GHANA CIVIL AVIATION (FLIGHT STANDARDS) DIRECTIVES

PART 7 – INSTRUMENTS AND EQUIPMENT

NOVEMBER 2018

INTRODUCTION

Part 7 presents regulatory requirements for instruments and equipment on aircraft expected to operate in Ghana and incorporates the Standards and Recommended Practices of ICAO Annex 6, Parts I, II and III.

The requirements of this part address both air operator certificate (AOC) holder and non-AOC holder operations. The requirements of this part that are applicable to all aircraft, and to both AOC and non-AOC holders, are noted by the key [AAC] preceding the particular requirement. Requirements applicable only to AOC holders are noted by the key [AOC].

In some instances, certain items, such as Machmeters or sea anchors, apply only to aircraft with performance characteristics requiring such items. Some [AAC] requirements apply to passenger-carrying aircraft. In such instances, the requirement addresses the operation of any passenger-carrying aircraft, most particularly turbine-engined aircraft, which may have performance and range capabilities matching the type of aircraft operated by AOC holders. Similarly, some equipment specified for [AOC] aircraft have sections keyed as [AAC].

The key [AAC] applies to all aircraft, whether on domestic or international flights. The key [AOC] applies to AOC holders operating in Ghana, whether on domestic or international flights. Certain sections, such as those addressing minimum navigation performance specifications (MNPS) airspace, may not address airspace contiguous to Ghana, but anticipate that Ghanaian AOC holders' aircraft may operate through such airspace in the course of commerce. Such requirements are intended to facilitate the integration of Ghanaian AOC holders into such operations.

This part includes survival equipment requirements that apply to operation in Ghana, as specified in ICAO Annex 6.

As in other Parts of these Directives, operators of aircraft operated in Ghana but registered in another Contracting State must notify the Authority in Ghana when alterations or major repairs are made to the aircraft. Ghana may have unique territorial or geographic features that may affect the operation of aircraft, and must be kept informed of the condition of aircraft operated within its borders.

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7.1 GENERAL

7.1.1 APPLICABILITY

(1) Part 7 prescribes the minimum instruments and equipment requirements for all aircraft in all operations.

(2) Part 7 requirements use the following key designators-

(a) AAC: All aircraft, including Commercial Air Transport and AOC Holders appropriate to the subject of the Directives, e.g. an all aircraft Directive may only refer to seaplanes, but will include CAT and AOC seaplanes;

(b) AOC: Air Operators Certificate Holders. Where AOC requirements are redundant to AAC or CAT requirements, or more detailed, the AOC requirements shall be followed.

7.1.2 DEFINITIONS

For the purpose of Part 7, the following definitions shall apply:

Extended overwater operation. With respect to aircraft other than helicopters, an operation over water at a horizontal distance of more than 80km. from the nearest shoreline, and to helicopters, an operation over water at a horizontal distance of more than 80 km from the nearest shoreline and more than 80 km. from an offshore heliport structure.

Flight recorders

(a) Flight recorders comprise two systems, a flight data recorder (FDR) and a Cockpit Voice Recorder (CVR).

(b) Combination recorders (FDR/CVR) can only be used to meet the flight recorders equipage requirements as specifically indicated in this part.

Long Range Overwater Flights. Routes on which an aircraft may be over water and at more than a distance corresponding to 120 minutes at cruising speed or 740 km (400 NM), whichever is lesser, away from land suitable for making an emergency landing.

Performance class 1 helicopter. A helicopter with performance such that, in case of critical power-unit failure, it is able to land on the rejected take-off area or safely continue the flight to an appropriate landing area, depending on when the failure occurs.

Performance class 2 helicopter. A helicopter with performance such that, in case of critical power-unit failure, it is able to safely continue the flight, except when the failure occurs prior to a defined point after take-off or after a defined point before landing, in which cases a forced landing may be required.

Performance class 3 helicopter. A helicopter with performance such that, in case of power-unit failure at any point in the flight profile, a forced landing must be performed.

7.1.3 ABBREVIATIONS

The following acronyms are used in Part7:

ADF	-	Automatic Direction Finder
AOC	-	Air Operator Certificate
DH	-	Decision Height
DME	-	Distance Measuring Equipment
ELT	-	Emergency Locator Transmitter
ILS	-	Instrument Landing System
IFR	-	Instrument Flight Rules
IMC	-	Instrument Meteorological Conditions
LRNS	-	Long Range Navigation System
MEL	-	Minimum Equipment List
MHz	-	Megahertz
MLS	-	Microwave Landing System
MNPS	-	Minimum Navigation Performance Specifications
NDB	-	Non-Directional Beacon
PBE	-	Pressure Breathing Equipment
RVSM	-	Reduced Vertical Separation Minimum
SSR	-	Secondary Surveillance Radar
VFR	-	Visual Flight Rules
VMC	-	Visual Meteorological Conditions
VOR	-	VHF Very High Omni Directional Range
VSM	-	Vertical Separation Minimum
TCAS/ ACAS	-	Traffic Collision Avoidance System/Airborne Collision Avoidance System
WWS	-	Windshear Warning System

7.1.4 GENERAL INSTRUMENT AND EQUIPMENT REQUIREMENTS

(1) (AAC) In addition to the minimum equipment necessary for the issuance of a certificate of airworthiness, the instruments, equipment and flight documents prescribed in Part 7 and Part 8 respectively shall be installed or carried, as appropriate, in aircraft according to the aircraft type used and to the circumstances under which the flight is to be conducted.

(2) (AAC) All required instruments and equipment shall be approved and installed in accordance with applicable airworthiness requirements.

(3) (AAC) Prior to operation in Ghana of any aircraft not registered in Ghana that uses an airworthiness inspection program approved or accepted by the State of Registry, the owner/operator shall ensure that instruments and equipment required by Ghana but not installed in the aircraft are properly installed and inspected in accordance with the requirements of the State of Registry.

(4) (AOC) An AOC holder shall ensure that a flight does not commence unless the required equipment-

(a) Meets the minimum performance standard, all operational and airworthiness requirements and the relevant provisions of the Ghana Civil Aviation Directives;

(b) Is installed such that the failure of any single unit required for communications, navigation or surveillance purposes or any combination thereof will not result in the failure of another unit required for communications, navigation or surveillance purposes.

(c) Is in operable condition for the kind of operation being conducted, except as provided in the MEL.

(5) (AAC) If equipment is to be used by one flight crewmember at his or her station during flight, it shall be installed so as to be readily operable from that station.

(6) (AAC) 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.

(7) A helicopter which has a maximum certificated take-off mass in excess of 3 175 kg or a maximum passenger seating configuration of more than 9 shall be equipped with a vibration health monitoring system.

7.2 FLIGHT AND NAVIGATIONAL INSTRUMENTS

7.2.1 GENERAL REQUIREMENTS

(1) (AAC) All aircraft shall be equipped with flight and navigational instruments which will enable the flight crew to-

(a) Control the flight path of the aircraft;

(b) Carry out any required procedural manoeuvres;

(c) Observe the operating limitations of the aircraft in the expected operating conditions; and

(d) In the event of the failure of one item or equipment at any stage of the flight operate the aircraft with the remaining navigation equipment in accordance with its operational flight and the requirements of ATS; except when, if not so precluded by the appropriate authority, navigation for flights under the visual flight rules is accomplished by visual reference to landmarks.

(2) (AAC) When a means is provided for transferring an instrument from its primary operating system to an alternative system, the means shall include a positive positioning control and shall be marked to indicate clearly which system is being used.

(3) (AAC) Those instruments that are used by any one flight crew member shall be so arranged as to permit the 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.

7.2.2 MINIMUM FLIGHT AND NAVIGATIONAL INSTRUMENTS

(1) (AAC) No person may operate any aircraft unless it is equipped with the following flight and navigational instruments:

(a) An airspeed indicating system calibrated in knots (kts).

(b) A sensitive pressure altimeter calibrated in feet with a sub-scale 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. (approval not required)

(d) A magnetic compass.

(e) Such additional instruments or equipment as may be prescribed by the Authority.

(2) **Minimum Navigation Performance**. An aircraft registered in Ghana shall not fly in airspace prescribed for the purposes of this Directive unless

(a) VFR flights which are operated as controlled flights shall be equipped in accordance with 7.2.4.

(b) It is equipped with navigation systems which enable the aircraft to maintain the prescribed navigation performance capability;

(c) The navigation system, operating procedures, installation and maintenance procedures.

(d) The equipment is operated in accordance with the approved procedure and it enables the aircraft to maintain the accuracy notified while it is flying in the said airspace.

(3) **Performance-based navigation (PBN)**: For operations where a navigation specification for performance-based navigation (PBN) has been prescribed, an aircraft shall, in addition to the requirements specified in 7.2:

(a) be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification(s);

(b) have information relevant to the aircraft navigation specification capabilities listed in the flight manual or other aircraft documentation approved by the State of the Design or State of Registry; and

(c) have information relevant to the aeroplane navigation specification capabilities included in the MEL.

(d) No person shall conduct PBN operation unless the Authority has issued in respect a specific approval for operations based on PBN authorization required (AR) navigation specifications.

(4) **Electronic navigation data management:**

(a) No Operator shall employ electronic navigation data products that have been processed for application in the air and on the ground unless approval has been issued by the Authority in addition to the operator's procedures for ensuring that the process applied and the products delivered have met acceptable standards of integrity, and that the products are compatible with the intended function of the equipment that will use them.

(b) The Operator shall ensure that it continues to monitor both process and products and shall implement procedures that ensures the timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that require it.

7.2.3 INSTRUMENTS FOR OPERATIONS REQUIRING TWO PILOTS

(AAC) Whenever two pilots are required, each pilot's station shall have separate flight instruments as follows:

(a) An airspeed indicator calibrated in knots;

(b) A sensitive pressure altimeter calibrated in feet with a sub-scale 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 altitude indicator; and

(f) A stabilized direction indicator.

7.2.4 IFR INSTRUMENTS

(1) (AAC) All aircraft when operated in IFR, or when the aircraft cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with-

(a) An airspeed indicating system with a means of preventing malfunctioning due to either condensation oricing;

(b) An additional sensitive pressure altimeter calibrated in feet with a sub-scale settle calibrated in hectopascalor millibars, adjustable for any barometric pressure likely to be set during flight.

(c) A turn and slip indicator;

(d) An attitude indicator (artificial horizon);

(e) A heading indicator (directional gyroscope);

(f) A means of indicating whether the supply of power to the gyroscopic instrument is adequate;

(g) A means of indicating in the flight crew compartment the outside air

temperature;

(h) A rate-of-climb and descent indicator; and

(i) Such additional instrument or equipment as may be prescribed by the Authority.

(2) (AOC) No person may operate an aircraft under IFR, or under VFR over routes that cannot be navigated by reference to visual landmarks, unless the aircraft is equipped with navigation equipment in accordance with the requirements of air traffic services in the area(s) of operation, but not less than:

(a) One VOR receiving system, one ADF system, one DME and one Marker Beacon receiving system;

(b) One ILS or MLS where ILS or MLS is required for approach navigation purposes;

(c) An Area Navigation System when area navigation is required for the route being flown;

(d) An additional VOR receiving system on any route, or part thereof, where navigation is based only on VOR signals;

(e) An additional ADF system on any route, or part thereof, where navigation is based only on NDB signals; and

(f) The Navigation specifications for Performance Based Navigation prescribed and the requirements of Air Traffic Services.

(3) No person shall operate an aircraft unless that aircraft is equipped with sufficient navigation equipment to ensure that, in the event of failure of one item of equipment at any stage of the flight, the remaining equipment will enable the aircraft to continue navigating in accordance with the requirements of this section.

(4) Each radio navigation system shall have an independent antenna installation, except that, where rigidly supported non wire antenna installation of equivalent reliability are used only one antenna is required.

(5) Where more than one navigation unit is required for the flight operation, each unit shall be independent of the other or others to the extent that a failure in any one will not result in the failure of any other.

(6) (AAC) All aircraft intended to land in IMC or at night shall be provided with radio navigation equipment capable of receiving signals providing guidance to-

(a) A point from which a visual landing can be effected; or

(b) Each aerodrome or heliport at which it is intended to land in IMC; and

(c) Any designated alternate aerodromes.

(7) (AOC) No person may conduct single pilot IFR operations unless the aircraft is equipped with an autopilot with at least altitude hold and heading mode.

(8) All helicopters when operating in accordance with VFR at night shall be equipped with:

(a) the equipment specified in 7.2.2;

(b) an attitude indicator (artificial horizon) for each required pilot and one additional attitude indicator;

(c) a slip indicator;

(d) a heading indicator (directional gyroscope);

(e) a rate of climb and descent indicator;

(f) such additional instruments or equipment as maybe prescribed by the Authority; and the following lights:

(i) the lights required by Ghana Civil Aviation (ANS) Directives Part 19 for aircraft in flight or operating on the movement area of a heliport;

(ii) two landing lights;

(iii) illumination for all instruments and equipment that are essential for the safe operation of the helicopter that are used by the flight crew;

(iv) lights in all passenger compartments; and

(v) a flashlight for each crew member station.

7.2.5 STANDBY ATTITUDE INDICATOR

(1) (AAC) No person may operate an aeroplane with a maximum certified take-off mass exceeding 5,700 kg and having a maximum approved passenger seating configuration of more than 9 seats or Class 1 and Class 2 helicopters unless it is equipped with at least one standby attitude indicator (artificial horizon)that-

(a) Operates independently of any other attitude indicating system;

(b) Is powered continuously during normal operation; and

(c) After a total failure of the normal electrical generating system, is automatically powered for a minimum of 30 minutes from a source independent of the normal electrical generating system.

(2) (AAC) When the standby attitude indicator is being operated by emergency power, it shall be clearly evident to the flight crew.

(3) (AAC) Where the standby attitude indicator has its own dedicated power supply there shall be an associated indication, either on the instrument or on the instrument panel when this supply is in use.

(4) (AAC) If the standby attitude instrument system is installed and usable through flight attitudes of 360^0 of pitch and roll, the turn and slip indicators may be replaced by slip indicators.

(5) The Provisions contained in 7.2.5 shall apply to aircraft with a maximum certified take-off mass exceeding 5,700 kg, newly introduced into service after 1st January1975.

7.2.6 INSTRUMENTS AND EQUIPMENT FOR CATEGORY II AND III OPERATIONS

(1) ***Category II Operations.*** The instruments and equipment listed in this subsection shall be installed, approved and maintained in accordance with Implementing Standard IS: 7.2.6, in each aircraft operated in a Category II operation:

> ***Note:*** *This subsection does not require duplication of instruments and equipment required by 7.2.2. or any other provisions of Part 7.*

(a) Group I

(i) Two localizer and glide slope receiving systems.

Note: Each system shall provide a basic ILS display and each side of the instrument panel must have a basic ILS display. However, a single localizer antenna and a single glide slope antenna may be used.

(ii) A communications system that does not affect the operation of at least one of the ILS systems.

(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.

(ix) A flight control guidance system that consists of either an automatic approach coupler or a flight director system.

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

(x) For Category II operations with decision heights below 150 ft., either a marker beacon receiver providing aural and visual indications of the inner marker or a radio altimeter.

(b) Group II

(i) Warning systems for immediate detection by the pilot of system faults in items (1) (a) (i), (1) (a) (iv), and (1) (a) (ix), of Group I and, if installed for use in Category III operations, the radio altimeter and auto throttle system.

(ii) Dual controls.

(iii) An externally vented static pressure system with an alternate static pressure source.

(iv) A windshield wiper or equivalent means of providing adequate cockpit visibility for a safe visual transition by either pilot to touchdown and rollout.

(v) 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 -
Implementing Standard: See IS 7.2.6 for details.

(2) ***Category III Operations.*** The instruments and equipment listed in this subsection shall be installed in each aircraft operated in a Category III operation:

7.2.7 SPECIAL NAVIGATION ACCURACY (PBN RNP AND MNPS)

(1) No person shall operate without specific Approval or Authorisation by the Authority for any flights in defined portions of airspace where a navigation specification for performance-based navigation has been prescribed, the navigational equipment shall continuously provide indications to the flight crew of the adherence to or departure from track to the required degree of accuracy at any point along track.

(2) No person shall operate an aircraft where MNPS are prescribed, unless it is equipped with—

(a) For unrestricted operations, two independent long range navigation systems; or

(b) For notified special routes, one long range navigation system.

(3) The navigation equipment required for operations in MNPS airspace shall be visible and usable by either pilot seated at their duty stations.

(4) (AOC) For unrestricted operations in MNPS airspace an aeroplane shall be equipped with two independent Long-Range Navigation Systems (LRNS).

(5) (AOC) For operations in MNPS airspace along notified special routes, an aircraft shall be equipped with one LRNS, unless otherwise specified.

(6) (AAC) For operations in the MNPS airspace along notified special routes and in the European airspace, an aircraft shall be equipped with a TCAS – Traffic Collision Avoidance System.

(7) No person shall operate an aircraft unless it has installed an operational navigation equipment which will enable it to be operated in accordance with the navigational accuracy required for the RNP type prescribed for the airspace or routes included in the flight plan.

7.2.8 NAVIGATION EQUIPMENT FOR OPERATIONS IN RVSM AIRSPACE

(1) For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, a reduced vertical separation minimum (RVSM) of 300 m (1000 ft.) is applied between FL 290 and FL 410 inclusive, an aircraft shall be provided with equipment which is capable of:

(a) indicating to the flight crew the flight level being flown;

(b) automatically maintaining a selected flight level;

(c) providing an alert to the flight crew when a deviation occurs from the selected flight level. The threshold for the alert shall not exceed ± 90 m (300 ft.)-

(d) automatically reporting pressure-altitude;and

Note: *Equipment shall comply with the atimetery Minimum Aircraft System*

Performance
Specifications (MASPS) prescribed in ICAO Doc 7030 in the form of Regional Supplementary Procedures.

(2) The State of the Operator shall issue a specific approval for RVSM Operations.

(3) Prior to granting the RVSM Specific approval required in accordance with (2) above, the Authority shall be satisfied that—

(a) The vertical navigation performance capability of the aircraft satisfies the requirements specified in Annex 6 Part 1, Appendix 4;

(b) The Operator has instituted appropriate procedures in respect of continued airworthiness (maintenance and repair) practices and programmes; and

(c) The Operator has instituted appropriate flight crew procedures for operations in RVSM airspace.

Note: An RVSM Specific approval is valid globally on the understanding that any operating procedures specific to a given region will be stated in the operations manual or appropriate crew guidance.

(4) The operator shall ensure that, in respect of those aircraft mentioned in this Directive, adequate provisions exist to ensure that it is—

(a) Receiving the reports of height-keeping performance issued by the monitoring agencies;

(b) Taking immediate corrective action for individual aircraft, or aircraft type groups, identified in such reports as not complying with the height-keeping requirements for operation in airspace where RVSM is applied; and

(c) Ensuring that the Authority is receiving the reports and the corrective actions that have been initiated.

(5) The Operator shall establish adequate procedures to ensure that when specific approval is issued for RVSM operations, a minimum of two aircraft of each fleet have their height-keeping performance monitored, at least once every two years or within intervals of 1000 flight hours per aircraft, whichever period is longer. If the operator's aircraft fleet consists of a single aircraft, monitoring of that aircraft shall be accomplished within the specified period.

(6) No person shall operate an aircraft in any designated RVSM airspace or shall conduct RVSM operation without a specific approval issued by the Authority.

(7) The Authority may approve PBN operations if satisfied that the operator or owner has established adequate procedures which complies with prescribed navigation specification for PBN including:

(a) normal and abnormal procedures including contingency procedures;

(b) flight crew qualification and proficiency requirements in accordance with the appropriate navigation specifications;

(c) training for relevant personnel consistent with the intended operations; and

(d) appropriate
maintenance procedures to ensure continued airworthiness in accordance with the appropriate navigation specifications.

Note 1.— Guidance on safety risks and mitigations for PBN operations, in accordance with Annex 19, are contained in the Performance-based Navigation (PBN) Operational Approval Manual *(Doc 9997).*

Note 2. — Electronic navigation data management is an integral part of normal and abnormal procedures.

7.2.9 AEROPLANES EQUIPPED WITH AUTOMATIC LANDING SYSTEMS, A HEAD-UP DISPLAY (HUD) OR EQUIVALENT DISPLAYS, ENHANCED VISION SYSTEMS (EVS), SYNTHETIC VISION SYSTEMS (SVS) AND/OR COMBINED VISION SYSTEMS (CVS)

(1) No person shall operate an aircraft equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, or any combination of those systems into a hybrid system, unless the use of such systems for the safe operation of the aircraft is approved by the Authority.

(2) The Authority may approve the operational use of automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, where the Operator has shown:

(a) that the equipment meets the appropriate airworthiness certification requirements;

(b) that it has carried out a safety risk assessment of the operations supported by the automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS; and

(c) that it has established and documented the procedures for the use of, and training requirements for, automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS.

7.2.10 (AOC) ELECTRONIC FLIGHT BAG (EFB) EQUIPMENT

(1) EFB equipment: Where portable EFBs are used on board, the operator shall ensure that they do not affect the performance of the aircraft systems, equipment or the ability to operate the aircraft as specified in 8.8.1.33.

(2) EFB functions: Where EFBs are used on board an aircraft the operator shall:

(a) assess the safety risk(s) associated with each EFB function;

(b) establish and document the procedures for the use of, and training requirements for, the device and each EFB function; and

(c) ensure that, in the event of an EFB failure, sufficient information is readily available to the flight crew for the flight to be conducted safely.

(3) The Authority shall issue a specific approval for the operational use of EFB functions to be used for the safe operations of aircraft.

(4) The Authority when issuing a specific approval shall ensure that ::

(a) the EFB equipment and its associated installation hardware, including interaction with aircraft systems if applicable, meet the appropriate airworthiness certification requirements;

(b) the operator has assessed the safety risks associated with the operations supported by the EFB function(s);

(c) the Operator has established requirements for redundancy of the information (if appropriate) contained in and displayed by the EFB function(s);

(d) the operator has established and documented procedures for the management of the EFB function(s) including any database it may use; and

(e) the operator has established and documented the procedures for the use of, and training requirements for, the EFB and the EFB function(s).

7.2.11 SURVEILLANCE EQUIPMENT

(1) For operations where surveillance equipment is required to meet an RSP specification for performance-based surveillance (PBS), an aircraft shall, in addition to the requirements specified in 7.3.1:

(a) be equipped with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specification(s) and the applicable requirements of Air Traffic Services.

(b) have information relevant to the aircraft RSP specification capabilities listed in the flight manual or other aircraft documentation approved by the State of Design or State of Registry; and

(c) have information relevant to the aircraft RSP specification capabilities included in the MEL.

(2) The Authority shall, approve of operations where an RSP specification for PBS has been prescribed if the operator has established and documented:

(a) normal and abnormal procedures, including contingency procedures;

(b) flight crew qualification and proficiency requirements, in accordance with appropriate RSP specifications;

(c) a training programme for relevant personnel consistent with the intended operations; and

(d) appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RSP specifications.

(3) The Operator shall ensure that, in respect of those aircraft specified in 7.2.11, adequate provisions exist for:

(a) compliance with surveillance performance issued by monitoring programmes established in accordance with the Ghana Civil Aviation (ANS) Directives 24.4.3.4.2; and

(b) taking immediate corrective action for individual aircraft, aircraft types or the operators if identified as not complying with the RSP specification.

7.3 COMMUNICATION EQUIPMENT

7.3.1 RADIO EQUIPMENT

(1) (AAC) No person shall operate an aircraft unless it is equipped with radio equipment required for the kind of operation being conducted.

(2) [AAC] All aircraft operated in VFR as a controlled flight, in IFR, at night, extended flight over water, or over land designated by the Authority as especially difficult for search and rescue, shall be equipped with radio communication equipment—

(a) Capable of conducting two-way communication at any time with air traffic services or aeronautical stations;

(b) Capable of conducting communications on those frequencies prescribed by the Authority,

(c) Capable of receiving meteorological information at any time during the flight;

(d) Capable of conducting communications on the aeronautical emergency frequency 121.5 MHz;

(e) Approved and installed in accordance with the requirements applicable to them, including the minimum performance requirements;

(f) Installed such that the failure of any single unit required for communication equipment, will not result in the failure of another unit required for communications purposes; and

(g) Meeting any other requirements as prescribed by the Authority.

(3) (AOC) No person may operate an aircraft in IFR, or in VFR over routes that cannot be navigated by reference to visual landmarks, unless the aircraft is equipped with communication and navigation equipment in accordance with the requirements of air traffic services in the area(s) of operation, but not less than-

(a) Two independent radio communication systems necessary under normal operating conditions to communicate with an appropriate ground station from any point on the route including diversions.

Note: Each system shall have an independent antenna installation except that where rigidly supported non-wire antennae or other antenna installations of equivalent reliability are used, only one antenna is required.

(b) Secondary Surveillance Radar transponder equipment as required for the route being flown.

(4) (AAC) When more than one communication equipment unit is required, each shall be independent of the other or others to the extent that a failure in any one will not result in failure of any other.

(5) (AAC) No person may operate an aircraft under IFR unless it is equipped with an

audio selector panel
accessible to each required flight crewmember.

(6) (AOC) No person may conduct single pilot IFR or night operations unless the aircraft is equipped with a headset with boom microphone or equivalent and a transmit button on the control wheel.

(7) The radio communication equipment shall provide for communication on the aeronautical emergency frequency 121.5MHz.

(8) Aircraft shall be provided with radio communication equipment capable of receiving meteorological information at any time during flight

(9) For operations where communication equipment is required to meet an RCP specification for performance-based communication (PBC), an aircraft shall, in

addition to the requirements specified in 7.3.1:

(a) be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP specification(s)

(b) have information relevant to the aircraft RCP specification capabilities listed in the flight manual or other aircraft documentation approved by the State of Design or State of Registry; and

(c) have information relevant to the aircraft RCP specification capabilities included in the MEL.

(10) The Authority shall, approve of operations where an RCP specification for PBC has been prescribed if the operator has established and documented:

(a) normal and abnormal procedures, including contingency procedures;

(b) flight crew qualification and proficiency requirements, in accordance with appropriate RCP specifications;

(c) a training programme for relevant personnel consistent with the intended operations; and

(d) appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.

(11) The Operator shall ensure that, in respect of those aircraft specified in 7.3.1(1), adequate provisions exist for:

(a) compliance with communication performance issued by monitoring programmes established in accordance with Ghana Civil Aviation (ANS) Directives 24.4.3(6) and

(b) to take immediate corrective action for individual aircraft, aircraft types or the operators if identified as not complying with the RCP specification.

(12) All helicopters which are modified on or after 1 January 2016 to install and utilize any of the data link communications applications listed in 7.3.1(2) and are required to carry a CVR shall record on a flight recorder the data link communications messages.

7.3.2 CREW MEMBER INTERPHONE OR BOOM MICROPHONE SYSTEM

(1) (AOC) No AOC holder may operate an aircraft on which a flight crew of more than one is required unless it is equipped with a flight crew interphone system, including headsets and microphones, for use by all members of the flight crew.

(2) Handheld microphones shall not be used below 15,000 feet.

(3) (AOC) No AOC holder may operate an aeroplane with a maximum certified take-off mass exceeding 15,000kg or having a maximum approved passenger seating configuration of more than 19 unless it is equipped with a crew member interphone system that-

(a) Operates independently of the public address system except for handsets, microphones selector switches and signaling devices;

(b) Provides a means of two-way communication between the flight crew compartment and each-

(i) Passenger compartment;

(ii) Galley located 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;

Is readily accessible for use-

(i) From each of the required flight crew stations in the flight crew compartment; and

(ii) At required cabin crewmember stations close to each separate or pair of floor level emergency exists;

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 in the event of suspicious activity or security breaches in the cabin;

(c) Has means for the recipient of a call to determine whether it is a normal call or an emergency call; and

(d) Provides on the ground a means of two-way communication between ground personnel and at least two flight crewmembers.

7.3.3 ALTITUDE REPORTING TRANSPONDER

(1) [AAC] No person may operate an aircraft in airspace that requires a pressure reporting transponder unless that equipment is operative.

(2) [AAC] No person may operate an aircraft at altitudes above FL 290 unless it is equipped with a system that is automatically reporting pressure altitude.

(3) [AAC] No person may operate an aircraft in commercial air transportation unless it is equipped with a pressure – altitude reporting transponder that operates in accordance with the requirements of Ghana Air Traffic Services.

(4) [AOC] No person may operate an aeroplane that is equipped with an automatic means of detecting airborne/on-the-ground status unless it is equipped with a Mode S transponder.

Note 1: These provisions will improve the effectiveness of airborne collision avoidance systems as well as air traffic services that employ Mode S radar. In particular, tracking processes are significantly enhanced with a resolution of 7.62 m (25 ft.), or better.

Note 2: Mode C replies of transponders always report pressure altitude in 30.50 m (100 ft.) increments irrespective of the resolution of the data service.

7.4 AIRCRAFT LIGHTS AND INSTRUMENT ILLUMINATION

(1) (AAC) All aircraft operated at night shall be equipped with:

(a) The equipment specified in 7.2.1, 7.2.2 and 7.2.4(1) of this Part;

(b) A landing light;

(c) Illumination for all flight instruments and equipment that are essential for the safe operation of the aircraft;

(d) Lights in all passenger compartments; and

(e) A flashlight for each crewmember station. (Approval not required)

(2) (AOC) No AOC holder may operate an aircraft by day or night unless it is equipped with:

(a) Two landing lights;

(b) An anti-collision light system;

(c) Illumination for all flight instruments and equipment that are essential for the safe operation of the aircraft;

(d) Lights in all passenger compartments; and

(e) A flashlight for each crewmember station. (Approval not required)

(3) (AOC) No AOC holder may operate an aircraft by night unless, in addition to the equipment specified in paragraph (1) above, it is equipped with-

(a) Navigation/position lights;

(b) Two landing lights or a single light having two separately energized filaments; and

(c) Lights to conform to the International Directives for preventing collisions at sea if the aircraft is a seaplane or an amphibian aircraft.

Note: Lights shall be installed in airplanes so as to minimise the possibility that they will:
(a) adversely affect the satisfactory performance of the flight crew's duties; or

(b) subject an outside observer to harmful dazzle.

(4) For helicopter operations, one of the landing lights should be turnable, at least in the vertical plane.

7.5 ENGINE INSTRUMENTS

(1) (AOC) Unless the Authority allows or requires different instrumentation for turbine engine powered aircraft to provide equivalent safety, no person may conduct any commercial air transport operations in any aircraft without the following engine instruments:

(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.

(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) (AOC) In addition to the listed equipment requirements in paragraph (1), reciprocating engine aircraft shall have the following:

(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.

(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 may be actuated at any point in the reversing cycle between the normal low pitch stop position and full reverse pitch, but it may not give an indication at or above the normal low pitch stop position.

(ii) The source of indication shall be actuated by the propeller blade angle or be directly responsive to it.

7.6 WARNING INSTRUMENTS AND SYSTEMS

7.6.1 MACH NUMBER INDICATOR

AAC) All aircraft with speed limitations expressed in terms of Mach number shall be equipped with a Mach number indicator.

7.6.2 LOSS OF PRESSURISATION INDICATOR

All pressurized aircraft intended to be operated at flight altitudes above 25,000 ft. shall be equipped with a device to provide positive warning to the flight crew of any dangerous loss of pressurization.

7.6.3 LANDING GEAR: AURAL WARNING DEVICE

(1) (AOC) Each aircraft with retractable landing gear shall have a landing gear aural warning device that functions continuously under the following conditions:

(a) For aircraft with an established approach wing-flap position, whenever the wing flaps are extended beyond the maximum certified approach climb configuration position in the Aircraft Flight Manual and the landing gear is not fully extended and locked.

(b) For aircraft 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) (AOC) The warning system required by paragraph (1) of this section:

(a) May not have a manual shutoff;

(b) Shall be in addition to the throttle actuated device installed under the type certification airworthiness requirements; and

(c) May utilize any part of the throttle-actuated system including the aural warning device.

(3) (AOC) The flap position-sensing unit may be installed at any suitable place in the aeroplane.

7.6.4 ALTITUDE ALERTING SYSTEM

(1) (AOC) No AOC holder may operate a turbine propeller powered aircraft with a maximum certified take-off mass in excess of 5,700kg or having a maximum approved passenger seating configuration of more than 9 seats, or a turbojet powered aircraft, unless it is equipped with an altitude alerting system capable of-

(a) Alerting the flight crew upon approaching preselected altitude in either ascent or descent; and

(b) Alerting the flight crew by at least an aural signal, when deviating above or below a preselected altitude.

(2) (AAC) For operations in defined portions of airspace where, based on Regional Air Navigation Agreement, a VSM of 300m (1,000 ft.) is applied above FL 290, an aircraft shall be provided with equipment which is capable of providing an alert to the flight crew when a deviation occurs from the selected flight level. The threshold for the alert may not exceed $\pm$90m (300ft).

7.6.5 GROUND PROXIMITY WARNING SYSTEM

(1) (AOC) Each ground proximity warning system shall automatically provide, by means of aural signals which may be supplemented by visual signals, timely and distinctive warning to the flight crew of sink rate, ground proximity, altitude loss after take-off or go around, incorrect landing configuration and downward glide slope deviation.

(2) (AOC) A ground proximity warning system shall provide, as a minimum, warnings of the following circumstances:

(a) Excessive descent rate;

(b) Excessive terrain closure rate;

(c) Excessive altitude loss after take-off or go-around;

(d) Unsafe terrain clearance while not in landing configuration;

(e) gear not locked down;

(f) flaps not in landing position; and

(g) Excessive descent below the instrument glide path.

(3) All turbine-engine aircraft of a maximum certificated take-off mass in excess of 15,000 kg or authorised to carry more than 30 passengers, for which the individual certificate of airworthiness is first issued on or after 1 January 2001, shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.

(4) All turbine-engined aircraft of maximum certificated take-off mass in excess of 5700 kg or authorised to carry more than 9 passengers, shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.

(5) All turbine-engined aircraft of a maximum certificated take-off mass of 5,700 kg or less and authorised to carry more than 5 but less than 9 passengers, shall be equipped with a ground proximity warning system which provides the warnings: excessive descent rate, excessive altitude loss after take-off or go-around, warning of unsafe terrain clearance and a forward looking terrain avoidance function.

(6) All piston 25ngine aircraft of a maximum certificated take-off mass in excess of 5,700 kg or authorised to carry more than 9 passengers shall be equipped with a ground proximity warning system which provides the warnings of excessive descent rate, excessive altitude loss after take-off or go-around, warning of unsafe terrain clearance and a forward looking terrain avoidance function.

(7) The provisions contained in 7.6.5, shall apply to all turbine powered aircraft of a maximum certificated take off mass in excess of 5700kg or authorized to carry more than nine passengers.

(8) The operator shall implement database management procedures that ensure the timely distribution and update of current terrain and obstacle data to the ground proximity warning system.

(9) A helicopter when operating in accordance with IFR and which has a maximum

certificated take-off
mass in excess of 3 175 kg or a maximum passenger seating configuration of more than 9 may be equipped with a ground proximity warning system which has a forward-looking terrain avoidance function.

7.6.6 WEATHER RADAR

(1) (AOC) No person may operate an aircraft in commercial air transport in an area where thunderstorms or other potentially hazardous weather conditions may be expected unless it is equipped with a weather radar.

(2) No person may begin a flight under IFR or night VFR conditions when current weather reports indicate that thunderstorms weather conditions that can be detected with airborne weather radar equipment may reasonably be expected along the route to be flown, unless the airborne weather radar equipment required by this section is in satisfactory operating conditions.

(3) If the airborne weather radar equipment becomes inoperative en-route, the aircraft

must be operated under the instructions and procedures specified for that event in the approved Aircraft Operating Manual.

7.6.7 AIRBORNE COLLISION AVOIDANCE SYSTEM (ACAS)

(1) [AAC] All aircraft should be equipped with an Airborne Collision Avoidance System (ACAS) approved by the Authority.

(2) [AOC] No person may operate a turbine engine aircraft authorised to carry more than 30 passengers, unless it is equipped with an airborne collision avoidance system (ACASII).

(3) [AOC]No person may operate a turbine powered aircraft with a maximum certificated take-off mass in excess of 5,700 kg or authorised to carry more than 19 passengers unless it is equipped with an airborne collision avoidance system (ACASII).

(4) [AOC]No person may operate a turbine powered aircraft with a maximum certificated take-off mass in excess of 15,000 kg unless it is equipped with an airborne collision avoidance system (ACASII).

(5) An Airborne Collision Avoidance System shall operate in accordance with the relevant provisions of the Ghana Civil Aviation Directives.

(6) The Airplane Flight Manual (AFM) or the Aircraft Operating Manual (AOM) required by this Directive shall contain the following information required by this section:

(a) Appropriate procedures for–

(i) The use of the equipment; and

(ii) Proper flight crew action with respect to the equipment operation.

(b) An outline of all input sources that must be operating for the ACAS to function properly.

Note: An Airborne Collision Avoidance System shall operate in accordance with the relevant provision of Annex 10 Volume IV.

7.6.8 FORWARD-LOOKING WINDSHEAR WARNING SYSTEM – TURBOJET AIRCRAFT

(1) [AOC] All turbo-jet aircraft of a maximum certificated take-off mass in excess of 5,700 kg or authorised to carry more than nine passengers should be equipped with a forward-looking wind shear warning system.

(2) [AOC] The system should be capable of providing the pilot with a timely aural and visual warning of wind shear ahead of the aircraft, and the information required to permit the pilot to safely commence and continue a missed approach or go-around or to execute an escape manoeuvre if necessary.

(3) The system should also provide an indication to the pilot when the limits specified for the certification of automatic landing equipment are being approached, when such equipment is in use.

7.6.9 PRESSURE ALTITUDE REPORTING TRANSPONDER

(1) All aircraft shall be equipped with a pressure-altitude reporting transponder intended to improve the effectiveness of air traffic services as well as airborne collision avoidance systems, which operates in accordance with the requirements of 7.3.1.

(2) A Pressure Altitude Reporting Transponder shall operate in accordance with the relevant provisions of the Ghana Civil Aviation Directives.

(3) Unless exempted by the Authority, all aircraft shall be equipped with a pressure-altitude reporting transponder in accordance with sub-paragraph of this sub-part.

(4) All aircraft shall be equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m (25 ft.), or better.

7.6.10 TURBINE AEROPLANE – RUNWAY OVERRUN AWARENESS AND ALERTING SYSTEM (ROAAS)

All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 2026, shall be equipped with a runway overrun awareness and alerting system (ROAAS).

Note. — Guidance material for ROAAS design is contained in EUROCAE ED-250, Minimum Operation Performance Specification (MOPS) for Runway Overrun Awareness and Alerting System (ROAAS), or equivalent documents.

7.7 FLIGHT RECORDERS[1]

Non-deployable flight recorder containers shall be painted a distinctive orange colour.

Non-deployable crash-protected flight recorder containers shall:

a) carry reflective material to facilitate their location; and

b) have securely attached an automatically activated underwater locating device operating at a frequency of 37.5 kHz and shall operate for a minimum of 90 days.

Automatic deployable flight recorder containers shall:

a) be painted a distinctive orange colour, however the surface visible from outside the aircraft may be of another colour;

b) Carry reflective material to facilitate their location; and

c) Have an integrated automatically activated ELT.

The flight recorder systems shall be installed so that:

a) The probability of damage to the recordings is minimized;

b) There is an aural or visual means for pre-flight checking that the flight recorder systems are operating properly; and

c) If the flight recorder systems have an erasure device, the installation shall be designed to prevent operation of the device during flight time or crash impact; and

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[1] *Crash protected flight recorders shall comprise one or more of the following systems:*
a flight data recorder (FDR),
a cockpit voice recorder (CVR),
an airborne image recorder (AIR),
a data link recorder (DLR).

image and data link information may be recorded on either the CVR or the FDR.

Lightweight flight recorders comprise one or more of the following systems:
an aircraft data recording system (ADRS),
a cockpit audio recording system (CARS),
an airborne image recording system (AIRS),
a data link recording system (DLRS).

image and data link information may be recorded on either the CARS or the ADRS.

d) for aeroplanes for which the
individual certificate of airworthiness is first issued on or after 1 January 2023, a flight crew-operated erase function shall be provided on the flight deck which, when activated, modifies the recording of a CVR and AIR so that it cannot be retrieved using normal replay or copying techniques. The installation shall be designed to prevent activation during flight. In addition, the probability of an inadvertent activation of an erase function during an accident shall also be minimized.

Note. — The erase function is intended to prevent access to CVR and AIR recordings by normal replay or copying means, but would not prevent accident investigation authorities' access to such recordings by specialized replay or copying techniques.

The crash protected flight recorder shall be installed so that they receive electrical power from a bus that provides the maximum reliability for operation of the flight recorder without jeopardizing service to essential or emergency loads.

The lightweight flight recorders system shall be connected to a power source having the characteristics which ensure proper and reliable recording in the operational environment.

Means shall be provided for an accurate time correlation between the flight recorder systems recordings.

The manufacturer shall provide the appropriate certificating authority with the following information in respect of the flight recorder systems:

a) manufacturer's operating instructions, equipment limitations and installation procedures;

b) Parameter origin or source and equations which relate counts to units of measurement; and

c) Manufacturer's test reports.

7.7.1 COCKPIT VOICE RECORDERS

(1) No person may operate the following aircraft unless it is equipped with a cockpit voice recorder capable of recording the aural environment of the flight deck during flight time:

(a) All aircraft with a maximum certificated takeoff mass of 27 000kg;

(b) A turbine powered aircraft operated in commercial air transportation-

(i) Having a maximum approved passenger seating of more than 9 seats; or

(ii) With a certificated takeoff mass of more than 5 700kg.

(c) A helicopter operated in commercial air transportation with a certificated takeoff mass of over-

(i) 7000 kg; or

(ii) For international commercial air transportation: 2 700kg.

(2) To facilitate location and identification in case of an accident, the cockpit voice recorder shall-

(a) Be either bright orange or bright yellow;

(b) Have reflective tape affixed to the external surface to facilitate its location under water; and

(c) Have an approved underwater locating device on or adjacent to the recorder, which is secured in such a manner that it is not likely to be separated during a crash impact.

(3) All aircraft for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which use any of the data link communications applications required to carry a CVR, shall record the data link communications messages on a crash-protected flight recorder

(4))All aircraft for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications, shall record the data link communications messages on a crash-protected flight recorder unless the installed data link communications equipment is compliant with a type certificate issued or aircraft modification first approved prior to 1 January 2016.

Note 1.— Refer to IS 7.7.3 for examples of data link communication recording requirements.

Note 2.— A Class B AIR could be a means for recording data link communications applications messages to and from the aircraft where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.

(5) Note 3.— The "aircraft modifications" refer to modifications to install the data link communications equipment on the aircraft (e.g. structural, wiring). All aircraft which utilize data link communications and are required to carry a CVR shall record on a flight recorder, all data link communications to and from the aircraft. The minimum recording duration shall be equal to the duration of the CVR, and shall be correlated to the recorded cockpit audio. Sufficient information to derive the content of the data link communications message and, whenever practical, the time the message was displayed to or generated by the crew shall be recorded.

Note: *Data link communication include but are not limited to, automatic dependent surveillance (ADS), controller-pilot data link communications (CPDLC), data link – flight information services (D–FIS) and aeronautical operational control (AOC) message.*

(6) All aircraft of a maximum certificated take-off mass over 5,700 kg, required to be equipped with a FDR and or a CVR, may alternatively be equipped with two combination recorders. (FDR/CVR).

(7) All multi-engined turbine powered aircraft of a maximum certificated take-off mass of 5,700 kg or less, required to be equipped with a FDR and/or a CVR, may alternatively be equipped with one combination recorder (FDR/CVR).

(8) All helicopters of a maximum certificated take-off mass over 2,700 kg, required to be equipped with an FDR and or a CVR, and may alternatively be equipped with one combination recorder. (FDR or CVR).

(9) Aircraft for which the individual certificate of airworthiness was first issued on or after 1 January 1987:

(a) All aircraft of a maximum certificated take-off mass of over 5,700 kg or all helicopters of a maximum certificated take-off mass of over 7,000 kg shall be

equipped with a
cockpit voice recorder, the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with an FDR at least main rotor speed shall be recorded on one track of the CVR.

(b) All multi-engine turbine powered aircraft of a maximum certificated take-off mass of 5,700 kg or less for which the individual certificate of airworthiness was first issued on or after 1 January 1990 should be equipped with a cockpit voice recorder, the objective of which is the recording of the aural environment on the flight deck during flight time.

(c) All helicopters of a maximum certificated take-off mass of over 3,175 kg up to and including 7,000 kg shall be equipped with a cockpit voice recorder, the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on one track of the CVR.

(10) Aircraft for which the individual certificate of airworthiness was first issued before 1 January1987:

(a) All turbine engine aircraft of a maximum certificated take-off mass of over 27,000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 shall be equipped with a cockpit voice recorder, the objective of which is the recording of the aural environment on the flight deck during flight time.

(b) All turbine engine aircraft of a maximum certificated take-off mass of over 5,700 kg up to and including 27,000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 should be equipped with a cockpit voice recorder, the objective of which is the recording of the aural environment on the flight deck during flight time.

(c) All helicopters of a maximum certificated take-off mass of over 7,000 kg shall be equipped with a cockpit voice recorder, the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on one track of the CVR.

Note: CVR performance required are as contained in the Minimum Operational Performance Specifications (MOPS) documents for Flight Recorder Systems of the European Organization for Civil Aviation Equipment (EUROCAE) or equivalent documents.

(11) All turbine-engined aircraft of a maximum certificated take-off mass of up to and including 5 700kg, for which the application for type certification is submitted on or after 1 January 2016and required to be operated by more than one pilot shall be equipped with either a CVR or a CARS.

(12) CVRs and CARS shall not use magnetic tape or wire.

(13) All aircraft of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after1 January 2022 shall be equipped with a CVR capable of retaining the information recorded during at least the last twenty-five hours of its operation.

(14) Cockpit voice recorder alternate power an alternate power source shall automatically engage and provide ten minutes, plus or minus one minute, of

operation whenever
aircraft power to the recorder ceases, either by normal shutdown or by any other loss of power. The alternate power source shall power the CVR and its associated cockpit area microphone components. The CVR shall be located as close as practicable to the alternate power source.

NOTE "Alternate" means separate from the power source that normally provides power to the CVR. The use of aircraft batteries or other power sources is acceptable provided that the requirements above are met and electrical power to essential and critical loads is not compromised. When the CVR function is combined with other recording functions within the same unit, powering the other functions is allowed.

(15) All aircraft of a maximum certificated take-off mass of over 27 000 kg for which the application for type certification is submitted on or after 1January 2018 shall be provided with an alternate power source, as specified in 7.7.1(n) that powers the forward CVR in the case of combination recorders.

(16) All aircraft of a maximum certificated take-off mass of over 27 000 kg for which the

individual certificate of airworthiness is first issued on or after 1 January 2018 should be provided with an alternate power source, as specified in 7.7.1(15) that powers at least one CVR.

(17) Duration

(a) A cockpit voice recorder shall be capable of retaining the information recorded during at least the last:

(i) 2 hours of their operation; or

(ii) All aircraft that are required to be equipped with CARS, and for which the individual certificate of airworthiness is first issued on or after 1 January 2025, shall be equipped with a CARS which shall retain the information recorded during at least the last two hours of their operation.

(b) A CVR, installed in aircraft of a maximum certificated take-off mass of over 5,700 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1990, shall be capable of retaining the information recorded during at least the last two hours of its operation.

(c) A cockpit voice recorder, installed in helicopters for which the individual certificate of airworthiness was first issued on or after 1 January 2003, shall be capable of retaining the information recorded during at least the last two hours of its operation.

(d) A cockpit voice recorder, installed in helicopters for which the individual certificate of airworthiness was first issued on or after 1 January 1990, shall be capable of retaining the information recorded during at least the last two hours of its operation.

Note - Implementing Standards See IS: 7.7.1 for details general and performance requirements of the CVR

7.7.2 FLIGHT DATA RECORDERS (FDR) AND AIRCRAFT DATA RECORDING SYSTEMS (ADRS)

(1) Flight recorders shall
be constructed, 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.

(2) Flight recorders shall be calibrated as required by the Authority.

(3) Flight recorders shall have an approved device to assist in locating a recorder that may be under water.

(4) Flight recorders shall meet the prescribed Crashworthiness and Fire Protection Specification.

(5) The use of engraving metal foil flight data recorders is prohibited.

(6) The use of photographic film data recorders and analogue data recorders using frequency modulation (FM) is prohibited.

(7) ***Aircraft for which the individual certificate or airworthiness was first issued on or after 1 January 1987 but before 1 January 1989:***

(a) All turbine engine aircraft of a maximum certificated take-off mass over 5,700kg, except those in (8)(c) of this section shall be equipped with a flight data recorder which shall record time, altitude, airspeed, normal acceleration and heading.

(b) All turbine engine aircraft of a maximum certificate take-off mass over 5,700kg, except those in (8)(c) of this section, shall be equipped with a flight data recorder which shall record time, altitude, airspeed, normal acceleration, heading and such additional parameters as are necessary to determine pitch attitude, roll attitude, radio transmission keying and power on each engine.

(8) Unless otherwise authorized by the Authority, no person may operate the following aircraft unless it is equipped with the appropriate flight data recorder system to record the flight parameters for accident and incident analysis—

(a) All multi-engine turbine-engined aircraft with a certificated takeoff weight of less than 5,700 kg (12,500 lbs.) shall be equipped with a Type IIA FDR.

(b) All aircraft with a certificated takeoff weight of more than 5700 kg, up to and including 27,000 kg, shall be equipped with a Type II FDR.

(c) All aircraft with a maximum certificated takeoff weight of over 27,000 kg shall be equipped with a Type I FDR.

(d) All aircraft with a gross takeoff mass of more than 5 700 kg (12,500 lbs.) that receive original type certification after 1 January 2005 shall be equipped with a Type IA FDR.

Note: In anticipation of changing international safety standards, the Authority recommends that turbine engine aircraft operated in commercial air transport with a certificated takeoff mass of 5700 kg or less should install a Type I or Type II flight data recorder.

(e) All helicopters operated in commercial air transport with a certificated takeoff mass of over 7,000kg shall have at least a Type IV flight data recorder.

(f) All helicopters of a maximum certificated take-off mass of over 2,700 kg up to and including 7,000 kg should be equipped with a Type V FDR.

(9) The minimum parameters which shall be recorded by a flight data recorder are prescribed in IS 7.7.2.

(10) Flight data recorders shall be capable of retaining the information recorded during at least the last—

(a) Type I, IA and II - 25 hours of operation.

(b) Type IIA - 30 minutes of operation.

(c) Type IV and V -10 hours of operations.

(d) Type IVA – 10 hours of operation

(11) The flight data recorder mediums not acceptable for use in aircraft registered in Ghana, or operated by AOC holders of Ghana are—

(a) Engraving metal foil;

(b) Photographic film; or

(c) Analogue data using frequency modulation.

(12) (AOC) Flight recorders shall:

(a) Be constructed, 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;

(b) Be calibrated as required by the Authority;

(c) Have an approved device to assist in locating a recorder that may be under water; and

(d) Meet the prescribed Crashworthiness and Fire Protection Specification

Note: *Industry Crashworthiness and fire protection specifications can be found in documents such as the European Organisation for Civil Aviation Equipment (EUROCAE) Document ED 55 and ED56A*

Implementing Standards See IS: 7.7.2 (B) for specific data to be recorded by flight data recorders.

(e) The use of engraving metal foil flight data recorders shall be discontinued by 1 January 1995.

(f) The use of photographic film data recorders and analogue data recorders using frequency modulation (FM) should be discontinued by 1 January 2003.

(g) Aircraft for which the individual certificate of airworthiness was first issued on or after 1 January 1989:

(i) All aircraft of a maximum certificate take-off mass of over

27,000kg shall be equipped with a type 1 Flight Data Recorder.

(ii) All aircraft of a maximum certificated take-off mass of over 5,700 kg up to and including 27,000kg, shall be equipped with a type II Flight Data Recorder.

(iii) All multi-engine turbine powered aircraft of maximum certificated take-off mass of 5,700kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 1990 should be equipped with a type IIA flight data recorder.

(h) Aircraft for which the individual certificate or airworthiness was first issued on or after 1 January 1987 but before 1 January1989:

i. All turbine engine aircraft of a maximum certificated take-off mass over 5,700kg, except those in (10)(c), shall be equipped with a flight data recorder which shall record time, altitude, airspeed, normal acceleration and heading.

ii. All turbine engine aircraft of a maximum certificate take-off mass over 5,700kg, except those in (10)(c), shall be equipped with a flight data recorder which shall record time, altitude, airspeed, normal acceleration, heading and such additional parameters as are necessary to determine pitch attitude, roll attitude, radio transmission keying and power on each engine.

iii. All turbine engine aircraft of a maximum certificated take-off mass of over 27,000kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 shall be equipped with a type II FDR.

(i) Aircraft for which the individual certificate or airworthiness was first issued before 1 January1987:

(i) All turbine engine aircraft of a maximum certificated take-off mass of over 5,700 kg shall be equipped with a flight data recorder which shall record time, altitude, airspeed, normal acceleration and heading.

(j) All turbine engine aircraft of a maximum certificated take-of mass over 27,000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 should be equipped with a flight data recorder which should record, in addition to time, altitude, airspeed, normal acceleration and heading, such additional parameters as are necessary to meet the objectives of determining:

(i) the attitude of the aircraft in achieving its flight path; and

(ii) the basic forces acting upon the aircraft resulting in the achieved flight path and the origin of such basic forces.

(k) Aircraft for which the individual certificate of airworthiness is first issued after 1 January 2005 with a maximum certificated take-off mass over 5,700 kg shall be equipped with a type 1A flight data recorder.

(13) (AAC) All turbine-engine aircraft of a maximum certificated take-off mass of 5 700 kg or less for which the application for type certification is submitted on or after 1 January 2016 shall be equipped with:

(a) a Type II FDR; or

(b) a Class C AIR or AIRS capable of recording flight path and speed parameters displayed to the pilot(s); or

(c) an ADRS capable of recording the essential parameters defined in IS 7.7.2(B)

(14) (AOC) All aircraft which are required to record normal acceleration, lateral acceleration and longitudinal acceleration for which the application for type certification is submitted on or after 1 January 2016 and which are required to be fitted with an FDR shall record those parameters at a maximum sampling and recording interval of 0.0625 seconds.

(15) (AAC) All aircraft which are required to record pilot input and or control surface position of primary controls (pitch, roll, yaw) for which the application for type certification is submitted on or after 1 January 2016 and which are required to be fitted with an FDR shall record those parameters at a maximum sampling and recording interval of 0.125 seconds.

Note. — For aircraft with control systems in which movement of a control surface will back drive the pilot's control, "or" applies. For aircraft with control systems in which movement of a control surface will not back drive the pilot's control, "and" applies. In aircraft with independent moveable surfaces, each surface needs to be recorded separately. In aircraft with independent pilot input on primary controls, each pilot input on primary controls needs to be recorded separately.

(16) The use of magnetic tape FDRs shall be discontinued by 1 January 2016.

(17) Flight recorder records:

(a) The pilot-in-command, and or the owner or operator, shall ensure, to the extent possible, in the event the aircraft 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 specified in 9.2.2.6.

(b) All helicopters of a maximum certificated take-off mass over 2,700 kg, required to be equipped with an FDR and or a CVR, and may alternatively be equipped with one combination recorder (FDR/CVR).

(c) Helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 1989 with a maximum certificated take- off mass over 7,000 kg, shall be equipped with a Type IV FDR.

(d) All helicopters of a maximum certificated take-off mass of over 2,700 kg up to and including 7000 kg, shall be equipped with a Type V FDR.

(e) Helicopters for which the individual certificate of airworthiness is first issued after 1 January 2005 with a maximum certificated take-off mass over 3,175 kg, shall be equipped with a Type IVA FDR with a recording duration of at least10hrs.

(f) All helicopters of a maximum certificated take-off mass of over 3 175 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2016 shall be equipped with a Type IVA FDR.

(g) All turbine-engined helicopters of a maximum certificated take-off mass of over 2 250 kg, up to and including3 175 kg for which the application for type certification was submitted to a Contracting State on or after 1 January 2018 shall be equipped with:

i. a Type IV A FDR; or

ii. a Class
C AIR capable of recording flight path and speed parameters displayed to the pilot(s); or

iii. an ADRS capable of recording the essential parameters.

Note. — The "application for type certification was submitted to a Contracting State" refers to the date of application of the original "Type Certificate" for the helicopter type, not the date of certification of particular helicopter variants or derivative models.

(h) All helicopters of a maximum certificated take-off mass of 3 175 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2018 shall be equipped with:

i. a Type IV A FDR; or
ii. a Class C AIR capable of recording flight path and speed parameters displayed to the pilot(s); or
iii. an ADRS capable of recording the essential parameters defined in IS: 7.7.2

(i) All helicopters of certificated take-off mass of over 3 175 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1987 should be equipped with a CVR. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on the CVR.

Note: *A single, combination CVR or FDR is acceptable.*

(18) Flight data recorders shall be capable of retaining the information recorded during the last –

i. Type I and II – 25 hours of operation.

ii. Type IIA – 30 minutes of operation.

iii. Type IV and V – 10 hours of operation.

(19) Flight data recorder media not acceptable for use in aircraft registered in Ghana or operated by AOC holders in Ghana are–

i. Engraving metal foil;

ii. Photographic film; or

iii. Analogue data using frequency modulation.

Implementing Standard: See IS: 7.7.2(A) for details of the emergency exit equipment requirements.

(20) ***Operations***

(a) Flight recorders shall not be switched off during flight time.

(b) To preserve flight recorders, flight recorders shall be de-activated upon completion of flight time following an accident or incident. The flight recorders shall not be re-activated before their disposition as determined in accordance with Annex13.

Note. *The need for removal of the flight recorder from the aircraft will be*

determined by
the investigation authority in the State conducting the investigation with due regard to the seriousness of an occurrence and the circumstances, including the impact on the operations.

(21) **Continued Serviceability.** Operational checks and evaluations of recordings from the CVR and FDR systems shall be conducted to ensure the continued serviceably of the recorders.

(22) The parameters that satisfy the requirement for ADRS are the first parameters listed in IS 7.7.2(a) and if further ADRS recording capacity is available, the recording of any parameter from 8 onwards as listed in IS 7.7.2(b) shall be considered.

7.7.2.1 INSPECTIONS OF FLIGHT RECORDER SYSTEMS

7.7.2.1
(1) Prior to the first flight of the day, the built-in test features for the flight recorders and flight data acquisition unit
(FDAU), when installed, shall be monitored by manual or automatic checks.

(2) FDR systems or ADRS, CVR systems or CARS, and AIR systems or AIRS shall have recording system inspection intervals of one year; subject to the approval from the Authority, this period may be extended to two years provided these systems have demonstrated a high integrity of serviceability and self-monitoring. DLR systems or DLRS shall have recording system inspection intervals of two years; subject to the approval from the Authority, this period may be extended to four years provided these systems have demonstrated high integrity of serviceability and self-monitoring.

(3) Recording system inspections shall be carried out as follows:

a) an analysis of the recorded data from the flight recorders shall ensure that the recorder operates correctly for the nominal duration of the recording;

b) a complete flight recording from the FDR or ADRS 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 FDR or ADRS. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be
detected by other aircraft systems;

c) 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;

d) an examination of the recorded signal on the CVR or CARS shall be carried out by replay of the CVR or CARS recording. While installed in the aircraft, the CVR or CARS shall record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards;

e) where practicable, during the examination, a sample of in-flight recordings of the CVR or CARS shall be examined for evidence that the intelligibility of the signal is acceptable; and

f) an examination of the recorded images on the AIR or AIRS shall be carried out by replay of the AIR or AIRS recording. While installed in the aircraft, the AIR or AIRS shall record test images from each aircraft source and from relevant external sources to ensure that all required images meet recording quality standards.

(g) an examination of the recorded messages on the DLR or DLRS shall be carried out by replay of the DLR or DLRS recording.

(4) A flight recorder system 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.

(5)A report of the recording system inspection shall be made available on request to regulatory authorities for monitoring purposes.

(6) Calibration of the FDR system:

a) for those parameters which have sensors dedicated only to the FDR 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

b) when the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, there shall be a recalibration performed as recommended by the sensor manufacturer, or at least every two years.

7.7.3 RECORDING OF DATA LINK COMMUNICATIONS

(1) All helicopters that use data link communications and are required to carry a CVR, shall record on a flight recorder all data link communications to and from the helicopters. This requirement is effective-l January 2005, in all aircraft for which the individual certificate of airworthiness is issued after this date.

(2) All aircraft that use data link communications and are required to carry a CVR, shall record on a flight recorder all data link communications to and from the aircraft. This requirement is effective:

(3) The minimum recording duration shall be equal to the duration of the CVR, and shall be correlated to the recorded cockpit audio.

(4) The recording shall contain sufficient information to derive the content of the data link communications message and, whenever practical, the time the message was displayed to or generated by the crew shall be recorded.

(5) Aircraft required to be equipped with a FDR and a CVR may alternatively be equipped with the following number of combination (FDR/CVR)recorders-

(a) 2 - for all aircraft of a certificated takeoff mass of over 5700kg.

(b) 1 - for all multi-engined turbine powered aircraft of less than 5 700kg.

(6) Flight recorder electronic documentation: - The documentation requirement concerning FDR and ADRS parameters provided by operators to accident investigation authorities shall be in electronic format and take account of industry specifications.

(7) All aircraft of a maximum certificated take-off mass of over 15 000 kg for which the application for type certification is submitted on or after 1 January 2016 and which are required to be equipped with both a CVR and an FDR, shall be equipped with two combination recorders (FDR or CVR). One recorder shall be located as close to the cockpit as practicable and the other recorder located as far aft as practicable.

(8) In approving the means to make flight recorder data available in a timely manner, the Authority shall take into account the following:

(a) the capabilities of the Operator;

(b) overall capability of the aircraft and its systems as certified by the State of Design;

(c) the reliability of the means to recover the appropriate CVR channels and appropriate FDR data; and

(d) specific mitigation measures.

Note 1— Guidance on approving the means to make flight recorder data available in a timely manner is contained in the Manual on Location of Aircraft in Distress and Flight Recorder Data Recovery *(Doc 10054).*

Note 2 : See IS 7.7.3 for Data Link Communication (DLC) recording installation clarification

7.8 EMERGENCY, RESCUE, AND SURVIVAL EQUIPMENT

7.8.1 EMERGENCY EQUIPMENT: ALL AIRCRAFT

(1) (AAC) Each item of emergency and flotation equipment shall be-
Readily accessible to the crew and, with regard to equipment located in the passenger compartment, to passengers without appreciable time for preparatory procedures;

(a) Clearly identified and clearly marked to indicate its method of operation;

(b) Marked as to date of last inspection; and

(c) Marked as to contents when carried in a compartment or container.

7.8.2 EMERGENCY EXIT EQUIPMENT

(1) (AOC) Each passenger carrying landplane emergency exit (other than-over- the wing) that is more than 6 feet (1.828 metres) from the ground with the aircraft on the ground and the landing gear extended shall have an approved means to assist the occupants in descending to the ground.

(2) (AOC) Each passenger emergency exit, its means of access, and its means of opening shall be conspicuously marked by a sign visible to occupants approaching

along the main passenger aisle.

(3) (AOC) Each passenger-carrying aircraft shall have an emergency lighting system, independent of the main lighting system that-

(a) Illuminates each passenger exit marking and locating sign;

(b) Provides enough general lighting in the passenger cabin; and

(c) Includes floor proximity emergency escape path marking.

(4) (AOC) Each passenger emergency exit and the means of opening that exit from the outside, shall be marked on the outside of the aircraft.

(5) (AOC) Each passenger carrying aircraft shall be equipped with a slip- resistant escape route that meets the requirements under which that aircraft was type certified.

Implementing Standard See IS: 7.8.2. for details.

7.8.3 VISUAL SIGNALLING DEVICES

(1) (AAC) No person may operate an aircraft over water or across land areas which have been designated by Ghana as areas in which search and rescue would be especially difficult, unless equipped with such signaling devices as may be appropriate to the area overflown, to include-

(a) Visual signals for use by intercepting and intercepted aircraft; and

(b) At least one pyrotechnic signaling device for each life raft required for overwater operations.

(2) All helicopters operating flights over designated sea areas as areas in which search and rescue would be especially difficult, shall be equipped with life-saving equipment (including means of sustaining life) as may be appropriate to the area overflown.

7.8.4 SURVIVAL KITS

(1) (AAC) No person may operate an aircraft across land areas which have been designated by Ghana as areas in which search and rescue would be especially difficult, unless equipped with enough survival kits for the number of occupants of the aircraft and is appropriately equipped for the route to be flown.

(2) For offshore operations, a survival suit shall be worn by all occupants when the sea temperature is less than 10°C or when the estimated rescue time exceeds the calculated survival time. When the elevation and strength of the sun results in a high temperature hazard on the flight deck, consideration may be given to alleviating the flight crew from this provision.

7.8.5 EMERGENCY LOCATOR TRANSMITTER

(1) (AAC) All aircraft on all flights shall be equipped with an automatically activated Emergency Locator Transmitter (ELT).

(2) (AOC) No person may operate an aircraft in long-range overwater operations without having on the aircraft, at least two survival type ELTs, one of which shall be automatic that transmits simultaneously on 121.5 MHz and 406MHz, and meets the technical standards specified by the Authority.

(3) At least one survival type ELT shall be located with each life raft carried. (See 7.8.17)

(4) (AAC) Batteries used in ELT's shall be replaced (or recharged if the battery is rechargeable)when-

(a) The transmitter has been in use for more than one cumulative hour; or
(b) 50 percent of their useful life (or for rechargeable batteries, 50 percent of their useful life of charge) has expired.

(5) (AAC) The expiration date for a replacement or recharged ELT battery shall be legibly marked on the outside of the transmitter.

***Note**: The battery useful life (or useful life of charge) requirements do not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.*

(6) ELT equipment carried to satisfy the requirements of 7.8.5(1) shall operate in accordance with the relevant provisions of Annex 10, Volume III.

(7) All ELT equipment carried shall operate in accordance with the relevant provisions of Annex 10, Volume III.

(8) All aircraft for which the individual certificate of airworthiness is first issued after 1 January 2002, operated on long-range over-water flights as described in 7.8.17, shall be equipped with at least two ELTs, one of which shall be automatic.

(9) All aircraft operated on long-range over-water flights as described in 7.8.17, shall be equipped with at least two ELTs, one of which shall be automatic.

(10) Except as provided for in (11), until 1 January 2005 aircraft on flights over designated land areas as described in 7.8.3 shall be equipped with at least one ELT(s).

(11) All aircraft for which the individual certificate of airworthiness is first issued after 1 January 2002, on flights over designated land areas as described in 7.8.3shall be equipped with at least one automatic ELT.

(12) All aircraft on flights over designated land areas as described in 7.8.3 shall be equipped with at least one automatic ELT.

(13)No person shall operate a helicopter without the following Emergency Locater Equipment:

(a) [AAC] All helicopters on all flights shall be equipped with an automatically activated ELT that transmits simultaneously on both 406 MHz and 121.5MHz and meets the technical standards specified by the Authority and the relevant portions of ICAO Annex 10, Volume III.

(b) [AAC] All helicopters operating on flights over water or in a hostile environment, designated as a land area where search and rescue may be especially difficult shall be equipped with at least one (1) automatic ELT and one (1) automatic ELT(S) in each life raft carried on board.

Note – Section 7.8.17 of this Part has additional requirements for life rafts.

Note – When operating in a hostile environment, a safe ditching requires a helicopter to be designed for landing on water or certificated in accordance with ditching provisions.

Note – The judicious choice of numbers of ELTs, their type, and placement on aircraft and associated floatable life support systems will ensure the greatest chance of ELT activation in the event of an accident for aircraft operating over water or land, including areas especially difficult for search and rescue. Placement of transmitter units is a vital factor in ensuring optimal crash and fire protection. The placement of the control and switching devices (activation monitors) of automatic fixed ELTs and their associated operational procedures will also take into consideration the need for rapid detection of inadvertent activation and convenient manual switching by crew members.

All Performance Class 1 and 2 helicopters operating on flights over water as described in 7.8.18 and Performance Class 3 helicopters operating as described in 7.8.18 shall be equipped with at least one automatic ELT and at least one ELT(S) in aircraft.

(14)Performance Class 1 and 2 helicopters for which the individual certificate of airworthiness is first issued after 1 July 2008, operating on flights over water as described in 7.8.18 and Performance Class 3 helicopters for which the individual certificate of airworthiness is first issued after 1 July 2008, operating as described in 7.8.18 shall be equipped with at least one automatic ELT and at least one ELT(S) in aircraft.

7.8.6 PORTABLE FIRE EXTINGUISHERS

No person may operate an aircraft unless it is equipped with portable fire extinguishers accessible for use in crew, passenger, and cargo compartments as follows:

(a) The type and quantity of extinguishing agent shall be suitable for the kinds of fire likely to occur in the compartment where the extinguisher is intended to be used.

Note: When discharged, the portable fire extinguisher shall not cause dangerous contamination of the air within the aircraft.

(b) At least one portable fire extinguisher shall be provided and conveniently located for use in each Class E cargo compartment which is accessible to crew members during flight, and at least one shall be located in each upper and

lower lobe galley.

(c) At least one portable fire extinguisher shall be conveniently located on the flight deck for use by the flight crew.

(d) At least one portable fire extinguisher shall be conveniently located in the passenger compartment, if the passenger compartment is separate from the flight deck and not readily accessible to the flight crew.

(e) For each aircraft having a passenger seating capacity of more than 30, there shall be at least the following number of portable fire extinguishers conveniently located and uniformly distributed throughout the compartment.

Minimum Number of Hand Fire Extinguishers	**Passenger**
30 through	**2**
61 through	**3**
201 through	**4**
301 through	**5**
401 through	**6**
501 through	**7**
601 or more	**8**

7.8.7 LAVATORY FIRE EXTINGUISHER

(1) [AOC] No person may operate a passenger-carrying transport category aircraft unless each lavatory in the aircraft is equipped with a built-in fire extinguisher for each disposal receptacle for towels, paper, or waste located within the lavatory.

(2) (AOC) Built-in lavatory fire extinguisher shall be designed to discharge automatically into each disposal receptacle upon occurrence of a fire in the receptacle.

(3) [AAC] Any agent used in a built-in fire extinguisher for each lavatory disposal receptacle for towels, or waste in an aircraft for which the individual certificate of airworthiness is first issued on or after 31 December 2011 shall:

(a) Meet the applicable minimum performance requirements of the Authority; and

(b) Not contain Halon 1211, Halon 1301, or Halon 2402.

Note 1: The substances listed in (1) (b) above of Halon 1211, Halon 1301, and Halon 2402 are listed Annex A, Group II of the Montreal Protocol on Substances that Deplete the Ozone Layer, 8th Edition, 2009, which is listed in ICAO Annex 6, Part I: 6.2.2.1; ICAO Annex 6, Part II, Section II: 2.4.2.3, and ICAO Annex 6, Part III, Section III: 4.1.3.2.

Note 2: Information concerning extinguishing agents is contained in the UNEP Halons Options Committee Technical Note No1 – New Technology Halon Alternatives and FAA Report no. Dot/FAA/AR-99-63, Options to the Use of Halons for Aircraft Fire Suppression Systems.

7.8.8 LAVATORY SMOKE DETECTOR

[AOC] No person may operate a passenger-carrying transport category aircraft unless each lavatory in the aircraft is equipped with a smoke detector system or

equivalent that provides-

(a) A warning light in the cockpit; or

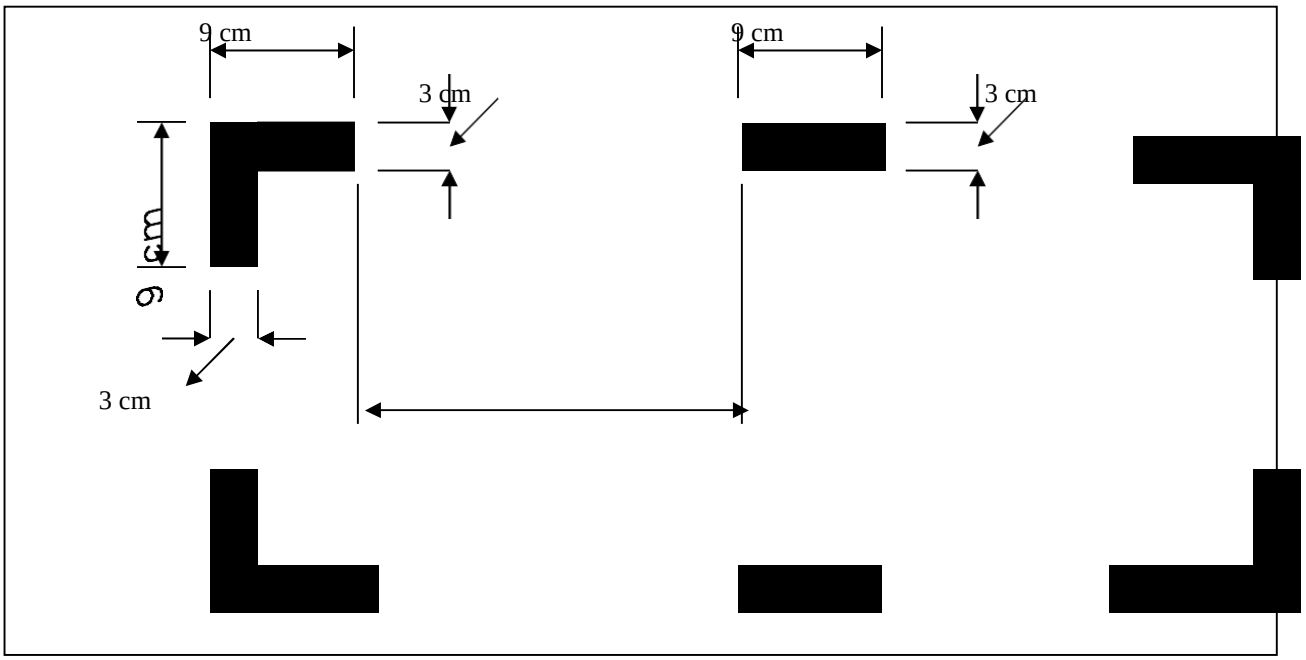
(b) A warning light or audio warning in the passenger cabin which would be readily detected by a cabin crew, taking into consideration the positioning of cabin crew throughout the passenger compartment during various phases of flight.

7.8.9 CRASH AXE

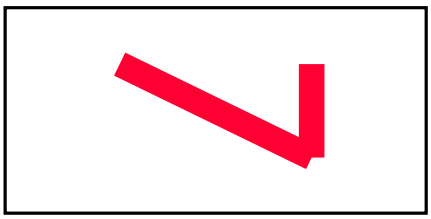
[AOC] No AOC holder shall operate an aircraft having a passenger seating configuration, excluding a pilot seat of more than 19 seats unless it is equipped with a crash axe appropriate to effective use in that type of aircraft, stored in a place not visible to passengers on the aircraft.

7.8.10 MARKING OF BREAK-IN POINTS

(1) (AAC) If areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on an aircraft, such areas shall be marked as shown below, (see figure below) and the colour of the markings shall be red or yellow and, if necessary, they shall be outlined in white to contrast with the background.



MARKING OF BREAK-IN POINTS



(2) If the corner markings are more than 2m apart, intermediate lines 9cm x 3cm shall be inserted so that there is no more than 2m between adjacent markings.

7.8.11 FIRST-AID AND EMERGENCY MEDICAL KIT

(1) (AOC) No person may operate an aircraft unless it is equipped with accessible first-aid kits and, on passenger flights, an approved emergency medical kit for treatment of injuries or medical emergencies that might occur during flight time or in minor accidents.

(2) [AOC] The type, number, location and contents of first-aid and medical kits to be carried shall comply with Implementing Standard: IS: 7.8.11.

(3) No person shall operate a helicopter unless it is equipped with:
(a) a first-aid kit; and
(b) for helicopters required to carry cabin crew as part of the operating crew, a universal precaution kit for the use of cabin crew in managing incidents of ill health associated with a case of suspected communicable disease, or in the case of illness involving contact with body fluids.

Implementing Standards: See IS: 7.8.11 for details of first aid medical supplies for aircraft and helicopters.

7.8.12 OXYGEN STORAGE AND DISPENSING APPARATUS

(1) [AAC] All aircraft intended to be operated at altitudes requiring the use of supplemental oxygen shall be equipped with adequate oxygen storage and dispensing apparatus as required in IS: 7.8.12 Table 2.

(2) [AAC) The oxygen apparatus, the minimum rate of oxygen flow, and the supply of oxygen shall meet applicable airworthiness standards for type certification in the transport category as specified by the Authority.

(3) [AOC] No AOC holder may operate an aircraft at altitudes above 10,000 feet unless it is equipped with oxygen masks, located so as to be within the immediate reach of flight crew members while at their assigned duty station as required in IS: 7.8.12 Table 2 and IS: 7.8.12(3).

(4) [AOC] No AOC holder may operate a pressurised aircraft at altitudes above 25,000 feet unless:

(a) Flight crew member oxygen masks are of a quick donning type;

(b) Sufficient spare outlets and masks and or sufficient portable oxygen units with masks are distributed evenly throughout the cabin to ensure immediate availability of oxygen to each required cabin crew member regardless of his location at the time of cabin pressurisation failure.

(c) An oxygen-dispensing unit connected to oxygen supply terminals is installed so as to be immediately available to each occupant, wherever seated. The total number of dispensing units and outlets shall exceed the number of seats by at least 10%. The extra units are to be evenly distributed throughout the cabin.

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

(6) A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is more than 376 hPa which cannot descend safely within four minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa, and for which the individual certificate of airworthiness was issued on or after 9 November 1998, shall be provided with automatically deployable oxygen equipment to satisfy the requirements of 7.8.12 (1). The total number of oxygen dispensing units shall exceed the number of passenger and cabin crew seats by at least 10 per cent.

(7) A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is more than 376 hPa which cannot descend safely within four minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa, and for

which the individual
certificate of airworthiness is issued before 9 November 1998, should be provided with automatically deployable oxygen equipment to satisfy the requirements of 7.8.12 (1). The total number of oxygen dispensing units should exceed the number of passenger and cabin crew seats by at least 10 per cent.

Implementing Standard: IS 7.8.12 to determine the amount of supplemental oxygen needed for non- pressurised and pressurized aircraft.

7.8.13 PROTECTIVE BREATHING EQUIPMENT(PBE)

(1) [AOC] No AOC holder may operate an aircraft with a maximum certified takeoff mass exceeding 5,700 kg, or having a maximum approved seating configuration of more than 19 seats unless-

(a) It has PBE to protect the eyes, nose and mouth of each flight crew member while on flight deck duty and to provide oxygen for a period of not less than 15 minutes; and

(b) It has sufficient portable PBE to protect the eyes, nose and mouth of all required cabin crewmembers and to provide breathing gas for a period of not less than 15minutes.

(2) [AOC] The oxygen supply for PBE may be provided by the required supplemental oxygen system.

(3) [AOC] The PBE intended for flight crew use shall be conveniently located on the flight deck and be easily accessible for immediate use by each required flight crew member at their assigned duty station.

(4) [AOC] The PBE intended for cabin crew use shall be installed adjacent to each required cabin crewmember duty station.

(5) [AOC] Easily accessible portable PBE shall be provided and located at or adjacent to the required hand fire extinguishers except that, where the fire extinguisher is located inside a cargo compartment, the PBE shall be stowed outside but adjacent to the entrance to that compartment.

(6) [AOC] The PBE while in use shall not prevent required communication.

7.8.14 FIRST AID OXYGEN DISPENSING UNITS

(1) [AOC] No AOC holder may conduct a passenger carrying operation in a pressurized aircraft at altitudes above 25,000feet, when a cabin crew member is required to be carried, unless it is equipped with-

(a) Undiluted first-aid oxygen for passengers who, for physiological reasons, may require oxygen following a cabin depressurization; and

(b) A sufficient number of dispensing units, but in no case less than two, with a means for cabin crew to use the supply.

(2) (AOC) The amount of first-aid oxygen required in paragraph (1) for a particular operation and route shall be determined on the basis of-

(a) Flight duration
after cabin depressurization at cabin altitudes of more than 8,000 feet;

(b) An average flow rate of at least 3 litres Standard Temperature Pressure Dry/minute/person; and

(c) At least 2% of the passengers carried, but in no case for less than one person.

7.8.15 MEGAPHONES

(1) [AOC] Each person operating a passenger-carrying aircraft shall have a portable battery-powered megaphone or megaphones readily accessible to the crewmembers assigned to direct emergency evacuation.

(2) [AOC] The number and location of megaphones required in paragraph (1) shall be determined as follows:

(a) On aircraft with a seating capacity of more than 60 and less than 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 aircraft with a seating capacity of more than 99 passengers, two megaphones in the passenger cabin on each aircraft one 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.

Note: The Authority may grant a deviation from the requirements of paragraph (2) if the Authority finds that a different location would be more useful for evacuation of persons during an emergency.

7.8.16 INDIVIDUAL FLOTATION DEVICES (AAC)

(1) Landplanes.

(a) [AAC] Landplanes shall carry the equipment prescribed in paragraph (b):

i. When flying en-route over water beyond gliding distance from the shore;

ii. When flying over water at a distance of more than 93 km (50 NM) away from the shore with either one or two power units inoperative; or

iii. When taking off or landing at an aerodrome where the Authority has determined the takeoff or approach path is so disposed over water that in the event of a mishap there would be the likelihood of a ditching.

(b) One life-jacket or equivalent flotation device equipped with a means of electronic illumination shall be carried for each person onboard, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided.

Note.— Life jackets accessible from seats or berths located in crew rest compartments are required only if the seats or berths concerned are certified to be occupied during take-off and landing.

(c) For helicopters
engaged in offshore operations, when operating beyond auto rotational distance from land, the life jacket shall be worn unless the occupant is wearing an integrated survival suit that includes the functionality of the life jacket.

(d) In the case of helicopters operating in performance Class 2 or 3, when 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, at least the equipment required in 7.8.16(1) (a) (iii) shall be carried.

(2) Seaplanes. [AOC] For all flights, seaplanes shall be equipped with the equipment prescribed in paragraph2.

7.8.17 LIFE RAFT

(1) [AOC] In addition to the equipment prescribed in 7.8.16, 7.9.15 and 7.9.16 of this Part, lifesaving rafts in sufficient numbers to carry all persons on board shall be installed in:

(a) Aircraft operated on routes on which the aircraft may be operated over water at more than a distance corresponding to 120mins at cruising speed or 740km (400NM) whichever is lesser away from land suitable for making an emergency landing in the case of aircraft operated in accordance with 8.7.2.6(1) and 8.7.2.7 (1).

(b) Aircraft operated on long range over-water flights with one engine inoperative in the event of the critical engine becoming inoperative, or two engines inoperative in the case of aircraft having three or more power units; and

(c) For all other aircraft when they are operated 30 minutes or 100 NM away from land suitable for making an emergency landing.

(2) All lifesaving rafts shall be stowed so as to facilitate their ready use in an emergency.

(3) Life rafts shall be equipped with the following life sustaining equipment

(a) A electronic survivor locator light;

(b) A survival kit;

(c) A pyrotechnic signaling device; and

(d) An ELT (See 7.8.5).

(4) [AOC] Life rafts which are not deployable by remote control and which have a mass of more than 40 kg shall be equipped with a means of mechanically assisted deployment.

(5) All helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 1991, at least 50 per cent of the life rafts carried in accordance with the provisions of 7.8.16(1)(b) shall be deployable by remote-control

(6) All aircraft on long-range over-water flights. In addition to the equipment prescribed in 7.8.1, 7.8.16 or 7.8.17 whichever is applicable, the following equipment shall be installed in all aircraft when used over routes on which the aircraft may be over water and at more than a distance corresponding to 120 minutes at cruising speed or740 km (400 NM), whichever is the lesser, away from land suitable for making an emergency landing in the case of aircraft operated in accordance with 8.7.2.3, 8.7.2.6 or 8.7.2.7, and 30 minutes or 185 km (100 NM), whichever is the lesser, for all other aircraft:

(a) life-saving rafts in sufficient numbers to carry all persons on board, stowed so as to facilitate their ready use in emergency, provided with such life-saving

(b) equipment including means of sustaining life as is appropriate to the flight to be undertaken;

(c) equipment for making the pyrotechnical distress signals described in Annex 2; and

(d) at the earliest practicable date but not later than 1January 2018, on all aircraft of a maximum certificated take-off mass of over 27 000 kg, a securely attached underwater locating device operating at a frequency of 8.8 kHz. This automatically activated underwater locating device shall operate for a minimum of 30 days and shall not be installed in wings or empennage.

Note. — Underwater Locator Beacon (ULB) performance requirements are as contained in the SAEAS6254, Minimum Performance Standard for Low Frequency Underwater Locating Devices (Acoustic) (Self-Powered)*, or equivalent documents.*

7.8.18 FLOATATION DEVICE FOR HELICOPTER DITCHING

(1) [AAC] All helicopters flying over water at a distance from land corresponding to more than 10 minutes at normal cruise speed in the case of performance Class 1 or 2 helicopters, or flying over water beyond auto rotational or safe forced landing distance from land in the case of performance Class 3 helicopters, shall be fitted with a permanent or rapidly deployable means of floatation so as to ensure a safe ditching of the helicopter.

(2) **All helicopters on flights over water (Means of flotation):** All helicopters intended to be flown over water shall be fitted with a permanent or rapidly deployable means of flotation to ensure a safe ditching of the helicopter when:

(a) engaged in offshore operations, or other overwater operations as prescribed by the State of the Operator; or
(b) flying over water in a hostile environment at a distance from land corresponding to more than 10minutes at normal cruise speed when operating in performance Class 1 or 2; or
(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.

7.8.19 *LOCATION OF AN AIRCRAFT IN DISTRESS:*

(a) All aircraft of a maximum
certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2023, shall autonomously transmit information from which a position can be determined by the operator at least once every minute, when in distress.

(b) The operator shall make position information of a flight in distress available to the Air Traffic Control Section.

7.9 MISCELLANEOUS SYSTEMS AND EQUIPMENT

7.9.1 SEATS, SAFETY BELTS, AND SHOULDER HARNESSES

[AOC] Each aircraft used in passenger operations shall be equipped with the following seats, safety belts, and shoulder harnesses that meet the airworthiness requirements for type certification of that aircraft:

(a) A seat or berth with safety belt for each person on board over an age of two-

(b) A safety harness for each flight crewmember seat. The safety harness for each pilot shall incorporate a device, which will automatically restrain the occupant's torso in the event of rapid deceleration.

(c) The safety harness for each pilot seat, which includes shoulder straps and a seat belt, should incorporate a device to prevent a suddenly incapacitated pilot from interfering with the flight controls.

(d) A forward or rearward facing (within 15 degrees of the longitudinal axis of the aircraft) seat equipped with safety harness for each cabin attendant station in the passenger compartment.

(e) Cabin crew seats shall be located near floor level and other emergency exits as required by the Authority for emergency evacuation.

(f) A safety harness for each flight crewmember seat. The safety harness for each pilot shall incorporate a device, which will automatically restrain the occupant's torso in the event of rapid deceleration.

(g) A forward or rearward facing (within 15 degrees of the longitudinal axis of the aircraft) seat equipped with safety harness for each cabin crew station in the passenger compartment.

(h) Cabin crew seats shall be located near floor level and other emergency exits as required by the Authority I State of Registry for emergency evacuation.

(i) Each cabin crew member assigned to emergency evacuation duties shall occupy a seat provided in accordance with 7.9.1 during take- off and landing and whenever the pilot-in-command so directs.

7.9.2 PASSENGER AND PILOT COMPARTMENT DOORS

(1) [AOC] Pilot compartment door-

(a) No person may operate a passenger carrying aircraft of a maximum certificated takeoff mass in excess of 45 000 kg or with a passenger seating capacity greater than 60 unless that aircraft 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 intrusions by unauthorized persons.

(b) No person may operate a passenger carrying aircraft having a certificated takeoff mass of less than 45 000 kg or with a passenger seating capacity of less than 60 unless that aircraft is equipped with

an approved flight crew compartment door, where practicable, that is designed to resist penetration by small arms fire and grenade shrapnel, and to resist forcible intrusions by unauthorized persons.

(c) Each pilot compartment door shall be capable of being locked and unlocked from either pilot's station.

(d) A means shall be provided for monitoring from either pilot station the entire door area outside the pilot compartment to identify persons requesting entry and to detect suspicious behaviour or potential threat.

(2) [AOC] Passenger compartment doors-

(a) Each passenger compartment door shall have–

(i) A means for the crew, in an emergency, to unlock each door that leads to a compartment that is normally accessible to passengers and that can be locked by passengers;

(ii) A placard on each door used to access a required passenger emergency exit, indicating that such door shall be open during takeoff and landing; and

(iii) A key, readily available for each crewmember, for each door that separates a passenger compartment from another compartment that has emergency exit provisions.

(3) (AOC) No person may conduct any passenger – carrying operation unless it has a means for the crew, in an emergency, to unlock each door that leads to a compartment that is normally accessible to passengers and that can be locked by passengers (e.g. toilet door).

(4) (AOC) No person may conduct any passenger – carrying operation unless it has a placard on each door that is the means of access to a required passenger emergency exit to indicate that it must be open during take-off and landing.

(5) In all aircraft which are equipped with a flight crew compartment door, this door shall be capable of being locked, and means shall be provided by which cabin crew can discreetly notify the flight crew in the event of suspicious activity or security breaches in the cabin.

(6) In all aircraft which are equipped with a flight crew compartment door in accordance with (1) above-

(a) This door shall be closed and locked from the time all external doors are closed following embarkation until any such door is opened for disembarkation, except when necessary to permit access and egress by authorized persons; and

7.9.3 PASSENGER INFORMATION SIGNS AND INSTRUCTIONS

(1) [AOC] No AOC holder shall operate a passenger carrying aircraft unless it is equipped with-

(a) At least one passenger information sign (using either letters or symbols)notifying when smoking is prohibited and one sign(using either letters or symbols) notifying when safety belts should be fastened and shall, when

illuminated, be legible to each person seated in the passenger cabin under all probable conditions of cabin illumination;

(b) Signs which notify when safety belts should be fastened and when smoking is prohibited shall be so constructed that the crew can turn them on and off;

(c) A sign or placard affixed to each forward bulkhead and each passenger seat back that reads "Fasten Seat Belt While Seated".

(2) [AOC] No AOC holder shall operate a passenger carrying aircraft unless it is provided with a means of ensuring that the following information and instructions are conveyed to passengers;

(a) When and how oxygen equipment is to be used if the carriage of oxygen is required;

(b) Location and use of life jackets or equivalent individual flotation devices where their carriage is required; and

(c) Location and method of opening emergency exits.

7.9.4 PUBLIC ADDRESS SYSTEM

[AOC] No AOC holder shall operate a passenger carrying aircraft with a maximum approved passenger seating configuration of more than 19 unless an approved public address system is installed that-

(a) Operates independently of the interphone systems except for handsets, headsets, microphones, selector switches and signaling devices;

(b) For each required floor level passenger emergency exit which has an adjacent cabin crew seat, has a microphone which is readily accessible to the seated cabin crew member, except that one microphone may serve more than one exit, provided the proximity of the exits allows unassisted verbal communication between seated cabin crewmembers;

(c) Is capable of operation within 10 seconds by a cabin crew member at each of those stations in the compartment from which its use is accessible;

(d) Is audible and intelligible at all passenger seats, toilets, and cabin crew seats and workstations; and

(e) Is accessible for immediate use from each of the flight crewmember stations in the pilot's compartment.

7.9.5 MATERIALS FOR CABIN INTERIORS

(1) [AOC] Upon the first major overhaul of an aircraft cabin or refurbishing of the cabin interior, all materials in each compartment used by the crew or passengers that do not meet the current airworthiness requirements pertaining to materials used in the interior of the cabin for type certification in the transport category as cited by the Authority, shall be replaced with materials that meet the requirements specified by the Authority.

(2) [AOC] Seat cushions, except those on flight crewmember seats, in any compartment occupied by crew or passengers shall meet requirements pertaining to fire protection as specified by the Authority.

7.9.6 MATERIALS FOR CARGO AND BAGGAGE COMPARTMENTS

[AOC] Each Class C or D cargo compartment greater than 200 cubic feet in volume in a transport category aircraft type certified after January 1, 1958 shall have ceiling and sidewall liner panels which are constructed of-

(a) Glass fibre reinforced resin;

(b) Materials which meet the test requirements for flame resistance of cargo compartment liners as prescribed for type certification; or

(c) In the case of installations approved prior to March 20, 1989, aluminum.

Note: *The term "liner" includes any design feature, such as a joint or fastener, which would affect the capability of the liner to safely contain fire.*

7.9.7 POWER SUPPLY, DISTRIBUTION, AND INDICATION SYSTEM

(1) [AOC] No AOC holder may operate an aircraft unless it is equipped with-

(a) A power supply and distribution system that meets the airworthiness requirements for certification of an aircraft in the transport category, as specified by the Authority, or

(b) A power supply and distribution system that is able to produce and distribute the load for the required instrument and equipment with use of an external power supply if any one power source or component of the power distribution system fails.

Note: *The use of common elements in the system may be approved if the Authority finds that they are designed to be reasonably protected against malfunctioning.*

(c) A means for indicating the adequacy for the power being supplied to the required flight instruments.

(2) (AOC) Engine-driven sources of energy, when used, must be on separate engines.

7.9.8 PROTECTIVE CIRCUIT FUSES

[AOC] No AOC holder may operate an aircraft in which protective fuses are installed unless there are spare fuses available for use in flight equal to at least 10% of the number of fuses of each rating or three of each rating whichever is the greater.

7.9.9 ICING PROTECTION EQUIPMENT

(1) [AAC] Unless an aircraft is certified under the transport category airworthiness requirements relating to ice protection, no person may operate an aircraft in icing condition unless it is equipped for the prevention or removal of ice on windshields, wings, empennage, propellers, and other parts of the aircraft where ice formation will adversely affect the safety of the aircraft.

(2) [AOC] No AOC holder may operate an aircraft in expected or actual icing condition at night unless it is equipped with a means to illuminate and or detect the formation of ice.

> ***Note:*** *Any illumination that is used shall be of a type that will not cause glare or reflection that would handicap crewmembers in the performance of their duties.*

(3) **Helicopters when carrying passengers :–** shall be equipped with operative weather radar or other significant – weather detection equipment whenever such helicopters are being operated in areas where thunderstorms or other potentially hazardous weather conditions, regarded as detectable, may be expected to exist along the route either at night or under instrument meteorological conditions.

7.9.10 PITOT HEATING INDICATION SYSTEMS

[AOC] No AOC holder may operate a transport category aircraft equipped with a flight instrument pitot heating system unless the aircraft is also equipped with an operable pitot heat indication system that complies with the following requirements:

(a) The indication provided shall incorporate an amber light that is in clear view of a flight crewmember.

(b) The indication provided shall be designed to alert the flight crew if either the pitot heating system is switched “off”, or the pitot heating system is switched “on” and any pitot tube heating element is inoperative.

7.9.11 STATIC PRESSURE SYSTEM

[AOC] No person may operate an aircraft unless two independent static pressure systems, vented to the outside atmospheric pressure so that they will be least affected by air flow variation or moisture or other foreign matter, and installed so as to be airtight except for the vent. When a means is provided for transferring an instrument from its primary operating system to an alternate system, the means must include a positive positioning control and must be marked to indicate clearly which system is being used.

7.9.12 WINDSHIELD WIPERS

[AOC] No AOC holder shall operate an aircraft with a maximum certified take-off mass of more than 5,700 kg unless it is equipped at each pilot station with a windshield wiper or equivalent means to maintain a clear portion of the windshield during precipitation.

7.9.13 CHART HOLDER

[AOC] No AOC holder shall operate an aircraft unless a chart holder is installed in an easily readable position which can be illuminated for night operations.

7.9.14 COSMIC RADIATION DETECTION EQUIPMENT

(1) [AOC] An AOC holder shall ensure that aircraft intended to be operated above 15,000m (49,000ft) are equipped with an instrument to measure and indicate continuously the dose rate of total cosmic radiation being received (i.e., the total of ionizing and neutron radiation of galactic and solar origin) and the cumulative doses on each flight.

(2) [AOC] An AOC holder shall ensure aircraft operated or intended to be operated above 15 000 m (49 000 ft.)shall carry equipment to measure and indicate continuously the dose rate of total cosmic radiation being received (i.e. the total of ionizing and neutron radiation of galactic and solar origin) and the cumulative dose on each flight. The display unit of the equipment shall be readily visible to a flight crew member.

Note. — The equipment is calibrated on the basis of assumptions acceptable to the Authority.

7.9.15 MARITIME SOUND SIGNALLING DEVICE

[AAC] All seaplanes for all flights shall be equipped with equipment for making the sound signals prescribed in all local and international regulations for Preventing Collisions at Sea, where applicable.

7.9.16 ANCHORS

[AAC] All seaplanes for all flights shall be equipped with one sea anchor (drogue), when necessary to assist in manoeuvring (approval for the anchors not required).

Note: *"Seaplanes" includes amphibians operated as seaplanes.*

GHANA CIVIL AVIATION (FLIGHT STANDARDS) DIRECTIVES

PART 7 – IMPLEMENTING STANDARDS

For ease of reference, the number assigned to each implementing standards corresponds to its associated directive. For example, IS 7.2.6 reflects the standard required in subsection 7.2.6

NOVEMBER 2018

IS: 7.2.6 CATEGORY II: INSTRUMENTS AND EQUIPMENT APPROVAL AND MAINTENANCE REQUIREMENTS

(a) ***General:*** The instruments and equipment required by 7.2.6 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 calendar month before the date of submission-

(1) The ILS localizer and glide slope equipment were bench checked according to the manufacturer's instructions and found to meet those standards specified in RTCA Paper 23-63/DO-177 dated March 14, 1963, "Standard Adjustment Criteria for Airborne Localizer and Glideslope Receivers";

(2) The altimeters and the static pressure systems were tested and inspected; and

(3) All other instruments and items of equipment specified in 7.2.6 that are listed in the proposed maintenance program were bench checked and found to meet the manufacturer's specifications.

(b) ***Flight control guidance system.*** All components of the flight control guidance system shall be approved as installed by the evaluation program specified in paragraph (e) 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.

(c) ***Radio altimeter.*** A radio altimeter must meet the performance criteria of this paragraph for original approval and after each subsequent alteration-

(1) It shall display to the flight crew clearly and positively the wheel height of the main landing gear above the terrain.

(2) 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 degrees about the mean approach attitude.

(ii) Roll angles of zero to 20 degrees in either direction.

(iii) Forward velocities from minimum approach speed up to 200 knots.

(iv) Sink rates from zero to 15 feet per second at altitudes from 100 to 200 feet.

(3) Over level ground, it must track the actual altitude of the aircraft without significant lag or oscillation.

(4) With the aircraft at an altitude of 200 feet or less, any abrupt change in terrain representing no more than 10 percent 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 1 second.

(5) 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 500 feet.

(6) 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.

(d) ***Other instruments and equipment.*** All other instruments and items of equipment required by 7.2.6 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.

(e) Evaluation program.

(1) ***Application***. Approval by evaluation is requested as a part of the application for approval of the Category II manual.

(2) ***Demonstrations.*** Unless otherwise authorised by the Authority, the evaluation program for each aircraft requires the demonstration specified in this paragraph. At least 50 ILS approaches shall be flown with at least five 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 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 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.

(3) ***Records.*** During the evaluation program the following 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.

(vii) Quality of overall system performance.

(4) ***Evaluation***. 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.

(f) Each maintenance program for Category II instruments and equipment shall contain the following:

(1) A list of each instrument and item of equipment specified in 7.2.6 that is installed in the aircraft and approved for Category II operations, including the make and model of those specified in 7.2.6(1)(a).

(2) A schedule that provides for the performance of inspections under subparagraph (5) of this paragraph within 3 calendar months after the date of the previous inspection. The inspection shall be performed by a person authorized by Part 5 (Airworthiness), 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 authorization for the type of aircraft checked.

(3) A schedule that provides for the performance of bench checks for each listed instrument and item of equipment that is specified in 7.2.6 (1) (a) within 12 calendar months after the date of the previous bench check.

(4) A schedule that provides for the performance of a test and inspection of each static pressure system within 12 calendar months after the date of the previous test and inspection.

(5) 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 7.2.6 (1)(a) to perform as approved for Category II operations including a procedure for recording functional flight checks.

(6) A procedure for assuring that the pilot is informed of all defects in listed instruments and items of equipment.

(7) 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.

(8) 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.

(g) ***Bench check.*** A bench check required by this section shall comply with this paragraph.

(1) Except as specified in paragraph (g)(2) of this subsection, it shall be performed by a certificated repair station holding one of the following ratings as appropriate to the equipment checked:
(i) An instrument rating.
(ii) Avionics

(2) It shall be performed by a certificated air operator on aircraft identified in its approved specific operating provisions with the approved authorizations to perform maintenance and approve for return to service its own aircraft maintained under a continuous maintenance program under an equivalent system identified in Part 9.

(3) 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.

(h) ***Extensions.*** After the completion of one maintenance cycle of 12 calendar 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.

IS: 7.7.1 COCKPIT VOICE RECORDERS

(a) General requirements

(1) The CVR is to be designed so that it will record at least the following:

(i) voice communication transmitted from or received in the aeroplane by radio;
(ii) aural environments on the flight deck;
(iii) voice communication of flight crew members on the flight deck using the interphone systems;
(iv) voice or audio signals identifying navigation or approach aids introduced in the headset or speaker;
(v) voice communication of flight crew members using the passenger address system, if installed; and
(vi) digital communication with ATS, unless recorded by the FDR.

(2) The CVR container is to:

(i) be painted a distinctive orange or yellow colour;
(ii) carry reflective material to facilitate its location; and
(iii) have securely attached an automatically activated under-water locating device.

(3) To aid in voice and sound discrimination, micro-phones in the cockpit are to be located in the best position for recording voice communication originating at the pilot and co-pilot station and voice communications of other crew members on the flight deck when directed to those stations. This can best be achieved by writing suitable boom micro-phones to record continuously on separate channels.

(4) The CVR is to be installed so that:

(i) the probability of damage to the recording is minimized. To meet this requirement it should be located as far aft as practicable. In the case of pressurized aeroplanes it should be located in the vicinity of the rear pressure bulkhead;

(ii) it receives its electrical power from a bus that provides the

maximum reliability for operation of the CVR without jeopardizing service to essential or emergency loads;

(iii) there is an aural or visual means for pre-flight checking of the CVR for proper operation; and

(iv) if the CVR has a bulk erasure device, the installation should be designed to prevent operation of the device during flight time or crash impact.

(b) Performance requirements

(1) The CVR will be capable of recording on at least four tracks simultaneously. To ensure accurate time correlation between tracks, the CVR is to record in an in-line format. If a bi-directional configuration is used, the in-line format and track allocation should be retained in both directions.

(2) The preferred track allocation is as follows:

Track 1 - co-pilot headphones and live boom Microphone.

Track 2 - pilot headphones and live boom microphone.

Track 3 - area microphones.

Track 4(aeroplanes) - time reference plus the third and fourth crew members' headphones and live microphones, if applicable.

Track 4(helicopters) - time reference, main rotor speed or the flight deck vibration environment, the third and fourth crew members' headphones and live microphones, if applicable.

Note 1: *Track 1 is located closest to the base of the recording head.*

Note 2: *The preferred track allocation presumes use of current conventional magnetic tape transport mechanism, 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.*

(3) The CVR, when tested by methods approved by the appropriate certificating authority, will be demonstrated to be suitable for the environmental extremes over which it is designed to operate.

(4) Means will be provided for an accurate time correlation between the FDR and CVR.

Note: *One method of achieving this is by superimposing the FDR time signal on the CVR.*

(c) Additional information

(1) The manufacturer usually provides the national certificating authority with the following information in respect of the CVR:

(i) manufacturer's operating instructions, equipment's limitations and installation procedures: and
(ii) manufacturer's test reports.

IS: 7.7.2(A) FLIGHT DATA RECORDERS

(a) The following table summarizes the parameters prescribed by the Authority that shall be recorded in a Type I, IA, II, IIA, IV, IVA and V FDR.s.
(b) Additional information is provided in the table regarding Type IA parameters—
(1) The parameters without an asterisk (*)are mandatory parameters that shall be recorded regardless of aircraft complexity.
(2) Those parameters designated by an asterisk (*) are to be recorded if an information source for the parameter is used by the aircraft systems and/or flight crew to operate the aircraft.

TYPE OF FLIGHT DATA RECORDER:	I	IA	II	II A	IV	V	IV A
Requirements for FLIGHT PA THAND SPEED:							
Pressure altitude	X	X	X	X	X	X	X
Indicated airspeed or calibrated airspeed.	X	X	X	X	X	X	X
Air-ground status and each landing gear air-ground sensor, when practicable	X	X					
Total or outside air temperature	X	X	X	X	X	X	X
Heading (primary flight crew reference)	X	X	X	X	X	X	X
Normal acceleration	X	X	X	X	X	X	X
Lateral acceleration	X	X			X		X
Longitudinal acceleration (body axis)	X	X			X		X
Time or relative time count	X	X	X	X	X	X	X
Navigation data*: drift angle, wind speed, wind direction, latitude/	X	X			X		X
Groundspeed*	X	X			X		X
Radio altitude*.	X	X			X		X

TYPE OF FLIGHT DATA RECORDER:	I	IA	II	II A	IV	V	IV A
Requirements for ATTITUDE:							
Pitch attitude	X	X	X	X	X	X	X
Roll attitude	X	X	X	X	X	X	X
Yaw or sideslip angle*		X					X
Yaw rate (acceleration)					X		X
Angle of attack*		X					

TYPE OF FLIGHT DATA RECORDER:	I	IA	II	II A	IV	V	IV A
Requirements for ENGINE POWER.							
Engine thrust/power: propulsive thrust/power on each engine,	X	X	X	X	X	X	X
Cockpit thrust/power lever position	X	X					
Thrust reverse status*	X	X	X	X	X	X	
Engine thrust command*		X					
Engine thrust target*		X					
Engine bleed valve position*		X					
Additional engine parameters*: EPR, Nl, indicated vibration level, N2, EGT, TLA, fuel flow,		X					
Power on each engine: free power turbine speed (N)i) engine torque, engine gas generator speed (N_g)							X
Rotor: main rotor speed, rotor brake					X	X	X
Main gearbox oil pressure*					X		X
Gearbox oil temperature*: main gearbox oil temperature, intermediate gearbox oil					X		X
Engine exhaust gas temperature (T4)*							X
Turbine inlet temperature (TIT)*							X

TYPE OF FLIGHT DATA RECORDER:	I	IA	II	IIA	IV	V	IV A
Requirements for CONFIGURATION:							
Pitch trim surface position	X	X					
Flaps*: trailing edge flap position, cockpit control selection	X	X	X	X			
Slats*: leading edge flap (slat) position, cockpit control selection	X	X	X	X			
Landing gear*: landing gear, gear selector positions	X	X			X		X
Yaw trim surface position*		X					
Roll trim surface position*		X					
Cockpit trim control input position pitch*		X					
Cockpit trim control input position roll*		X					
Cockpit trim control input position yaw*		X					
Ground spoiler and speed brake*: Ground spoiler position, ground spoiler selection, speed brake position, speed brake selection	X	X	X	X			
De-icing and/or anti-icing systems selection*		X					
Ice detector liquid water content*							X
Hydraulic pressure (each system)*	X	X					
Fuel quantity*		X					X
AC electrical bus status*		X					
DC electrical bus status*		X					
APU bleed valve position*		X					
Computed		X					

TYPE OF FLIGHT DATA RECORDER:	I	IA	II	IIA	IV	V	IV A
Requirements for OPERA TION:							
Master Warnings	X	X			X		X
Warnings		X					X
Primary flight control surface and primary flight control pilot input: pitch axis, roll axis, yaw axis	X	X					

Primary Flight Controls. Pilot input and/or control output position; collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal, controllable stabilator, hydraulic selection.					X	X	X
Marker beacon passage	X	X			X		X
Each navigation receiver frequency selection	X	X			X		X
Hydraulics low pressure					X	X	X
Stability augmentation system engagement*					X	X	X
Indicated sling load force*					X		X
Altitude rate*							X
Ice detector liquid water content*							X
Helicopter health and usage monitor system (HUMS)*: engine data chip detectors, track timing, exceedance discretes, broadband							X
Manual radio transmission keying and CVR/FDR synchronization reference	X	X	X	X	X	X	X
Autopilot/autothrottle/AFCS mode and engagement status*	X	X	X	X	X	X	X
Selected barometric setting*: pilot, first officer		X					
Selected altitude (all pilot selectable modes of operation)*		X					
Selected speed (all pilot selectable modes of operation)*		X					
Selected Mach (all pilot selectable modes of operation)*		X					
Selected vertical speed (all pilot selectable modes of operation)*		X					
Selected heading (all pilot selectable modes of operation)*		X					

TYPE OF FLIGHT DATA RECORDER:	I	IA	II	IIA	IV	V	IVA
Selected flight path (all pilot selectable modes of operation)*: course/DSTRK, path angle		X					
Selected decision height*		X					
EFIS display format*: pilot, first officer		X					
Multi-function/engine/alerts display format*		X					
GPWS/TAWS/GCAS status: selection of terrain display mode including pop-up display status, terrain alerts, both cautions and warnings, and	X	X					

Low pressure warning*: hydraulic pressure, pneumatic pressure		X					
Computer failure*		X					
Loss of cabin pressure		X					
TCAS/ACAS (traffic alert and collision avoidance system/airborne collision avoidance system)*		X					
Ice detection*		X					
Engine warning each engine vibration*		X					
Engine warning each engine over temperature*		X					
Engine warning each engine oil pressure low*		X					
Engine warning each engine over speed*		X					
Wind shear warning*		X					
Operational stall protection, stick shaker and pusher activation*		X					
All cockpit flight control input forces*: control wheel, control column, rudder pedal cockpit input		X					
Vertical deviation*: ILS glide patch, MLS elevation, GNSS	X	X			X		X
Horizontal deviation*: ILS localizer, MLS azimuth, GNSS	X	X			X		X
DME 1 and 2 distances	X	X			X		X
Primary navigation system reference*: GNSS, INS, VOR/DME, MLS, Loran-C,	X	X					
Brakes*: left and right brake pressure, left and right brake pedal position		X					

TYPE OF FLIGHT DATA RECORDER:	I	IA	II	IIA	IV	V	IVA
Date*		X					
Event Marker*		X					
Head-up display in use*		X					
Para visual display on*		X					

IS 7.7.2(B) AIRCRAFT DATA RECORDING SYSTEMS (ADRS)

(a) ADRS shall be capable of recording, as appropriate to the aircraft, at least the essential (E) parameters in the Table below.

(b) The measurement range, recording interval and accuracy of parameters on installed equipment is usually verified by methods approved by the Authority.

(c) Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability or maintenance information shall be maintained by the operator. The documentation shall be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

Note: See GCADs 7.7.2.1

Table—Parameter Guidance for Aircraft Data Recording Systems

No.	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˚	1	±2˚	0.5˚	*If not available, record rates
2	Pitch attitude	E*	±90˚	0.25	±2˚	0.5˚	*If not available, record rates
3	Roll attitude	E*	±180˚	0.25	±2˚	0.5˚	*If not available, record rates
4	Yaw rate	E*	±300˚	0.25	±1% + drift of 360˚/hr	2˚	*Essential if no heading available
5	Pitch rate	E*	±300˚	0.25	±1% + drift of 360˚/hr	2˚	*Essential if no pitch attitude available
6	Roll rate	E*	±300˚	0.25	±1% + drift of 360˚/hr	2˚	*Essential if no roll rate available
7	Positioning system: latitude/ longitude	E	Latitude: ±90˚; Longitude: ±180˚	2 (1 if available)	As installed (0.00015˚ recommended	0.00005˚	--
8	Positioning system:	E*	Available range	2 (1 if available)	As installed	As installed	*If available

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
	estimated error						
9	Positioning system: altitude	E	-300 m (-1 000 ft) to maximum certificated altitude of aeroplane +1 500 m (5 000 ft)	2 (1 if available)	As installed (±15 m (±50 ft) recommended)	1.5 m (5 ft)	--
10	Positioning system: time	E	24 hours	1	±0.5 second	0.1 second	*UTC time preferred where available
11	Positioning system: ground speed	E	0-1 000 kt	2 (1 if available)	As installed (±5 kt recommended)	1 kt	--
12	Positioning system: channel	E	0-360˚	2 (1 if available)	As installed (±2˚ recommended)	0.5˚	--
13	Normal acceleration	E	-3 g to + 6 g(*)	0.25 (0.125 if available)	As installed (±0.09 g excluding a datum error of ±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	--

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
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 (31.03 in-Hg) or available sensor range	1	As installed (±1 mb (0.1 in-Hg) or ±30 m (±100 ft) to ±210 m (±700 ft) recommended)	0.1 mb (0.01 in-Hg) or 1.5 m (5 ft)	--
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	--

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
20	Engine oil pressure	R	Full range	Each engine each second	As installed (5% of full range)	2% of full range	--
21	Engine oil temperature	R	Full range	Each engine each second	As installed (5% of full range)	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. EPRN/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 overspeed should be provided.
25	Engine gas generator speed (Ng)	R	0-150%	Each engine each second	As installed	0.2% of full range	--
26	Free power turbine speed (Nf)	R	0-150%	Each engine each second	As installed	0.2% of full range	--

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
27	Coolant temperature	R	Full range	1	As installed (±5˚C recommended)	1˚C	--
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˚	--
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	As installed	--	*Where available, record up-and-

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
				every 2 seconds			locked and down-and-locked position
37	Novel/ unique aircraft features	R	As required	As required	As required	As required	--

Parameters Characteristics for Flight Data Recorders

Serial number	Parameter	Applicability	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 GNSS time sync)		24 hours	4	±0.125% h	1 s
2.	Pressure-altitude		-300 m (-1 000 ft) to maximum certificated altitude of aircraft + 1500m (+5000 ft)	1	±30 m to ±200 m (±100 ft to ±700 ft)	1.5 m (5ft)
3.	Indicated airspeed or calibrated airspeed		95 km/h (50 kt) to max V_{So} *(Note 1)* V_{So} to 1.2 V_D *(Note 2)*	1	±5% ±3%	1 kt (0.5 kt recommended)
4.	Heading (primary flight crew reference)		360^0	1	$\pm 2^0$	0.5°
5.	Normal acceleration *(Note 3)*	Application for type certification is submitted to a Contracting State before 1 January 2016	-3 g to +6 g	0.125	±1% of maximum range excluding datum error of ±5%	0.004 g

		Application for type certification is submitted to a Contracting State on or after 1 January 2016	-3 g to +6 g	0.0625	±1% of maximum range excluding datum error of ±5%	0.004 g
6.	Pitch attitude		±75 degrees or usable range whichever is greater	0.25	±2 degrees	0.5°
7.	Roll attitude		±180 degrees	0.25	±2 degrees	0.5°

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
8.	Radio transmission keying		On-off (one discrete)	1		
9.	Power on each engine *(Note 3)*		Full range	1 (per engine)	±2%	0.2% of full range or the resolution required to operate the aircraft
10.	Trailing edge flap or 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 cockpit control selection		Full range or each discrete position	2	±5% or as pilot's indicator	0.2% 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 selection (selection and position)		Full range or each discrete position	1	±2% unless higher accuracy uniquely required	0.2% of full range
14.	Outside air temperature		Sensor range	2	±2 degrees C	0.3°C
15.	Autopilot/auto throttle/AFCS mode and engagement status		A suitable combination of discretes	1		

16.	Longitudinal acceleration (Note 3)	Application for type certification submitted to a Contracting State before 1 January 2016	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
		Application for type certification submitted to a Contracting State on or after 1 January 2016	±1 g	0.0625	±0.015 g excluding a datum error of ±0.05 g	0.004 g
17.	Lateral acceleration (Note 8)	Application for type certification submitted to a Contracting State before 1 January 2016	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
		Application for type certification submitted to a Contracting State on or after 1 January 2016	±1 g	0.0625	±0.015 g excluding a datum error of ±0.05 g	0.004 g

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
18.	Pilot input and/or control surface position-primary controls (pitch, roll, yaw) (Notes 4 and 8)	Application for type certification submitted to a Contracting State before 1 January 2016	Full range	0.25	±2° unless higher accuracy uniquely required	0.2% of full range or as installed
		Application for type certification submitted to a Contracting State on or after 1 January 2016	Full range	0.125	±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 (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)
21.	Vertical beam deviation (ILS/GNSS/GLS glide path, MLS elevation, IRNAV/IAN vertical deviation) deviation		Signal range	1	±3%	0.3% of full range
22.	Horizontal beam deviation (ILS/GNSS/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.	NAV 1 and 2 frequency selection *(Note 5)*		Full range	4	As installed	
26.	DME 1 and 2 distance (includes Distance to runway threshold (GLS) and Distance to missed approach point (IRNAV/IAN)) *(Notes 5 and 6)*		0 – 370 km (0-200 NM)	4	As installed	1 852 m (1 NM)
27.	Air/ground status		Discrete	1		

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
28.	GPWS/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	As installed	0.5 % of full range
31.	Navigation data (latitude/longitude, ground speed and drift angle) *(Note 7)*		As installed	64	As installed	0.1 mb (0.01 in-Hg)
32.	Landing gear and gear selector position		Discrete	4	As installed	
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, discretes 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, engine fuel metering valve position)	Engine fuel metering valve position: Application for type certification is submitted to a Contracting State on or after 1 January 2023	As installed	Each engine each second	As installed	2% of full range

Serial number	**Parameter**	**Applicability**	**Measurement range**	**Maximum sampling and recording interval (seconds)**	**Accuracy limits (sensor input compared to FDR read-out)**	**Recording resolution**
36.	TCAS/ACAS (traffic alert and collision avoidance system)		Discretes	1	As installed	

37.	Wind shear warning		Discretes	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 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 crew selection
Serial number	**Parameter**	**Applicability**	**Measurement range**	**Maximum sampling and recording interval (seconds)**	**Accuracy limits (sensor input compared to FDR read-out)**	**Recording resolution**
44.	Selected flight path (all pilot selectable modes of operation) (course/DSTRK, path angle, final approach path (IRNAV/IAN))		As installed	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.	Multifunction/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)	4	As installed	
53.	Engine thrust command		As installed	2	As installed	
54.	Engine thrust target		As installed	4	As installed	2% of full range

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
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	
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
Serial number	**Parameter**	**Applicability**	**Measurement range**	**Maximum sampling and recording interval (seconds)**	**Accuracy limits (sensor input compared to FDR read-out)**	**Recording resolution**
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	±5%	
70.	Hydraulic pressure (each system)		Full range	2	±5%	100 psi

71.	Loss of cabin pressure		Discrete	1	±5%	
72.	Cockpit trim control input position, Pitch		Full range	1	±5%	0.2% of full range or as installed
73.	Cockpit trim control input position, Roll		Full range	1	±5%	0.2% of full range or as 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 (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	
79.	Cabin pressure altitude	Application for type certification submitted to a Contracting State on or after 1 January 2023	As installed (0 ft to 40 000 ft recommended)	1	As installed	100 ft
80.	Aeroplane computed weight	Application for type certification submitted to a Contracting State on or after 1 January 2023	As installed	64	As installed	1% of full range
81.	Flight director command	Application for type certification submitted to a Contracting State on or after 1 January 2023	Full range	1	± 2°	0.5°
82.	Vertical speed	Application for type certification submitted to a Contracting State on or after 1 January 2023	As installed	0.25	As installed (32 ft/min recommended)	16 ft/min

1. V_{So} stalling speed or minimum steady flight speed in the landing configuration.

2. V_D design diving speed.

3. Record sufficient inputs to determine power.

4. For aeroplanes with conventional control systems ‘‘or’’ applies. For aeroplanes with non-mechanical control systems ‘‘and’’ applies. In aeroplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately. In aeroplanes with independent pilot input on primary controls, each pilot input on primary controls needs to be recorded separately.

5. If signal available in digital form.

6. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.

7. If signals readily available.

8. It is not intended that aeroplanes issued with an individual certificate of airworthiness before 1 January 2016 be modified to meet the measurement range, maximum sampling and recording interval, accuracy limits or recording resolution description detailed in this GCAD and the applicable Annex 6 Appendix

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

(i) operational information from electronic display systems, such as electronic flight instrument systems (EFIS), electronic centralized aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS). Use the following order of priority:

(A) parameters selected by the flight crew relating to the desired flight path, e.g. barometric pressure setting, selected altitude, selected airspeed, decision height, and autoflight system engagement and mode indications if not recorded from another source;

(B) display system selection/status, e.g. SECTOR, PLAN, ROSE, NAV, WXR, COMPOSITE, COPY, ETC;

(C) warning and alerts;

(D) the identity of display pages for emergency procedures and checklists;

(4) retardation information including brake application for use in the investigation of landing overruns and rejected take-offs; and

(5) additional engine parameters (EPR,N1,EGT, fuel, etc.)

(b) Parameters to be recorded (Helicopters)

(1) ***Type IV FDR.*** This FDR will be capable of recording, as appropriate to the helicopter, at least the thirty parameters in Table B. However, other parameters may be substituted with due regard to the helicopter type and the characteristics of the recording equipment.

(2) ***Type V FDR.*** This FDR will be capable of recording, as appropriate to the helicopter, at least the first fifteen parameters in Table B. However, other parameters may be substituted with due regard to the helicopter type and the characteristics of the recording equipment.

Table B

Parameters for Flight Data Recorders (Helicopters)

Serial Number	Parameter	Measurement	Recording Interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)
1	Time (UTC when available, otherwise elapsed time)	24 hours	4	±0.125% per hour
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)
3	Indicated airspeed	As the installed measuring system	1	±3%
4	Heading	360^0	1	$\pm 2^0$
5	Normal acceleration	-3 g to +6 g	0.125	±1%
6	Pitch attitude	$\pm 75^0$	0.5	$\pm 2^0$
7	Roll attitude	$\pm 180^0$	0.5	$\pm 2^0$
8	Radio transmission keying	On-off (one discrete)	1	

9	Power on each engine (Note 1)	Full range	1 (per engine)	±2%
10	Main rotor speed	50-130%	0.5	±2%
11	Pilot input and/or control surface position-primary controls (Collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal) (Note 2)	Full range	1	±2% unless higher accuracy uniquely required.
12	Hydraulics, each system (low pressure)	Discrete	2	
13	Outside air temperature	Sensor range	2	$\pm 2^0C$
14	Autopilot/auto throttle/AFCS mode and engagement status	A suitable combination of discrete	1	
15	Stability augmentation system engagement	Discrete	1	
Note: The preceding 15 parameters satisfy the requirements for a Type V FDR.				

Serial Number	Parameter	Measurement	Recording Interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)
16	Main gearbox oil pressure	As installed	1	As installed
17	Main gearbox oil temperature	As installed	2	As installed
18	Yaw acceleration (or yaw rate)	±1 g	0.25	±1.5% max range excluding datum error of ±5%
19	Sling load force	0-200% of certified load	0.5	±3% of max range
20	Longitudinal acceleration	±1 g	0.25	±1.5% max range excluding datum error of ±5%
21	Lateral acceleration	±1 g	0.25	±1.5% max range excluding datum error of ±5%
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 150m (500 ft) ±5% above 150 m (500 ft)
23	Glide path deviation	Signal range	1	±3%

24	Localizer deviation	Signal range	1	±3%
25	Marker beacon passage	Discrete	1	
26	Master warning	Discrete	1	
27	NAV 1 and 2 frequency selection (Note 3)	Full range	4	As installed
28	DME 1 and 2 distance (Notes 3 and 4)	0-370 km	4	As installed
29	Navigation data (latitude/longitude, ground speed) (Note 5)	As installed	2	As installed
30	Landing gear or gear selector position	Discrete	4	As installed
Note: The preceding 30 parameters satisfy the requirements for a Type IV FDR.				

NOTES:

1. Record sufficient inputs to determine power.

2. For helicopters with conventional control systems “or” applies. For helicopters with non-mechanical control systems “and” applies.
3. If signal available in digital form.

4. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.

5. If signals readily available.

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

(i) Operational information from electronic display systems, such as electronic flight instrument systems (EFIS), electronic centralized aircraft monitor (ECAM), and engine indication and crew alerting system (EICAS).

Use the following order of priority:

(A) parameters selected by the flight crew relating to the desired flight path, e.g. barometric pressure setting, selected altitude, selected airspeed, decision height, and autoflight system engagement and mode indications if not recorded from another source;

(B) display system selection/status, e.g. SECTOR, PLAN, ROSE, NAV, WXR, COMPOSITE, COPY, etc;

(C) warnings and alerts data; and

(D) the identity of displayed pages for emergency procedures and checklists; and

(ii) additional engine parameters (EPR, NI, EGT, fuel flow, etc).

(c) Inspections of FDR and CVR systems

(1) Prior to the first flight of the day, the built-in test features on the flight deck for the CVR, FDR and Flight Data Acquisition Unit (FDAU), when installed, should be monitored.

(2) Annual inspections should be carried out as follows:

(i) the read-out of the recorded data from the FDR and CVR should ensure that the recorder operates correctly for the nominal duration of the recording;

(ii) the analysis of the FDR should evaluate the quality of the recorded data to determine if the bit error rate is within acceptable limits and to determine the nature and distribution of the errors.

(iii) a complete flight from the FDR should be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention should be given to parameters from sensors dedicated to the FDR. 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 read-out facility should 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 CVR should be carried out by re-play of the CVR recording. While installed in the aircraft, the CVR should record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards; and

(vi) where practicable, during the annual examination, a sample of in-flight recordings of the CVR should be examined for evidence that the intelligibility of the signal is acceptable.

(3) Flight recorder systems should 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.

(4) A report of the annual inspection should be made available on request to the Authority for monitoring purposes.

(5) Calibration of the FDR systems:

(i) the FDR systems should be re-calibrated at least every five years 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 FDR systems, there should be a re-calibration performed as recommended by the sensor manufacturer, or at least every two years.

Rows	Date individual certificate of airworthiness was first issued	Date aircraft type certificate issued or modification for DLC equipment first approved	Date of activation for use of DLC equipment	DLC recording required	GCAD REFERENCE
1	On or after 1 January 2016	On or after 1 January 2016	On or after 1 January 2016	Yes	7.7.1(4)
2	On or after 1 January 2016	Before 1 January 2016	On or after 1 January 2016	Yes	7.7.1(4)
3	Before 1 January 2016	On or after 1 January 2016	On or after 1 January 2016	Yes	7.7.1(5)
4	Before 1 January 2016	Before 1 January 2016	Before 1 January 2016	No	7.7.1(5)
5	Before 1 January 2016	Before 1 January 2016	On or after 1 January 2016	No[1]	7.7.1(4) 7.7.1(5)

IS 7.7.3 DATA LINK COMMUNICATION (DLC) RECORDING INSTALLATION CLARIFICATION

1. TABLE HEADINGS

1.1 Date individual certificate of airworthiness was first issued is self-explanatory.

1.2 Date aircraft type certificate issued or modification for DLC equipment first approved is the date that allows the installation of DLC equipment on the aircraft and refers to the airworthiness approval of the installation of aircraft components such as the structural and wiring provisions with which the DLC equipment needs to be compliant. These airworthiness approvals are usually in a form of a type certificate, a supplemental type certificate or an amended type certificate.

1.2.1 It is not uncommon for original customers of an aircraft that have airworthiness approvals related to DLC capability, to choose not to install the DLC equipment or choose not to have it activated even if the aircraft is prepared for it.

1.3 Date of activation for use of DLC equipment refers to the date that a DLC application was first activated for use.

1.3.1 Datalink communication (DLC) equipment as used in these provisions, refer to the physical unit(s) (e.g. box(es)) that was approved to a minimum performance standard issued by a certification authority (e.g. TSO or ETSO).

1.3.2 The activation of DLC functions refer to approved software activation of DLC functions or software updates.

1.4 DLC recording required refers to the requirement to record DLC message in accordance with provisions 7.7.1(4) and 7.7.1(5).

2. GENERAL

2.1 It is the date on which the CVR capabilities of the aircraft were approved that determines the DLC recording requirement. The date in which the DLC equipment was approved to a minimum performance standard is not relevant for CVR recording requirement purposes.

2.2 For the DLC equipment to be compliant with an airworthiness approval, it needs to be able to use, without modification, the installed aircraft components that are necessary to provide the DLC function such as the:

a) datalink router (e.g. hosted in the communications management unit);

b) radios (e.g. VHF, HF datalink, Satcom) and related antennas.

2.3 Approved software updates to installed equipment or software activation of functions normally do not alter the DLC equipment compliance with the rest of the aircraft systems.

3. EXAMPLES

3.1 For rows 1 and 2:
The recording requirement is driven by 7.7.1(4) which is based on when the individual certificate of airworthiness was first issued. Any subsequent airworthiness modifications related to DLC capability do not exempt the aircraft from the requirement to record DLC messages.

3.2 For rows 3 to 5 — General:

The recording requirement is driven by 7.7.1(5) and is based on whether or not the aircraft has an airworthiness approval for DLC capabilities and the date of its issue. Since there was no requirement to record DLC messages prior to 1 January 2016, airworthiness approvals related to DLC capability issued before that date did not necessarily include this function.

3.3 For row 3:
The recording requirement applies regardless of when the certificate of airworthiness was issued, because an airworthiness approval related to DLC capability was issued on or after 1 January 2016. The date of installation of the equipment would typically be after the airworthiness approval.

3.4 For row 4:
The recording requirement does not apply because the aircraft's certificate of airworthiness and an airworthiness approval related to DLC capability was issued before 1 January 2016. The date of installation of DLC equipment is not a factor for DLC message recording requirements as long as the equipment is compliant with that airworthiness approval.

3.5 For row 5:

The recording requirement does not apply because the aircraft's certificate of airworthiness and an airworthiness approval related to DLC capability was issued before 1 January 2016. The date of installation of DLC equipment is not a factor for DLC message recording requirements as long as the equipment is compliant with that airworthiness approval.

Notwithstanding the above, if the activation for use of the DLC equipment is on or after 1 January 2016, DLC messages should be recorded in accordance with 7.7.1(4), 7.7.1(5)

IS: 7.8.2 EMERGENCY EXIT EQUIPMENT

(a) The assisting means for a floor level emergency exit shall meet the requirements under which the aircraft was type certified.

(b) The location of each passenger emergency exits shall be -

(1) Recognisable from a distance equal to the width of the cabin.

(2) Indicated by a sign visible to occupants approaching along the main passenger aisle.

(c) There shall be an emergency exit locating sign-

(1) 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;

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

(3) 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.

(d) Each passenger emergency exit marking and each locating sign shall be manufactured to meet the interior emergency exit marking requirements under which the aircraft 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 (brightness) decreases to below 250 microlamberts.

(e) 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.

(f) 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 foot-candles.

(g) Each emergency light shall-

(1) Be operable manually both from the flight crew station and from a point in the passenger compartment that is readily accessible to a normal cabin crew seat;

(2) Have means to prevent inadvertent operation of the manual controls;

(3) When armed or turned on at either station, remain lighted or become lighted upon interruption of the aircraft's normal electric power;

(4) Provide the required level of illumination for at least 10 minutes at the critical ambient conditions after emergency landing; and

(5) Have a cockpit control device that has an "on", "off", and "armed" position.

(h) 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 aircraft was type certified, unless the Authority cites different requirements for compliance with this paragraph.

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

(j) Access to emergency exits shall be provided as follows for each passenger-carrying aircraft:

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

(2) 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 (f) 1, of

this section.

(3) 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 certificated, unless the Authority cites different requirements for compliance with this paragraph.

(4) If it is necessary to pass through 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.

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

(6) If it is necessary to pass through a doorway separating the passenger cabin from other area 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 takeoff and landing. 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 citied by the Authority.

(k) 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 outlined the exit on the side of the fuselage.

(l) Each passenger emergency exit marking, including the band, shall be readily distinguishable from the surrounding fuselage area by contrast in colour an shall comply with the following:

(1) If the reflectance of the darker colour is 15 percent or less, the reflectance of the lighter colour shall be at least 45 percent.

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

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

(3) 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.

(m) Each passenger-carrying aeroplane shall be equipped with exterior lighting that meets the required under which that aeroplane was type certificated, unless the Authority

cites different requirements for compliance with this paragraph.

(n) Each passenger-carrying aeroplane shall be equipped with a slip-resistant escape route that meets the requirements under which that aeroplane was type certificated, unless the Authority cities different requirements for compliance with this paragraph.

(o) 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 10 or more metres high and 20 or more inches wide, but not wider than 46 inches, each passenger ventral exit and each tail cone exit, shall meet the requirements of this section for floor level emergency exits.

Note: 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.

(p) 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.

(q) On each large passenger-carrying turbojet powered aeroplane each ventral exit and tail cone exit shall be-

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

(2) Marked with a placard readable from a distance of 10 metres 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.

IS: 7.8.11 FIRST AID AND EMERGENCY MEDICAL KIT

(a) Aeroplanes

Two types of medical supplies should be provided: first-aid kit(s) for carriage in all aeroplanes and a medical kit for carriage where the aeroplane is authorized to carry more than 250 passengers.

(1) Location

(i) It is essential that the required first-aid kits be distributed as evenly as practicable throughout the passenger cabin. They should be readily accessible to cabin crew, and, in view of the possible use of medical supplies outside the aeroplane in an emergency situation, they should be located near an exit.

(ii) The medical kit, when carried, should be stored securely and kept free from dust, inactive and damaging temperatures.

(iii) Protective latex gloves or equivalent non-permeable gloves may be placed in the first-aid kit or in a location that is readily accessible to crewmembers.

(2) Contents

Different factors must be taken into consideration in deciding the contents of first-aid kits and medical kits. The following are typical contents of first-aid and medical kits for carriage aboard an aeroplane.

(i) First-aid kit:

- a handbook on first-aid.
- "ground-air visual signal code for use by survivors" as contained in IS: 7.8.11 Fig. 1.
- materials for treating injuries.
- ophthalmic ointment.
- a decongestant nasal spray.
- insect repellant.
- emollient eye drops.
- sunburn cream.
- water-miscible antiseptic or skin cleanser.
- materials for treatment of extensive burns.
- oral drugs as follows: analgesic, antispasmodic, central nervous system stimulant, circulatory stimulant, coronary vasodilator, antidiarrhoeic and motion sickness medications.
- an artificial plastic airway and splints.

a. Medical kit:

Equipment

- one pair of sterile surgical gloves.
- Sphygmomanometer.
- Stethoscope.
- sterile scissors.
- haemostatic forceps.
- haemostatic bandages or tourniquet.
- sterile equipment for suturing wounds.
- disposable syringes and needles.
- disposable scalpel handle and blade.

Drugs

- coronary vasodilators.
- Analgesics.
- Diuretics.
- anti-allergics.
- Steroids.

- Sedatives.
- Ergometrine.
- where acceptable, a narcotic drug in injectable form
- injectable broncho dilator.

Note: *The United Nations Conference for Adoption of a Single Convention on Narcotic Drugs in March 1961 adopted such a Convention, Article 32 of which contains special provisions concerning the carriage of drugs in medical kits of aircraft engaged in international flight.*

(b) Helicopters

The following is typical contents of a first-aid kit for carriage aboard a helicopter:

- a handbook on first aid.
- "ground-air visual signal code for use by survivors" as contained in IS: 7.8.11 Fig. 1.
- materials for treating injuries.
- ophthalmic ointment.
- a decongestant nasal spray.
- insect repellent.
- emollient eye drops.
- sunburn cream.
- water-miscible antiseptic/skin cleanser.
- materials for treatment of extensive burns.
- oral drugs as follows: analgesic, antispasmodic, central nervous system stimulant, circulatory stimulant, coronary vasodilator, antidiarrhoeic and motion sickness medications.
- an artificial plastic airway and splints.

(c) (AAC) Ground-air visual signal code for use by survivors

NO.	Message	Code symbol
1	Require assistance	**V**
2	Require medical assistance	**X**
3	No. or Negative	**N**
4	Yes or Affirmative	**Y**
5	Proceeding in this direction	↑

(d) (AAC) Universal Precaution Kit

A universal precaution kit should be carried on a helicopter that is required to operate with at least one cabin crew member.
Such a kit may be used to clean up any potentially infectious body contents such as blood, urine, vomit and faeces and to protect the cabin crew who are assisting potentially infectious cases of suspected communicable disease.

Typical contents

- Dry powder that can convert small liquid spill into a sterile granulated gel
- Germicidal disinfectant for surface cleaning
- Skin wipes
- Face/eye mask (separate or combined)
- Gloves (disposable)
- Protective apron
- Large absorbent towel
- Pick-up scoop with scraper
- Bio-hazard disposal waste bag
- Instructions

IS: 7.8.12 OXYGEN STORAGE AND DISPENSING APPARATUS

(a) The supplemental oxygen supply requirements for non-pressurised aircraft are as follows:

(1) ***Flight crewmembers.*** 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 crewmembers on flight deck duty for the purpose of oxygen supply.

(2) Cabin crewmembers, additional crewmembers and passengers. Cabin crewmembers and passengers shall be supplied with

oxygen in accordance with Table 1. Cabin crewmembers carried in addition to the minimum number of cabin crewmembers required, and additional crewmembers, shall be considered as passengers for the purpose of oxygen supply.

Table 1 – Supplemental Oxygen for Non-Pressurized Aircraft

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

(b) The supplemental oxygen supply requirements for pressurized aircraft are as follows:

(1) The amount of supplemental oxygen required shall be determined on the basis of cabin pressure altitude, flight duration and the assumption that a cabin pressurization 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 aircraft will descend in accordance with emergency procedures specified in the Flight Manual to a safe altitude for the route to be flown that will allow continued safe flight and landing.

(2) Following a cabin pressurization failure, the cabin pressure altitude shall be considered the same as the aircraft altitude, unless it is demonstrated to the Authority that no probable failure of the cabin or pressurization system will result in a cabin pressure altitude equal to the aircraft altitude. Under these circumstances, this lower cabin pressure altitude may be used as a basis for determination of oxygen supply.

(3) Flight crewmembers.

(i) 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 crewmembers 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.

(4) Cabin crew members, additional crew members, and passengers;

(i) Cabin crewmembers and passengers shall be supplied with supplemental oxygen in accordance with Table 2. Cabin crewmembers carried in addition to the minimum number of cabin crewmembers required, and additional crew members, shall be considered as passengers for the purpose of oxygen supply;

(ii) The oxygen supply requirements, as specified in Table 2, for aircraft not certificated to fly at altitudes above 25,000 ft. may be reduced to the entire flight time between 10,000 ft. and 14,000 ft. cabin pressure altitudes for all required cabin crew members and for at least 10% of the passengers if, at all points along the route to be flown, the aircraft is able to descend safely within 4 minutes to a cabin pressure altitude of 14,000 ft.

Table 2 – Requirement for Supplemental Oxygen – Pressurized Aircraft During and Following Emergency Descent (*See Note 1 below*)

SUPPLY FOR	DURATION AND CABIN PRESSURE ALTITUDE
All occupants of flight deck seats on flight deck duty flight	Entire flight time when the cabin pressure altitude exceeds 13,000 ft and entire time when the cabin pressure altitude exceeds 10,000 ft. but does not exceed 13,000 ft. after the first 30 minutes at those altitudes, but in no case less than: *(i)* 30 minutes for aircraft certificated to fly at altitudes not exceeding 25,000 ft. (*See Note 2 below)* (ii) 2 hours for aircraft certificated to fly at altitudes more than 25,000 ft. (*See Note 3*)
All required cabin crewmembers	Entire flight time when cabin pressure altitude exceeds 13,000 ft. but not less than 30 minutes (Note 2), and entire flight time when cabin pressure altitude is greater than 10,000 ft. but does not exceed 13,000 ft. after the first 30 minutes at these altitudes.
100% of passengers	10 minutes or the entire flight time when the cabin pressure altitude exceeds 15,000 ft. whichever is the greater. (*See Note 4 below*)
30% of passengers	Entire flight time when the cabin pressure altitude exceeds 14,000 ft. but does not exceed 15,000 ft.

10% of passengers	Entire flight time when the cabin pressure altitude exceeds 10,000 ft but does not exceed 14,000 ft. 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 aircraft's maximum certificated operating altitude to 10,000 ft in 10 minutes and followed by 20 minutes at 10,000 ft*

Note 3: *The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum certificated operating altitude to 10,000 ft in 10 minutes and followed by 110 minutes at 10,000 ft. The oxygen required meeting 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 aircraft's maximum certificated operating altitude to 15,000ft.*

(c) For helicopters on high altitude flights the approximate altitude in the Standard Atmosphere corresponding to the value of absolute pressure used is as follows:

Absolute pressure Metres Feet

700 hPa 3 000 10 000
620 hPa 4 000 13 000
376 hPa 7 600 25 000

A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is less than 700 hPa in personnel compartments shall be equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen required in 7.8.12.