircraft's barometric pressure altitude;

- (d) An indication of the aircraft's velocity;
  - (e) An indication if TCAS II or ACAS is installed and operating in a mode that can generate resolution advisory alerts;
  - (f) If an operable TCAS II or ACAS is installed, an indication if a resolution advisory is in effect;
  - (g) An indication of the Mode 3/A transponder code specified by ATC;
  - (h) An indication of the aircraft's call sign that is submitted on the flight plan, or the aircraft's registration number, except when the pilot has not filed a flight plan, has not requested ATC services, and is using a TSO-C154c self-assigned temporary 24-bit address;
  - (i) An indication if the flight crew has identified an emergency, radio communication failure, or unlawful interference;
  - (j) An indication of the aircraft's "IDENT" to ATC;
  - (k) An indication of the aircraft assigned ICAO 24-bit address, except when the pilot has not filed a flight plan, has not requested ATC services, and is using a TSO-C154c self-assigned temporary 24-bit address;
  - (l) An indication of the aircraft's emitter category;
  - (m) An indication of whether an ADS-B In capability is installed;
  - (n) An indication of the aircraft's geometric altitude;
  - (o) An indication of the Navigation Accuracy Category for Position (NACP);
  - (p) An indication of the Navigation Accuracy Category for Velocity (NACV);
  - (q) An indication of the Navigation Integrity Category (NIC);
  - (r) An indication of the System Design Assurance (SDA); and
  - (s) An indication of the Source Integrity Level (SIL).
- (5) ADS-B Latency Requirements—
- (a) The aircraft must transmit its geometric position no later than 2.0 seconds from the time of measurement of the position to the time of transmission.

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[Subsidiary]

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- (b) Within the 2.0 total latency allocation, a maximum of 0.6 seconds can be uncompensated latency. The aircraft must compensate for any latency above 0.6 seconds up to the maximum 2.0 seconds total by extrapolating the geometric position to the time of message transmission.
  - (c) The aircraft must transmit its position and velocity at least once per second while airborne or while moving on the airport surface.
  - (d) The aircraft must transmit its position at least once every 5 seconds while stationary on the airport surface.
- (6) Equipment with an approved deviation. Operators with equipment installed with a deviation approved by the Authority are in compliance with this section.

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