LEGAL NOTICE NO ……..

CIVIL AVIATION ACT
(354)

THE DRAFT CIVIL AVIATION (AIRCRAFT INSTRUMENTS AND EQUIPMENT) REGULATIONS, 2019

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DRAFT MODAL EAC CIVIL AVIATION (AIRCRAFT INSTRUMENTS AND EQUIPMENT) REGULATIONS, 2019

PART I
PRELIMINARY PROVISIONS

Citation	**1.** These Regulations may be cited as the Civil Aviation (Aircraft Instruments and Equipment) Regulations, 2019.
Interpretation	**2.** In these Regulations, unless the context otherwise requires- ***"aerial work" means*** an aircraft operation in which an aircraft is used for specialized services such as agriculture, construction, photography, surveying, observation and patrol, search and rescue, aerial advertisement; "aerodrome" means a defined area on land or water, including any buildings, installations and equipment intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft; "aeroplane " means a power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight; "aircraft" means any machine that can derive support in the atmosphere from the reactions of the air, other than the reactions of the air against the earth's surface; "Aircraft operating manual" means a manual, acceptable to the State of the Operator, containing normal, abnormal and emergency procedures, checklists, limitations, performance information, details of the aircraft systems and other material relevant to the operation of the aircraft and the aircraft operating manual is part of the operations manual; ***"Air traffic service (ATS)" means a*** generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service); "air operator certificate (AOC)" means a certificate authorising an operator to carry out specified commercial air transport operations; "Altimetry system error (ASE)" means the difference between the altitude indicated by the altimeter display, assuming a correct altimeter barometric setting, and the pressure altitude corresponding to the undisturbed ambient pressure;

	"alternate aerodrome" means an aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing where the necessary services and facilities are available, where aircraft performance requirements can be met and which is operational at the expected time of use. Alternate aerodromes include the following – (a) *(a)Take-off alternate.* An alternate aerodrome at which an aircraft would be able to land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure; (b) *En-route alternate.* An alternate aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while en route; and (c)*Destination alternate*. An alternate aerodrome at which an aircraft would be able to land should it become either impossible or inadvisable to land at the aerodrome of intended landing; "alternate heliport" means a heliport to which a helicopter may proceed when it becomes either impossible or inadvisable to proceed to or to land at the heliport of intended landing where the necessary services and facilities are available, where aircraft performance requirements can be met and which is operational at the expected time of use. Alternate heliports include the following – (a) Take-off alternate means an alternate heliport at which a helicopter would be able to land should this become necessary shortly after take-off and it is not possible to use the heliport of departure; (b) En-route alternate means an alternate heliport at which a helicopter would be able to land in the event that a diversion becomes necessary while en route. (c) Destination alternate means an alternate heliport at which a helicopter would be able to land should it become either impossible or inadvisable to land at the heliport of intended landing, "approach and landing phase — helicopters" means that part of the flight from 300 m (1 000 ft) above the elevation of the FATO, if the flight is planned to exceed this height, or from the commencement of the descent in the other cases, to landing or to the balked landing point; "appropriate airworthiness requirements" means the comprehensive and detailed airworthiness codes established, adopted or accepted by a Contracting State for the class of aircraft, engine or propeller under consideration; "appropriate Authority" means-

	(a) in relation to an aircraft, the Authority which is responsible for approval of design and issuance of a type certificate; (b) in relation to the content of a medical kit, the State of Registry; (c) in relation to the Republic of (State), the Director General / Managing Director / Chief Executive Director of the Authority; "approved standard" means a manufacturing, design, maintenance, or quality standard approved by the Authority; "Area navigation (RNAV)" means a method of navigation which permits aircraft operation on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids or a combination of these; "Authority" means the (State) Civil Aviation Authority; "Automatic deployable flight recorder (ADFR)" means a combination flight recorder installed on the aircraft which is capable of automatically deploying from the aircraft; "Cabin crew member" means a crew member who performs, in the interest of safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member; "calibration" means a set of operations, performed in accordance with a definite documented procedure, that compares the measurement performed by a measurement device or working standard for the purpose of detecting and reporting or eliminating by adjustment errors in the measurement device, working standard, or aircraft component tested; "cargo compartment classifications" means- (a) class A, one in which a presence of a fire would be easily discovered by a crewmember while at station and to which each part of the compartment is easily accessible in flight; (b) class B, one in which- (i) there is sufficient access in flight to enable a crewmember to effectively reach any part of the compartment with the contents of a hand fire extinguisher; (ii) when the access provisions are being used, no hazardous quantity of smoke, flames, or extinguishing agent, will enter any compartment occupied by the crew or passengers; and (iii) there is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station. (c) class C, one in which- (i) there is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer

station;

(ii) there is an approved built-in fire extinguishing or suppression system controllable from the cockpit;

(iii) there is means to exclude hazardous quantities of smoke, flames, or extinguishing agent, from any compartment occupied by the crew or passengers; and

(iv) there are means to control ventilation and drafts within the compartment so that the extinguishing agent used can control any fire that may start within the compartment.

(d) class E, one on airplanes used only for the carriage of cargo and in which-

(i) there is a separate approved smoke or fire detector system to give warning at the pilot or flight engineer station;

(ii) there are means to shut off the ventilating airflow to, or within, the compartment, and the controls for these means are accessible to the flight crew in the crew compartment;

(iii) there are means to exclude hazardous quantities of smoke, flames, or noxious gases, from the flight crew compartment; and

(iv) the required crew emergency exits are accessible under any cargo loading condition. "Category II (CAT II) operations" means, a precision instrument approach and landing with a decision height lower than 60m (200) Ft), but not lower than 30m (10 Ft), and a runway visual range not less than 350m.

"Category IIIA (CAT IIIA) operations" means, a precision instrument approach and landing with:

(a) a decision height lower than 30m (100Ft) or no decision; and

(b) a runway visual range not less than 200m.

"Category IIIB (CAT IIIB) operations" means, a precision instrument approach and landing with:

(a) a decision height lower than 15m (50Ft) or no decision height; and

(b) a runway visual range less than 200m but not less than 50m.

"Category IIIC (CAT IIIC) operations" means a precision instrument approach and landing with no decision height and no runway visual range limitations;

"Class 1 helicopter" means a helicopter with performance such that, in case of critical engine 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;

"Class 2 helicopter" means a helicopter with performance such that, in case of critical engine 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 case a forced landing may be required;

	"Class 3 helicopter" means a helicopter with performance such that, in case of engine failure at any point in the flight profile, a forced landing shall be performed; "Combined vision system (CVS)" means a system to display images from a combination of an enhanced vision system (EVS) and a synthetic vision system (SVS); "Commercial air transport operation" means an aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire; ***"Combined vision system (CVS)" means*** a system to display images from a combination of an enhanced vision system (EVS) and a synthetic vision system (SVS); "commercial air transport" means an aircraft operation involving the transport of passengers, cargo, or mail for remuneration or hire; "Contracting States" means all States that are signatories to the Convention on International Civil Aviation (Chicago Convention); "controlled flight" means any flight which is subject to an air traffic control clearance; "congested hostile environment" means a hostile environment within a congested area; "continuing airworthiness" means a set of processes by which an aircraft, engine, rotor or part complies with the applicable airworthiness requirements and remains in a condition for safe operation throughout its operating life; "continuing airworthiness records" means records which are related to the continuing airworthiness status of an aircraft, engine, rotor or associated part; "crew member" means a person assigned by an operator to duty on an aircraft during a flight duty period; "critical engine" means the engine whose failure would most adversely affect the performance or handling qualities of an aircraft; "Decision altitude (DA) or decision height (DH)" means a specified altitude or height in a 3D instrument approach operation at which a missed approach shall be initiated if the required visual reference to continue the approach has not been established. (a) Decision altitude (DA) is referenced to mean sea level and decision height (DH) is referenced to the threshold elevation. (b) The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In Category III operations with a decision height the required visual reference is that specified for the particular procedure and operation.

(c)For convenience where both expressions are used they may be written in the form "decision altitude/height" and abbreviated "DA/H";

"defined point after take-off (DPATO) means a point, within the take-off and initial climb phase, before which the helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required;

"defined point before landing (DPBL)" means a point, within the approach and landing phase, after which the helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required;

"duty" means any task that flight or cabin crew members are required by the operator to perform, including, for example, flight duty, administrative work, training, positioning and standby when it is likely to induce fatigue;

"duty period" means a period which starts when a flight or cabin crew member is required by an operator to report for or to commence a duty and ends when that person is free from all duties;

"Electronic flight bag (EFB)" means an electronic information system, comprised of equipment and applications for flight crew, which allows for the storing, updating, displaying and processing of EFB functions to support flight operations or duties;

"elevated heliport" means a heliport located on a raised structure on land;

"Emergency locator transmitter (ELT)" means a generic term describing equipment which broadcast distinctive signals on designated frequencies and, depending on application, may be automatically activated by impact or be manually activated. An ELT may be any of the following –

(a) Automatic fixed ELT (ELT(AF))" means an automatically activated ELT which is permanently attached to an aircraft;

(b) Automatic portable ELT (ELT(AP))means an automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft;

(c) Automatic deployable ELT (ELT(AD)) means an ELT which is rigidly attached to an aircraft and which is automatically deployed and activated by impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided;

(d) Survival ELT (ELT(S)) means an ELT which is

	removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors; "engine" means a unit used or intended to be used for aircraft propulsion and consists of at least those components and equipment necessary for functioning and control, but excludes the propeller or rotors (if applicable); "enhanced vision system (EVS)" means a system to display electronic real-time images of the external scene achieved through the use of image sensors; "extended flight over water" means a flight operated over water at a distance of more than 93 km (50 NM), or 30 minutes at normal cruising speed, whichever is the lesser, away from land suitable for making an emergency landing; "final approach segment (FAS)" means that segment of an instrument approach procedure in which alignment and descent for landing are accomplished; "flight crewmember" means a licensed crewmember charged with duties essential to the operation of an aircraft during a flight duty period; "flight data analysis" means a process of analyzing recorded flight data in order to improve the safety of flight operations. "flight duty period" means the period which commences when a flight or cabin crew member is required to report for duty that includes a flight or a series of flights and which finishes when the aircraft finally comes to rest and the engines are shut down at the end of the last flight on which he or she is a crew member; "flight manual" means a manual, associated with the certificate of airworthiness, containing limitations within which the aircraft is to be considered airworthy, and instructions and information necessary to the flight crew members for the safe operation of the aircraft. "flight plan" means specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft; "flight recorder" means any type of recorder installed in the aircraft for the purpose of complementing accident or incident Investigation; "flight time — aeroplanes" means the total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight;

	"flight time - helicopters" means the total time from the moment the helicopter blades start turning until the moment the helicopter finally comes to rest at the end of the flight and the rotor blades are stopped; "general aviation operation" means an aircraft operation other than a commercial air transport operation or an aerial work operation; "Head-up display (HUD)" means a display system that presents flight information into the pilot's forward external field of view; "helicopter" means a heavier-than-air aircraft supported in flight chiefly by the reactions of the air on one or more power-driven rotors on substantially vertical axes; "heliport" means an aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters; "hostile environment" means an environment in which: (a) a safe forced landing cannot be accomplished because the surface and surrounding environment are inadequate; (b) the helicopter occupants cannot be adequately protected from the elements; (c) search and rescue response or capability is not provided consistent with anticipated exposure; or (d) there is an unacceptable risk of endangering persons or property on the ground. "Human Factors principles" means principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance; "human performance" means human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations; "instrument approach operations" means an approach and landing using instruments for navigation guidance based on an instrument approach procedure. There are two methods for executing instrument approach operations: (a) a two-dimensional (2D) instrument approach operation, using lateral navigation guidance only; and (b) a three-dimensional (3D) instrument approach operation, using both lateral and vertical navigation guidance. Note.— Lateral and vertical navigation guidance refers to the guidance provided either by: (a) a ground-based radio navigation aid; or (b) computer-generated navigation data from ground-based, space-based, self-contained navigation aids or a combination of these.

	"Instrument approach procedure (IAP)" means a series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply; "Instrument meteorological conditions (IMC)" means Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specified for visual meteorological conditions; "inspection" means the examination of an aircraft or aircraft component to establish conformity with a standard approved by the Authority; "integrated survival suit" means a survival suit which meets the combined requirements of the survival suit and life jacket; Large aeroplane. An aeroplane of a maximum certificated take-off mass of over 5 700 kg; "maintenance" means the performance of tasks on an aircraft, engine, propeller or associated part required to ensure the continuing airworthiness of an aircraft, engine, propeller or associated part including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair; "Master minimum equipment list (MMEL)" means a list established for a particular aircraft type by the organization responsible for the type design with the approval of the State of Design containing items, one or more of which is permitted to be unserviceable at the commencement of a flight and the MMEL may be associated with special operating conditions, limitations or procedures; "meteorological information" means meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions. "Minimum Equipment List (MEL)" means a list which provides for the operation of an aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the Master Minimum Equipment List (MMEL) established for the aircraft type; "modification" means a change to the type design of an aircraft, engine or propeller; "navigation specification" means a set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace and there are two kinds of navigation specifications-

	(a) Required navigation performance (RNP) specification". A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP; and (b) Area navigation (RNAV) specification. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1. "night" means the hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise, as may be prescribed by the appropriate authority; "non-congested hostile environment" means a hostile environment outside a congested area; "non-hostile environment" means an environment in which - (a) a safe forced landing can be accomplished because the surface and surrounding environment are adequate; (b) the helicopter occupants can be adequately protected from the elements; (c) search and rescue response and capability is provided consistent with anticipated exposure; and (d) the assessed risk of endangering persons or property on the ground is acceptable, "Offshore operations" means operations which routinely have a substantial proportion of the flight conducted over sea areas to or from offshore locations. Such operations include, but are not limited to, support of offshore oil, gas and mineral exploitation and sea-pilot transfer; "operation" means an activity or group of activities which are subject to the same or similar hazards and which require a set of equipment to be specified, or the achievement and maintenance of a set of pilot competencies, to eliminate or mitigate the risk of such hazards and such activities could include, but would not be limited to, offshore operations, heli-hoist operations or emergency medical service; "operational control" means the exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency and efficiency of the flight; "operational flight plan" means the operator's plan for the safe conduct of the flight based on considerations of helicopter performance, other operating limitations and relevant expected conditions on the route to be followed and at the heliports concerned; "operational flight plan" means the operator's plan for the safe conduct of the flight based on considerations of aeroplane performance, other operating

	limitations, and relevant expected conditions on the route to be followed and at the aerodromes concerned; Operations in performance Class 1. Operations with performance such that, in the event of a critical engine failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, unless the failure occurs prior to reaching the take-off decision point (TDP) or after passing the landing decision point (LDP), in which cases the helicopter must be able to land within the rejected take-off or landing area; Operations in performance Class 2. Operations with performance such that, in the event of critical engine failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, except when the failure occurs early during the take-off manoeuvre or late in the landing manoeuvre, in which cases aforced landing may be required. Operations in performance Class 3 - Operations with performance such that, in the event of an engine failure at any time during the flight, a forced landing will be required. “Operations manual” means a manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties; “Operations specifications” means the authorizations, conditions and limitations associated with the air operator certificate and subject to the conditions in the operations manual. “Operator” means a person, organization or enterprise engaged in or offering to engage in an aircraft operation; *“*Performance-based communication (PBC)” means communication based on performance specifications applied to the provision of air traffic services; “Performance-based navigation (PBN)” means area navigation based on performance requirements for aircraft operating along an airspace; Performance-based surveillance (PBS). Surveillance based on performance specifications applied to the provision of air traffic services; “Pilot-in-command” means a pilot designated by the operator or the owner as being in command and charged with the safe conduct of a flight; “pressurised aircraft” means an aircraft fitted with means of controlling out flow of cabin air in order to maintain maximum cabin altitude of not more than 10,000 ft so as to enhance breathing and comfort of passengers and crew; “pressure-altitude” means a n atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the Standard Atmosphere;

	"propeller" means a device for propelling an aircraft that has blades on a powerplant driven shaft and that, when rotated, produces by its action on the air, a thrust approximately perpendicular to its plane of rotation including control components normally supplied by its manufacturer, but does not include main and auxiliary rotors or rotating airfoils of powerplants; "prototype" means an aircraft in respect of which an application has been made for a certificate of airworthiness and the design of which has previously been investigated in connection with any such application; "Psychoactive substances" means alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded; "rating" means an authorisation entered on or associated with a licence or certificate and forming part thereof, stating special conditions, privileges or limitations pertaining to such licence or certificate; "repair" means the restoration of an aircraft, engine, propeller or associated part to an airworthy condition in accordance with the appropriate airworthiness requirements, after it has been damaged or subjected to wear; "Required communication performance (RCP) specification" means a set of requirements for air traffic service provision and associated ground equipment, aircraft capability, and operations needed to support performance-based communication; "Required surveillance performance (RSP) specification" means a set of requirements for air traffic service provision and associated ground equipment, aircraft capability, and operations needed to support performance-based surveillance; "Runway visual range (RVR)" means the range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line. "Safe forced landing" means unavoidable landing or ditching with a reasonable expectancy of no injuries to persons in the aircraft or on the surface; "series of flights" means series of flights are consecutive flights that: (a) begin and end within a period of 24 hours; and (b) are all conducted by the same pilot-in-command "small aircraft" means an aircraft of a maximum certificated take-off mass of 5,700kg or less; "State of Registry" means the State on whose register the aircraft is entered; "State of the Operator" means the State in which the operator's principal

	place of business is located or, if there is no such place of business, the operator's permanent residence; "Synthetic vision system (SVS" means a system to display data-derived synthetic images of the external scene from the perspective of the flight deck; "Total vertical error (TVE)" means the vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level); "overhaul" means the restoration of an aircraft or aircraft component using methods, techniques, and practices acceptable to the Authority, including disassembly, cleaning, and inspection as permitted, repair as necessary, and reassembly; and testing in accordance with approved standards and technical data, or in accordance with current standards and technical data acceptable to the Authority, which have been developed and documented by the State of Design, holder of the type certificate, supplemental type certificate, or a material, part, process, or appliance approval under Parts Manufacturing Approval (PMA) or Technical Standard Order (TSO); "VFR" means the abbreviation used to designate the Visual Flight Rules; "Visual meteorological conditions (VMC)" means meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.
Applicability	**3.** These Regulations prescribe the minimum instrument and equipment requirements for all aircraft in all operations as classified in these Regulations.

PART II: GENERAL REQUIREMENTS FOR AIRCRAFT EQUIPMENT AND INSTRUMENTS

General instrument and equipment requirements for aeroplanes and helicopters.	**4.** (1) An operator shall not operate an aircraft unless it is equipped so as to comply with the law of the State of Registry.
	(2)An operator shall not operate an Aircraft registered in the (State) without such additional or special equipment as the Authority may determine.
	(3) An operator operating an Aircraft in the (State) shall ensure that all the required emergency equipment is installed on board the aircraft, are clearly marked, and the aircraft is stowed or maintained so as to not be the source of danger on the aircraft.
	(4) In addition to the minimum equipment necessary for the issuance of a certificate of airworthiness, the instruments, equipment and flight

	documents prescribed in these Regulations shall be installed or carried, as appropriate, in all Aircraft according to the Aircraft use and to the circumstances under which the flight is to be conducted.
	(5) All required instruments and equipment including their installation shall be approved or accepted by the Authority.
	(6) An Aircraft shall be equipped with instruments which will enable the flight crew to control the flight path of the aircraft, carry out any required procedural manoeuvres and observe the operating limitations of the Aircraft in the expected operating conditions.
	(7)Where a means is provided on any aircraft 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.
	(8) For all aircraft, the instruments that are used by any one flight crewmember shall be so arranged as to permit the flight crewmember to readily see the indications from station with the minimum practicable deviation from the position and line of vision which the flight crewmember normally assumes when looking forward along the flight path.
	(9) Prior to operation in the (State) of any foreign registered Aircraft that uses an aircraft maintenance program approved or accepted by the State of Registry, the owner or operator shall ensure that instruments and equipment required by these Regulations but not installed in the Aircraft are properly installed and inspected in accordance with the requirements of the State of Registry.
	(10) An operator shall ensure that a flight does not commence unless the required equipment— (a) meets the minimum performance standard and the operational and airworthiness requirements in accordance Civil Aviation (Airworthiness) regulations; (b) is installed such that the failure of any single unit required for either communication or navigation purposes, or both, shall not result in the inability to communicate or navigate safely on the route being flown; and (c)is in operable condition for the kind of operation being conducted, except as provided in the minimum equipment list.
	(11) Where equipment is to be used by one flight crewmember at his station during flight, that equipment shall be installed so as to be readily operable from his station.
	(12) Where a single item of equipment is required to be operated by more than one flight crewmember, the equipment shall be installed so as to be readily operable from any station at which it is required to be operated.
Standby attitude indicator	**5.** (1) An operator shall not operate an aeroplane with a maximum certified take-off mass exceeding 5700 kg or a performance Class 1 or 2 helicopter unless it is equipped with a single 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) Where the standby attitude indicator is being operated by emergency power, it shall be clearly operating and illuminated to the flight crew.
	(3) 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) Where the standby attitude instrument system is installed and usable through flight attitudes of 360 degrees of pitch and roll, the turn and slip indicators may be replaced by slip indicators.
Instruments and equipment required for Category II operations.	**6.** (1) An Operator shall not fly an Aeroplane in Category II operation unless the Aeroplane is fitted with the following instruments and equipment— (a) two localizer and glide slope receiving systems; (b) a communications system that does not affect the operation of at least one of the Instrument Landing System; (c) a marker beacon receiver that provides distinctive aural and visual indications of the outer and the middle markers; (d) two gyroscopic pitch and bank indicating systems; (e) two gyroscopic direction indicating systems; (f) two airspeed indicators; (g) two sensitive altimeters adjustable for barometric pressure, having markings at twenty foot intervals and each having a placard correction for altimeter scale error and for the wheel height of the Aeroplane; (h) two vertical speed indicators; (i) one self monitoring radio altimeter with dual-display; (j) the flight control guidance system may be operated from one of the receiving systems required by paragraph (a) that consists of either— (i) flight director system capable of displaying computed information as steering command in relation to an Instrument Landing System localizer and, on the same instrument, either computed information as pitch command in relation to an Instrument Landing System glide slope or basic Instrument Landing System glide slope information; or (ii) an automatic approach coupler capable of providing at least automatic steering in relation to an Instrument Landing System localiser; (k) for Category II operations with decision heights below 150 feet either a marker beacon receiver providing aural and visual indications of the inner marker a radio altimeter; (l) warning systems for immediate detection by the pilot of system faults in items specified in paragraphs (a), (d), (e) and (i) and, if installed for use in Category III operations, the radio altimeter and auto throttle system; (m) dual controls; (n) an externally vented static pressure system with an alternate static pressure source; (o) a windshield wiper or equivalent means of providing adequate cockpit

	visibility for a safe visual transition by either pilot to touchdown and rollout; and (p) a heat source for each airspeed system pilot tube installed or an equivalent means of preventing malfunctioning due to icing of the pilot system.
	(2) The instruments and equipment specified in this regulation shall be installed, approved and maintained in accordance with the provisions of the maintenance programme before being used in Category II operations.
Approval and maintenance of instruments and equipment required for Category II operations.	**7.** (1) An Operator shall not fly an Aeroplane unless the instruments and equipment required by regulation 6 have been approved as provided in this regulation for use in Category II operations. (2) Before presenting an Aeroplane for approval of the instruments and equipment, it shall be shown that since the beginning of the 12th calendar month of the date of submission— (a) the instrument landing system localizer and glide slope equipment were bench checked according to the manufacturer's instructions and found to meet the standards specified by the Authority; (b) the altimeters and the static pressure systems were tested and inspected and found to meet the requirements of the manufacturers maintenance manual; and (c) all other instruments and items of equipment specified in this regulation that are listed in the proposed maintenance program were bench checked and found to meet the manufacturer's maintenance manual.
	(3) All components of the flight control guidance system shall be approved as installed by the evaluation program specified in this regulation if they have not been approved for Category III operations under applicable type or supplemental type certification procedures.
	(4) Any subsequent changes to make, model, or design of the components shall be approved by the Authority and 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.
	(5) A radio altimeter shall meet the performance criteria of this sub-regulation for original approval and for any subsequent alteration— (a) it shall display to the flight crew clearly and positively the wheel height of the main landing gear above the terrain; (b) it shall display wheel height above the terrain to an accuracy of ± (plus or minus)5 feet or 5 percent, whichever is greater, under the following conditions—
	(i)pitch angles of zero to ±5° (degree) about the mean approach attitude; (ii) roll angles of zero to 20° in either direction; (iii) forward velocities from minimum approach speed up to 200 knot; and (iv) sink rates from zero to fifteen feet per second at altitudes from one hundred to two hundred feet; (c) over level ground, it shall track the actual altitude of the Aeroplane without significant lag or oscillation;

	(d) with the Aeroplane at an altitude of two hundred feet or less, any abrupt change in terrain representing no more than ten percent of the Aeroplane's altitude shall not cause the altimeter to unlock, and indicator response to such changes shall not exceed 0.1 seconds. If the system unlocks for greater changes, it shall reacquire the signal in less than one second; (e) systems that contain a push to test feature shall test the entire system with or without an antenna at a simulated altitude of less than five hundred feet; and (f) the system shall 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.
	(6) All other instruments and items of equipment required by regulation 12, shall be capable of performing as necessary for Category II operations and shall be approved by the Authority after each subsequent alteration to these instruments and items of equipment— (a) approval by evaluation is requested as a part of the application for approval of the Category II manual; (b) unless otherwise authorised by the Authority, the evaluation program for each Aeroplane requires the following demonstrations— (i) at least fifty instrument landing system approaches shall be flown with at least five approaches on each of three different instrument landing system facilities and no more than one half of the total approaches on any one instrument landing system facility; (ii) all approaches shall be flown under simulated instrument conditions to a one hundred foot decision height and ninety percent of the total approaches made shall be successful.
	(7) A successful approach shall be one in which— (a) at the one hundred foot decision height, the indicated airspeed and heading are satisfactory for a normal flare and landing (speed shall be ±5 knots of programmed airspeed, but shall not be less than computed threshold speed if auto throttles are used); (b) the Aeroplane at the one hundred foot decision height, is positioned so that the cockpit is within, and tracking so as to remain within, the lateral confines of the extended runway; (c) deviation from glide slope after leaving the outer marker does not exceed fifty percent of full-scale deflection as displayed on the Instrument Landing System indicator; (d) no unusual roughness or excessive attitude changes occur after leaving the middle marker; and (e) in the case of an Aeroplane equipped with an approach coupler, the Aeroplane 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.
	(8) During the evaluation program the following information shall be maintained by the applicant for the Aeroplane with respect to each approach and made available to the Authority upon request—

	(a) each deficiency in airborne instruments and equipment that resented the initiation of an approach; (b) the reasons for discontinuing an approach, including the altitude above the runway at which it was discontinued; (c) speed control at the one hundred foot decision height if auto throttles are used; (d) trim condition of the Aeroplane upon disconnecting the auto coupler with respect to continuation to flare and landing; (e) position of the Aeroplane at the middle marker and at the decision height indicated both on a diagram of the basic instrument landing system display and a diagram of the runway extended to the middle marker, with the estimated touchdown point indicated on the runway diagram; (f) compatibility of flight director with the auto coupler, if applicable; and (g) quality of overall system performance.
	(9) 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.
	(10) Any bench check required by this regulation or any other regulation shall— (a)be performed by an approved maintenance organisation holding one of the following Ratings as appropriate to the equipment checked— (i) an instrument Rating; (ii) a radio Rating; or (iii) computer Rating; (b) 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 Aeroplane in which the instrument or item of equipment is installed.
Aircraft Lights and instruments illumination	**8.** An Operator shall not operate an Aeroplane unless it is equipped with— (a) for flight by day— (i) anti-collision light system; (ii) lighting supplied from the Aeroplane electrical system to provide adequate illumination for all instruments and equipment essential for the safe operation of the Aeroplane; (iii) lighting supplied from the Aeroplane electrical system to provide adequate illumination in all passenger compartments; (iv) an electric torch for each required crewmember readily accessible to crewmember when seated at their designated station; (b) for flight by night, in addition to the equipment specified in paragraph (a) — (i) the lights required by the Civil Aviation (Rules of the Air)

	Regulations, for Aeroplane in flight or operating on the movement area of an Aerodrome; (ii) lighting supplied from the Aeroplane electrical system to provide adequate illumination for all instruments and equipment essential for the safe operation of the Aeroplane; (iii) lights in all passenger compartments; (iv) an electric torch for each crewmember station; (v) navigation/position lights; (vi) a landing light.
Engine instruments	**9.** An operator shall not operate a powered aircraft without the following engine instruments: (a) A means for indicating fuel quantity in each fuel tank to be used. (b) An oil pressure indicator for each engine. (c) An oil temperature indicator for each engine. (d) A manifold pressure indicator for each altitude engine. (e) A tachometer for each engine.
Landing gear indicator position and aural warning device	**10.** An operator shall not operate a powered civil aircraft with retractable landing gear unless it has a landing gear position indicator.
Altitude alerting system	**11.** (1) An operator shall not operate a turbine powered aeroplane with a maximum certified take-off mass in excess of 5700 kg or having a maximum approved passenger seating configuration of more than 9 seats, or a turbojet powered aeroplane, 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)For operations in defined portions of airspace where, based on Regional Air Navigation Agreement, a VSM of 300 m (1000 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 ±90 m (300 ft).
Emergency exit	**12.** (1)An Operator shall not fly an Aeroplane unless, every exit and every internal door in the Aeroplane is in working order, and, subject to sub-regulations (2), (3) and (4), during take-off and landing and during any emergency, every such exit and door shall be kept free of obstruction and operating handle shall not be fastened by locking or otherwise so as to prevent, hinder or delay door operation during emergency. (2) An exit may be obstructed by cargo if it is an exit which, in accordance with arrangements approved by the Authority, either generally or in relation to a class of Aeroplane or a particular Aeroplane, is not required for use by passengers.

	(3) Every exit from the Aeroplane, being an exit intended to be used by passengers in normal circumstances, shall be marked with the word "EXIT" and "KUTOKA" in capital letters and every exit, being an exit intended to be used by passengers in an emergency only, shall be marked with the words "EMERGENCY EXIT" and "MLANGO WA DHARURA" in capital letters or approved symbols depicting the same. (4) Every exit from the Aeroplane shall be marked with instructions and with diagrams, to indicate the correct method of opening the exit and the markings shall be placed on or near the inside surface of the door or other closure of the exit and, if it can be opened from the outside of the Aeroplane, or near the exterior surface. (5) Subject to compliance with sub regulation (4), if one, but not more than one, exit from an Aeroplane becomes inoperative at a place where it is not reasonably practicable for it to be repaired or replaced, nothing in this regulation shall prevent that Aeroplane from carrying passengers until it next lands at a place where the exit can be repaired or replaced. (6) On any flight pursuant to this sub regulation— (a) the number of passengers carried and the position of the seats which the passengers occupy shall be in accordance with arrangements approved by the Authority either in relation to the particular Aeroplane or to a class of Aeroplane; and (b) in accordance with arrangements so approved, the exit shall be fastened by locking or otherwise, the words 'EXIT', KUTOKA', 'EMERGENCY EXIT' and 'MLANGO WA DHARURA' shall be covered, and the exit shall be marked by a red disc at least 23 centimetres in diameter with a horizontal white bar across it bearing the words 'NO EXIT' and 'HAKUNA KUTOKA' in red letters or approved symbols depicting the same.
Survival kit	**13.** An operator shall not operate an aircraft across land areas which have been designated by the Authority as areas in which search and rescue would be especially difficult, unless equipped with enough survival kits for the number of occupants of the aeroplane appropriate for the route to be flown.
ELT Batteries	**14.** (1) For each aircraft, batteries used in emergency locator transmitters 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.
	(2) The expiration date for a replacement or recharged emergency locator transmitter battery shall be legibly marked on the outside of the transmitter on all aircraft.

Crash axe	**15.** (1)An Operator shall not operate an Aeroplane with a maximum certificated take-off mass of over 5,700 kg or having a maximum approved passenger seating configuration of more than nine seats unless it is equipped with at least one crash axe or crowbar located in the cockpit.
	(2) Where the maximum approved passenger-seating configuration is more than two hundred an additional crash axe or crowbar shall be carried and located in or near the most rearward galley area.
	(3) Crash axes and crowbars located in the passenger compartment shall not be visible to the passengers.
Icing protection equipment	**16.** (1)No person may operate an aircraft in expected or actual icing conditions unless it is equipped for the prevention or removal of ice on windshields, wings, control surfaces, empennage, propellers, rotor blades, or other parts of the aircraft where ice formation will adversely affect the safety of the aircraft.
	(2) No person may operate an aircraft in expected or actual icing conditions at night unless it is equipped with a means to illuminate or detect the formation of ice. 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.
Pitot heat and indication systems	**17.** (1)An operator shall not operate an aircraft in instrument flight conditions unless it is equipped with a pitot heat system.
	(2) An operator shall not operate an aeroplane equipped with a flight instrument pitot heating system unless the aeroplane 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 crew member. The indication provided shall be designed to alert the flight crew if either: (i) The pitot heating system is switched "off," and (ii) The pitot heating system is switched "on" and any pitot tube heating element is inoperative, or (b) an integrated flight crew alerting system that will notify the crew if the pitot system is malfunctioning.
Static pressure system	**18.** (1)An operator shall not operate an aircraft unless it is equipped with a static pressure system vented to the outside atmospheric pressure so that they will be least affected by airflow variation or moisture or other foreign matter, and installed so as to be airtight except for the vent.
	(2)An operator shall not operate an aircraft in IFR or VFR at night unless it is equipped with a static pressure system vented to the outside atmospheric pressure so that they will be least affected by airflow variation or moisture or other foreign matter, and installed so as to be airtight except for the vent and a means of selecting an alternative source of static pressure.
	(3)An Operator shall not operate an Aeroplane in accordance with instrument flight rules or by night unless the Aeroplane is equipped with two independent static pressure systems, except that for Propeller -driven Aeroplanes with maximum certificated take-off mass of 5,700 kg or less, one static pressure system and one alternate source

	of static pressure is allowed.

PART III – INTERNATIONAL COMMERCIAL AIR TRANSPORT — AEROPLANES

Aeroplane Instruments, Equipment And Flight Documents	
Air Operator Certificate	**19.** (1) An aeroplane registered in {State} shall, carry a certified true copy of the air operator certificate specified in Civil Aviation (Air Operator Certification and Administration) Regulations, and a copy of the operations specifications relevant to the aeroplane type, issued in conjunction with the certificate.
	(2) When the certificate and the associated operations specifications are issued by the State of operator in a language other than English, an English translation shall be included.
Minimum Equipment List (MEL)	**20.** (1) The operator shall include in the operations manual a minimum equipment list (MEL), approved by the State of the Operator which shall enable the pilot-in-command to determine whether a flight may be commenced or continued from any intermediate stop should any instrument, equipment or systems become inoperative.
	(2)Where the State of the Operator is not the State of Registry, the State of the Operator shall ensure that the minimum equipment list does not affect the aeroplane's compliance with the airworthiness requirements applicable in the State of Registry
Aircraft Operating Manual	**21.** (1) The operator shall provide operations staff and flight crew with an aircraft operating manual, for each aircraft type operated, containing the normal, abnormal and emergency procedures relating to the operation of the aircraft.
	(2)The manual shall include details of the aircraft systems and of the checklists to be used and the design of the manual shall observe Human Factors principles.
Aeroplanes on all flights	**22.** An aeroplane shall be equipped with instruments which will enable the flight crew to control the flight path of the aeroplane, carry out any required procedural manoeuvres and observe the operating limitations of the aeroplane in the expected operating conditions.
Medical supplies	**23.** An aeroplane shall be equipped with accessible and adequate medical supplies comprising of – (a)one or more first-aid kits for the use of cabin crew in managing incidents of ill health; (b) for aeroplanes required to carry cabin crew as part of the operating crew, one universal precaution kit (two for aeroplanes authorized to carry more than 250 passengers) for the use of cabin

	crew members 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; and (c) for aeroplanes authorized to carry more than 100 passengers, on a sector length of more than two hours, a medical kit, for the use of medical doctors or other qualified persons in treating in-flight medical emergencies.
Protective breathing equipment	**24.** An operator shall not operate an aeroplane with a maximum certified takeoff mass exceeding 5700 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 crew members and to provide breathing gas for a period of not less than 15 minutes. (2) The oxygen supply for PBE may be provided by the required supplemental oxygen system. (3) 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) The PBE intended for cabin crew use shall be installed adjacent to each required cabin crew member duty station. (5) 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) The PBE while in use shall not prevent required communication.
Megaphones	**25.** (1)An operator operating a passenger-carrying aeroplane shall have a portable batterypowered megaphone or megaphones readily accessible to the crew members assigned to direct emergency evacuation. (2) The number and location of megaphones required in paragraph (a) shall be determined as follows: (a) On aeroplanes 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 cabin crew member seat; and (b) On aeroplanes with a seating capacity of more than 99 passengers, two megaphones in the passenger cabin on each aeroplane one installed at the forward end and the other at the most rearward location where it would be readily accessible to a normal cabin crew member seat; (c) For aeroplanes with more than one passenger deck, in all cases when the total passenger seating configuration of a deck is more than 60, at least one megaphone is required on the deck.

Portable fire extinguishers

26. (1)An aeroplane shall be equipped with portable fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the aeroplane and at least one shall be located in:

(a) the pilot's compartment; and

(b) each passenger compartment that is separate from the pilot's compartment and that is not readily accessible to the flight crew.

(2)An operator shall not 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 fires likely to occur in the compartment where the extinguisher is intended to be used;

(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 aeroplane 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 Seating Capacity	
7 through 29	1
30 through 60	2
61 through 200	3
201 through 300	4
301 through 400	5
401 through 500	6
501 through 600	7
601 or more	8

Lavatory smoke detector

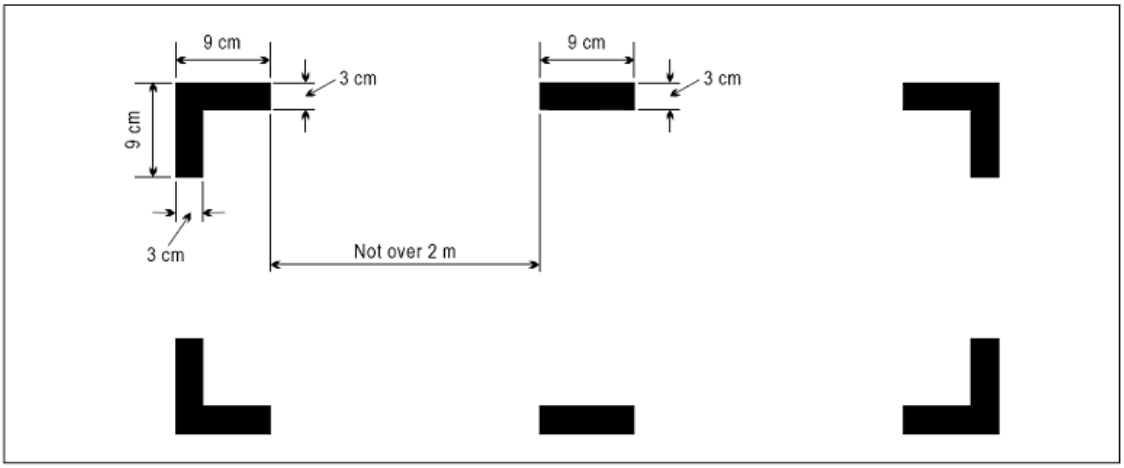
27. No person may operate a passenger-carrying transport category aeroplane unless each lavatory in the aeroplane is equipped with a smoke detector system or equivalent that provides:

(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 member, taking into consideration the

	positioning of cabin crew members throughout the passenger compartment during various phases of flight.
Seat / berth and seat belt / safety harness	**28.** (1) An aeroplane shall be equipped with: (a) a seat or berth with safety belt for each person on board over the age of two years; (b) a seat belt for each seat and restraining belts for each berth; and
	(2) A safety harness for each flight crew member seat. (a) The safety harness for each pilot seat shall incorporate a device, which will automatically restrain the occupant's torso in the event of rapid deceleration. (b) The safety harness for each pilot seat, which includes shoulder straps and a seat belt, should incorporate a restraining device to prevent a suddenly incapacitated pilot from interfering with the flight controls.
Fasten seat belt, use of oxygen, no smoking, life jackets and emergency exit	**29.** An aeroplane shall be equipped with means of ensuring that the following information and instructions are conveyed to passengers: (vi) when seat belts are to be fastened; (ii) when and how oxygen equipment is to be used if the carriage of oxygen is required; (iii) restrictions on smoking; (iv) location and use of life jackets or equivalent individual flotation devices where their carriage is required; and (vii) location and method of opening emergency exits;
Spare electrical fuses	**30.** An aeroplane shall be equipped with spare electrical fuses of appropriate ratings for replacement of those accessible in flight.
Required aeroplane lights and instrument illuminatio n	**31.** An operator shall not operate an aircraft in commercial air transport operations unless it is equipped with- (a) Two landing lights or a single light having two separately energised filaments; (b) An anti-collision light system; (c) Illumination for all flight instruments and equipment that are essential for the safe operation of the (d) aircraft; (e) Lights in all passenger compartments; (f) A flashlight for each crew member station; (g) Navigation/position lights; and (h) Lights to conform to the International regulations for preventing collisions at sea if the aircraft is a (i) seaplane or an amphibian aircraft.
Lavatory fire Extinguisher	**32.** (1)Any agent used in a built-in fire extinguisher for each lavatory disposal receptacle for towels, paper or waste in an aeroplane for which the individual certificate of airworthiness is first issued on or after 31 December 2011 and any extinguishing agent used in a portable fire extinguisher in an aeroplane for which the individual certificate of airworthiness is first issued on or after 31 December 2018 shall:

	(a) meet the applicable minimum performance requirements of the State of Registry; and (b) Not contain Halon 1211, Halon 1301, or Halon 2402.
	(2)Built-in lavatory fire extinguishers shall be designed to discharge automatically into each disposal receptacle upon occurrence of a fire in the receptacle.
Windshield wipers	**33.** An Operator shall not operate an Aeroplane with a maximum certificated take off mass of over 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.
Operations Manual / Flight Manual and Charts.	**34.** An aeroplane shall carry: (a) the operations manual prescribed in Civil Aviation (Air Operator Certification and Administration) Regulations, or those parts of it that pertain to flight operations; (b) the flight manual for the aeroplane, or other documents containing performance data required for the application of Aeroplane Performance operating limitations in accordance with Civil Aviation (Operation of Aircraft - Commercial Air Transport Aeroplane) Regulations and any other information necessary for the operation of the aeroplane within the terms of its certificate of airworthiness, unless these data are available in the operations manual; and (c) current and suitable charts to cover the route of the proposed flight and any route along which it is reasonable to expect that the flight may be diverted.
Marking of break-in points	**35.** (1) Where areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on an aeroplane, such areas shall be marked as shown below in Figure(1).
	(2) The colour of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.

	(3) Where the corner markings are more than 2 m apart, intermediate lines 9 cm × 3 cm shall be inserted so that there is no more than 2 m between adjacent markings. Figure (1). Marking of break-in Points 
Engine instruments	**36.** In addition to the listed equipment requirements in regulation 9, an operator shall not operate a powered aircraft without the following engine instruments: (a) A carburettor air temperature indicator for each piston engine. (b) A cylinder head temperature indicator for each air-cooled piston engine. (c) A fuel pressure indicator for each engine. (d) A fuel flowmeter or fuel mixture indicator for each engine not equipped with an automatic altitude mixture control; (e) An oil quantity indicator for each oil-tank when a transfer or separate oil reserve supply is used. (f) 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. (g) A device for each reversible propeller, to indicate to the pilot when the propeller is in reverse pitch, which 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.
Landing gear indicator position and aural warning device	**37.** (1) In addition to the requirements in regulation 10, an operator shall not operate an aeroplane with retractable landing gear unless it has an aural warning device that functions continuously under the following conditions: (a) For aeroplanes with an established approach wing-flap position, whenever the wing flaps are extended beyond the maximum certified approach climb configuration position in the Aeroplane Flight Manual and the landing gear is not fully extended and locked; (b)For aeroplanes without an established approach climb wing-flap position, whenever the wing flaps are extended beyond the position at which landing gear extension is normally performed and the landing gear is not fully extended and

	locked. (2) The warning system required by sub-regulation (1): (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 utilise any part of the throttle-actuated system including the aural warning device. (3) The flap position-sensing unit required in sub-regulation (1) may be installed at any suitable place in the aeroplane.
Passenger information signs	**38.** (1)An operator shall not operate a passenger-carrying aeroplane with a maximum certificated takeoff weight of 5700 kg (12,500 lbs) or more 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, which 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)Notwithstanding sub-regulation (1), an operator shall not operate an aircraft in which all passenger seats are not visible from the flight deck, unless it is equipped with a means of indicating to all passengers and cabin crew when seat belts shall be fastened and when smoking is not allowed.
Materials for cabin interiors	**39.** (1)An operator shall not operate an aircraft unless each compartment used by the crew or passengers meet the following requirements of the State of Design: (a) materials must be at least flash resistant; (b) the wall and ceiling linings and the covering of upholstering, floors and furnishings must be flame resistant; (c) each compartment where smoking is to be allowed must be equipped with self-contained ash trays that are completely removable and other compartments must be placarded against smoking; and (d) each receptacle for used towels, papers and wastes must be of fire-resistant material and must have a cover or other means of containing possible fires started in the receptacles.
	(2) For aircraft for which the State of Design has developed new airworthiness requirements for cabin interiors since original type certification, the owner of the aircraft shall ensure that all materials that do not meet current State of Design requirements shall have them replaced upon the first major overhaul of the aircraft cabin or refurbishing of the cabin interior with materials that meet the new requirements.
Materials for cargo and	**40.** (1) Each cargo compartment shall have ceiling and sidewall liner panels which are constructed of materials which meet the test requirements for

baggage compartments	flame resistance of cargo compartment liners as prescribed for type certification.
	(2) For purposes of sub-regulation (1), 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.
Power supply, distribution, and indication system.	**41.** (1) An Operator shall not operate an Aeroplane unless it is equipped with an electrical power supply and distribution system that— (a) meets the airworthiness requirements for certification of a commercial air transport Aeroplane, as specified by the Authority; or (b) is able to produce and distribute the load for the required instruments and equipment, with use of an external power supply if any one electrical power source or component of the power distribution system fails, and a means for indicating the adequacy of the electrical power being supplied to required flight instruments.
	(2) Engine-driven sources of energy when used shall be on separate engines.
Flight recorders	**42.** (1) Crash-protected flight recorders shall comprise one or more of the following systems: (a) a flight data recorder (FDR); (b) a cockpit voice recorder (CVR); (c) an airborne image recorder (AIR); or (d) a data link recorder (DLR).
	(2) Image and data link information may be recorded on either the CVR or the FDR.
	(3) Lightweight flight recorders shall comprise one or more of the following systems: (a) an aircraft data recording system (ADRS); (b) a cockpit audio recording system (CARS); (c)an airborne image recording system (AIRS); or (d) a data link recording system (DLRS).
	(4) Image and data link information may be recorded on either the CARS or the ADRS.
	(5) The parameters to be recorded are listed in Third Schedule of these Regulations.
Flight Data Recorders (FDR) and aircraft data recording systems - Applicability	**43.** (1)All turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less for which the application for type certification is submitted to a Contracting State on or after 1 January 2016 shall be equipped with: (a) an FDR which shall record at least the first 16 parameters listed in Table A8-1 in Third schedule of these Regulations; or (b) a Class C AIR or AIRS which shall record at least the flight path and speed parameters displayed to the pilot(s); as defined in the Third Schedule of these Regulations; or (c) an ADRS which shall record at least the first 7 parameters listed in

	Table A8-3 in Third Schedule of these Regulations.
	(2) All turbine-engined aeroplane of a maximum certificated take-off mass of 5 700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2016 shall be equipped- (a) an FDR which shall record at least the first 16 parameters listed in Table A8-1 in Third schedule of these Regulations; or (b) a Class C AIR or AIRS which shall record at least the flight path and speed parameters displayed to the pilot(s); as defined in the Third Schedule of these Regulations or (c) an ADRS which shall record at least the first 7 parameters listed in Table A8-3 in Third Schedule of these Regulations.
	(3)All aeroplanes 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 1989 shall be equipped with FDR which shall record at least the first 32 parameters listed in Table A8-1 of the Third Schedule of these Regulations; .
	(4)All aeroplanes of a maximum certificated take-off mass of over 5 700 kg, up to and including 27 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1989, shall be equipped with an FDR which shall record at least the first 16 parameters listed in Table A8-1 of the Third Schedule of these Regulations
	(5)All multi-engined turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 1990 shall be equipped with an FDR which shall record at least the first 16 parameters listed in Table A8-1 of the Third Schedule of these Regulations.
	(6)All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1989, with a maximum certificated take-off mass of over 5 700 kg, except those in sub-regulation (8), shall be equipped with an FDR which shall record at least the first 5 parameters listed in Table A8-1 of the Third Schedule of these Regulations.
	(7)All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987 but before 1 January 1989, with a maximum certificated take-off mass of over 5 700 kg, except those in sub-regulation (8), shall be equipped with an FDR which shall record at least the first 9 parameters listed in Table A8-1 of the Third Schedule of these Regulations.
	(8)All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued on or after 1 January 1987 but before 1 January 1989, with 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 an FDR which shall record at least the first 16 parameters listed in Table A8-1 of

	the Third Schedule of these Regulations.
	(9) All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with 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 an FDR which shall record, in addition to the first 5 parameters listed in the Table A8-1 of the Third Schedule of these Regulations, such additional parameters as are necessary to meet the objectives of determining: (a) the attitude of the aeroplane in achieving its flight path; and (b) the basic forces acting upon the aeroplane resulting in the achieved flight path and the origin of such basic forces.
	(10) All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued after 1 January 2005 shall be equipped with an FDR which shall record at least the first 78 parameters listed in Table A8-1 of the Third Schedule of these Regulations.
	(11) All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the application for type certification is submitted to a Contracting State on or after 1 January 2023 shall be equipped with an FDR capable of recording at least the 82 parameters listed in Table A8-1 of the Third Schedule of these Regulations.
	(12)All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which individual certificate of airworthiness is first issued to a Contracting State on or after 1 January 2023 shall be equipped with an FDR capable of recording at least the 82 parameters listed in Table A8-1 of the Third Schedule of these Regulations. (13) Inspection of flight data records shall be recorded annually and the report of the annual inspection shall be submitted to the Authority.
Recording technology of FDR	**44.** FDRs or ADRS shall not use engraving metal foil, frequency modulation (FM), photographic film or magnetic tape.
Duration of FDR	**45.** All FDRs shall retain the information recorded during at least the last 25 hours of their operation, with exception of those installed on aeroplanes referenced in regulation (18) (5) for which the FDR shall retain the information recorded during at least the last 30 minutes of its operation, and in addition sufficient information from the preceding take-off for calibration purpose.
Cockpit voice recorders	**46.** (1) All turbine-engined aeroplanes of a maximum certificated take-off mass of over 2 250 kg, up to and including 5 700 kg, for which the application for

(CVR) and Cockpit Audio Recording Systems(CARS)- Applicability	type certification is submitted to a Contracting State on or after 1 January 2016 and required to be operated by more than one pilot shall be equipped with either a CVR or a CARS.
	(2) All turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2016 and required to be operated by more than one pilot shall be equipped with either a CVR or a CARS.
	(3)All aeroplanes 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 1987 shall be equipped with a CVR.
	(4)All turbine-engined aeroplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 5 700 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 CVR.
CVR-Recording Technology	**47.** CVRS and CARS shall not use magnetic tape or wire.
CVR- Duration	**48.** (1) All CVRs shall retain the information recorded during at least the last 2 hours of their operation.
	(2) All aeroplanes 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 2021 shall be equipped with a CVR which shall retain the information recorded during at least the last 25 hours of its operation.
CVR - alternate power source	**49.** (1) An alternate power source shall automatically engage and provide 10 minutes, plus or minus one minute, of operation whenever aeroplane power to the recorder ceases, either by normal shutdown or by any other loss of power.
	(2)Subject to sub-regulation (1), the alternate power source shall power the CVR and its associated cockpit area microphone components.
	(3) The CVR shall be located as close as practicable to the alternate power source.
	(4) All aeroplanes of a maximum certificated take-off mass of over 27 000 kg for which the application for type certification is submitted to a Contracting State on or after 1 January 2018 shall be provided with an alternate power source, as defined in sub-regulation(1) that powers the forward CVR in the case of combination recorders.
	(3)All aeroplanes 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 shall be provided with an alternate power source, as

	defined in sub-regulation (1) that powers at least one CVR.
Data link recorders- Applicability	**50.** (1)All aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which utilize any of the data link communications applications listed in paragraph 5.1.2 of the Third Schedule and are required to carry a CVR, shall record on a crash-protected flight recorder the data link communications messages.
	(2)All aeroplanes which are modified on or after 1 January 2016 to install and utilize any of the data link communications applications listed in paragraph 5.1.2 of the Third Schedule and are required to carry a CVR, shall record on crashed-protected a flight recorder the data link communications messages.
Data link recorders - Duration	**51.** The minimum recording duration shall be equal to the duration of the CVR.
Data link recorders - Correlation	**52.** Data link recording shall be able to be correlated with the recorded cockpit audio.
Flight crew-machine interface recordings	**53.** (1) All aeroplanes of a maximum take-off mass of over 5 700 kg for which the application for type certification is submitted to a Contracting State on or after 1 January 2023 shall be equipped with a crash-protected flight recorder which shall record the information displayed to the flight crew from electronic displays, as well as the operation of switches and selectors by the flight crew as defined in Third Schedule of these Regulations.
	(2)The minimum flight crew-machine interface recording duration shall be at least for the last two hours and be able to be correlated to the recorded cockpit audio.
Flight recorders — general	**54.** ***(1)Construction and installation:*** (a) 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; and (b) Flight recorders shall meet the prescribed crashworthiness and fire protection specifications.
	(2) ***Operation:*** (a) Flight recorders shall not be switched off during flight time. (b) To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident. (c) The flight recorders shall not be reactivated before their disposition as determined in accordance with Civil Aviation (Aircraft Accident and

	Incident Investigation) Regulations.
	***(3)*Continued serviceability:** Operational checks and evaluations of recordings from the flight recorder systems shall be conducted annually to ensure the continued serviceability of the recorders in accordance with the Third Schedule.
	***(4)*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.
Annual Inspection of Cockpit voice recorders.	**55.** (1)A flight crew member shall monitor the built-in test features on the cockpit for the cockpit voice recorder prior to the first flight of the day. (2)The operator shall conduct annual inspections of a cockpit voice recorder as follow—- the read-out of the recorded data shall ensure that the recorder operates correctly for the nominal duration of the recording; an annual examination of the recorded signal on the cockpit voice recorder shall be carried out by replay of the recording of cockpit voice recorder; while installed in the aircraft, the cockpit voice recorder shall record text signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards; during the annual examination, a sample of in-flight recordings of the cockpit voice recorder shall be examined for evidence that the intelligibility of the signal is acceptable; and Operational checks and evaluations of recordings from the flight recorder systems shall be conducted to ensure the continued serviceability of the recorders. (3)The operator shall give a report of the annual inspection conducted under this regulation to the Authority.
Combination recorders	**56.** (1) All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the application for type certification is submitted to the Contracting State 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/CVR).
	(2)All aeroplanes of a maximum certificated take-off mass of over 15 000 kg for which the application for type certification is submitted to a Contracting State 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/CVR).
	(3) Subject to sub-regulation (2), one recorder shall be located as close to the cockpit as practicable and the other recorder located as far aft as practicable.
	(4)All aeroplanes of a maximum certificated take-off mass over 5 700 kg, required to be equipped with an FDR and a CVR, may alternatively be equipped with two combination recorders (FDR/CVR).
	(5) This regulation may be complied with by equipping the aeroplanes with two combination recorders (one forward and one aft) or separate devices.
	(4) All multi-engined turbine-powered aeroplanes of a maximum certificated take-off mass of 5 700 kg or less, required to be equipped with an FDR and/or a CVR, may alternatively be equipped with one combination recorder (FDR/CVR).
Flight recorder data recovery	**57.** (1)All aeroplanes of a maximum certificated take-off mass of over 27 000 kg and authorized to carry more than nineteen passengers for which the application for type certification is submitted to a Contracting State on or after 1 January 2021, shall be equipped with a means approved by the State of the Operator, to recover flight recorder data and make it available in a timely manner.
	(2)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 aeroplane 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.
All aeroplanes operated as VFR flights	**58.** (1) All aeroplanes when operated as VFR flights shall be equipped with: a) a magnetic compass; b) an accurate timepiece indicating the time in hours, minutes and seconds; c) sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight; d) an airspeed indicating system calibrated in knots, miles per hour or kilometers per hour; and e) such additional instruments or equipment as may be prescribed by the appropriate Authority.

	(2) VFR flights which are operated as controlled flights shall be equipped in accordance with Instruments Flight Rules.
Instruments for operations requiring two pilots in day VFR	**59.** An operator shall not operate an aeroplane that requires two pilots to operate unless each pilot's station is equipped with separate instruments as follows: (a) an airspeed indicator calibrated in knots, miles per hour or kilometers per hour; (b) a sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals/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 co-coordinator incorporating a slip indicator; (e) an attitude indicator; (f) a stabilised direction indicator, and (g) any other equipment as required by the Authority.
All Aeroplanes on Flights Over Water	**60.** ***(1)Seaplanes***. All seaplanes for all flights shall be equipped with: (a) one life jacket, or equivalent individual flotation device, for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided; (b) equipment for making the sound signals prescribed in the International Regulations for Preventing Collisions at Sea, where applicable; and (c) one sea anchor (drogue).
	(2***) Landplanes:*** Landplanes shall carry the equipment prescribed in this regulation: a) when flying over water and at a distance of more than 93 km (50 NM) away from the shore, in the case of landplanes operated in accordance with Civil Aviation(Operation of Aircraft – Commercial Air Transport Aeroplanes) Regulations. b) when flying en route over water beyond gliding distance from the shore, in the case of all other landplanes; and c) when taking off or landing at an aerodrome 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 a likelihood of a ditching.
	(3) The equipment referred to in **sub-regulation(1)** shall comprise one life jacket or equivalent individual flotation device for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided.
All aeroplanes on long-range over-water flights	**61.** (1) Notwithstanding Regulation 34, the following equipment shall be installed in all aeroplanes when used over routes on which the aeroplane may be over water and at more than a distance corresponding to 120 minutes at cruising speed or 740 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 5 Civil Aviation(Operation of Aircraft

	– Commercial Air Transport Aeroplanes) Regulations, and 30 minutes or 185 km (100 NM), whichever is the lesser, for all other aeroplanes: (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 equipment including means of sustaining life as is appropriate to the flight to be undertaken; (b) equipment for making the pyrotechnical distress signals described in Civil Aviation (Rules of the Air) Regulations; and (c) on all aeroplanes of a maximum certificated takeoff mass of over 27 000 kg, a securely attached underwater locating device operating at a frequency of 8.8 kHz. (d) subject to paragraph c) above, automatically activated underwater locating device shall operate for a minimum of 30 days and shall not be installed in wings or empennage.
	(2) Each life jacket and equivalent individual flotation device, when carried in accordance with these regulations, shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons, except where the requirement are met by the provision of individual flotation devices other than life jackets.
All Aeroplanes on flights over designated land areas	**62.** Aeroplanes, when operated across land areas which have been designated by the State concerned as areas in which search and rescue would be especially difficult, shall be equipped with such signaling devices and life-saving equipment (including means of sustaining life) as may be appropriate to the area overflown.
All aeroplanes on high altitude flights	**63.** (1) Approximate altitude in the Standard Atmosphere corresponding to the value of absolute pressure used in this text 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*
	(2) An aeroplane 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 supplies required in Civil Aviation (Operation of Aircraft – Commercial Air Transport Aeroplanes) Regulations.
	(3) An aeroplane intended to be operated at flight altitudes at which the atmospheric pressure is less than 700 hPa but which is provided with means of maintaining pressures greater than 700 hPa in personnel compartments shall be provided with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in Civil Aviation (Operation of Aircraft – Commercial Air Transport Aeroplanes) Regulations.

	(4) Pressurized aeroplanes intended to be operated at flight altitudes at which the atmospheric pressure is less than 376 hPa shall be equipped with a device to provide positive warning to the flight crew of any dangerous loss of pressurization.
	(5) An aeroplane intended to be operated at flight altitudes at which the atmospheric pressure is less than 376 hPa, or which, if operated at flight altitudes at which the atmospheric pressure is more than 376 hPa, cannot descend safely within four minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa shall be provided with automatically deployable oxygen equipment to satisfy the requirements of Civil Aviation(Operation of Aircraft – Commercial Air Transport Aeroplanes) Regulations.
	(6) The total number of oxygen dispensing units shall exceed the number of passenger and cabin crew seats by at least 10 per cent.
All aeroplanes operated in accordance with instrument flight rules (IFR)	**64.** (1)All aeroplanes when operated in accordance with the instrument flight rules, or when the aeroplane cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with: a) a magnetic compass; b) an accurate timepiece indicating the time in hours, minutes and seconds; c) two sensitive pressure altimeters with counter drum-pointer or equivalent presentation; d) an airspeed indicating system with means of preventing malfunctioning due to either condensation or icing; e) a turn and slip indicator; f) an attitude indicator (artificial horizon); g) a heading indicator (directional gyroscope); h) a means of indicating whether the power supply to the gyroscopic instrument is adequate; i) a means of indicating in the flight crew compartment the outside air temperature; j) a rate-of-climb and descent indicator; and k) such additional instruments or equipment as may be prescribed by the appropriate Authority.
	(2) The requirements of paragraphs (e), (f) and (g) may be met by combinations of instruments or by integrated flight director systems provided that the safeguards against total failure, inherent in the three separate instruments, are retained.
All aeroplanes over 5 700 kg — Emergency power supply for electrically operated attitude	**65.** (1) All aeroplanes of a maximum certificated take-off mass of over 5 700 kg newly introduced into service after 1 January 1975 shall be fitted with an emergency power supply, independent of the main electrical generating system, for the purpose of operating and illuminating, for a minimum period of 30 minutes, an attitude indicating instrument (artificial horizon), clearly visible to the pilot-in-command.

indicating instruments	(2) Subject to sub-regulation (1), the emergency power supply shall be automatically operative after the total failure of the main electrical generating system and clear indication shall be given on the instrument panel that the attitude indicator(s) is being operated by emergency power.
All aeroplanes when operated at night	**66.** (1)All aeroplanes when operated at night shall be equipped with: a) all equipment specified in regulation 40; b) the lights required by the Civil Aviation (Rule of the Air) regulations for aircraft in flight or operating on the movement area of an aerodrome; c) two landing lights; d) illumination for all instruments and equipment that are essential for the safe operation of the aeroplane that are used by the flight crew; e) lights in all passenger compartments; and f) an independent portable light for each crew member station.
	(2) Specifications for lights meeting the requirements of the Civil Aviation (Rules of the air) regulations for navigation lights are contained in the First Schedule.
	(3)The general characteristics of lights are specified in Civil Aviation (Airworthiness) regulations.
Pressurized aeroplanes when carrying passengers — weather radar	**67.** Pressurized aeroplanes when carrying passengers should be equipped with operative weather radar whenever such aeroplanes are being operated in areas where thunderstorms or other potentially hazardous weather conditions, regarded as detectable with airborne weather radar, may be expected to exist along the route either at night or under instrument meteorological conditions.
All aeroplanes operated above 15 000 m (49 000 ft) — radiation indicator	**68.** (1)All aeroplanes 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.
	(2)The display unit of the equipment shall be readily visible to a flight crew member.
All aeroplanes complying with the noise certification Standards Civil Aviation (Environmental – Noise Certification)	**69.** (1)An aeroplane shall carry a document attesting noise certification.
	(2)When the document, or a suitable statement attesting noise certification as contained in another document approved by the State of Registry, is issued in a language other than English, it shall include an English translation.

Regulations	
Mach number indicator	**70.** All aeroplanes with speed limitations expressed in terms of Mach number shall be equipped with a Mach number indicator.
Aeroplanes required to be equipped with Ground Proximity Warning Systems (GPWS)	**71.** (1) All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system.
	(2) All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 15 000 kg or authorized to carry more than 30 passengers shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.
	(3) All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers, for which the individual certificate of airworthiness is first issued on or after 1 January 2004, shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.
	(4) All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system which has a forward-looking terrain avoidance function.
	(5)All turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less and authorized to carry more than five but not more than nine passengers shall be equipped with a ground proximity warning system which provides the warnings excessive descent rate and excessive altitude loss after take-off or go-around, warning of unsafe terrain clearance and a forward looking terrain avoidance function.
	(6) All piston-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system which provides the warnings in excessive descent rate and excessive altitude loss after take-off or go-around, warning of unsafe terrain clearance and a forward-looking terrain avoidance function.
	(7) A ground proximity warning system shall provide automatically a timely and distinctive warning to the flight crew when the aeroplane is in potentially hazardous proximity to the earth's surface.
	(8) A ground proximity warning system shall provide, unless otherwise specified herein, 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:

	i. gear not locked down; ii. flaps not in a landing position; and e) excessive descent below the instrument glide path.
Aeroplanes carrying passengers — cabin crew seats	**72.** (1)All aeroplanes shall be equipped with a forward or rearward facing (within 15 degrees of the longitudinal axis of the aeroplane) seat, fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of Civil Aviation(Operation of Aircraft – Commercial Air Transport Aeroplanes) Regulation in respect of emergency evacuation.
	(2) Cabin crew seats provided in accordance with sub-regulation (1) shall be located near floor level and other emergency exits as required by the State of Registry for emergency evacuation.
Emergency Locator Transmitter (ELT)	**73.** (1)All aeroplanes shall carry an automatic ELT.
	(2) All aeroplanes authorized to carry more than 19 passengers shall be equipped with at least one automatic ELT or two ELTs of any type.
	(3) ELT equipment carried to satisfy the requirements of this regulation shall operate in accordance with the relevant provisions of Civil Aviation (Communication Systems) Regulations.
	(4) At least one survival type ELT shall be located with each life raft carried.
	(5) An operator shall not operate an aeroplane in long-range overwater operations or over designated land areas where search and rescue would be especially difficult, without having on the aeroplane at least two ELTs, one of which shall be automatic.
Location of an aeroplane in distress	**74.** (1) All aeroplanes 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 2021, shall autonomously transmit information from which a position can be determined by the operator at least once every minute, when in distress, in accordance with Eighth Schedule of these regulations.
	(2) The operator shall make position information of a flight in distress available to the appropriate search and rescue organizations, as established by the Authority.
Aeroplanes required to be equipped with An airborne collision avoidance system (ACAS II)	**75.** (1) An operator shall not operate an aeroplane installed with airborne collision avoidance system unless in accordance with the relevant provisions of Civil Aviation (Aeronautical Telecommunications – Surveillance and Collision Avoidance Systems) Regulations (2)Any airborne collision avoidance system installed on an aeroplane shall be approved by the Authority. (3) An operator operating an aeroplane equipped with an airborne collision avoidance system shall have that system on and operating.

	(1) All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than 19 passengers shall be equipped with an airborne collision avoidance system (ACAS II).
Requirements for pressure-altitude reporting transponders	**76.** (1) An operator shall not operate an aeroplane in airspace that requires a pressure altitude reporting transponder unless that equipment is operative. (2) An operator shall not operate an aeroplane unless it is equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Civil Aviation (Surveillance and Collision Avoidance Systems) Regulations.
	(3) An operator shall not operate an aeroplane unless it is equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m (25 ft), or better.
	(4) The Mode S transponder shall be provided with the airborne/on-the-ground status if the aeroplane is equipped with an automatic means of detecting such status.
Microphones	**77.** All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones below the transition level/altitude.
Turbo-jet aeroplanes — forward-looking wind shear warning system	**78.** (1) All turbo-jet aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a forward-looking wind shear warning system.
	(2) A forward-looking wind shear warning system shall 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) Subject to sub-regulation (2), the system shall 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.
All aeroplanes operated by a single pilot under the Instrument Flight Rules (IFR) or at night	**79.** For approval in accordance with Civil Aviation (Operation of Aircraft – Commercial Air Transport Aeroplanes) Regulations, all aeroplanes operated by a single pilot under the IFR or at night shall be equipped with: a) a serviceable autopilot that has at least altitude hold and heading select modes; b) a headset with a boom microphone or equivalent and a transmit button on the control wheel; c) audio selector panel accessible to each required flight crew member; and d) a chart holder for displaying charts that enables them to be readable in

	all ambient light conditions.
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)	**80.** (1) Where aeroplanes are equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, or any combination of those systems into a hybrid system, the use of such systems for the safe operation of an aeroplane shall be approved by the Authority.
	(2) In approving the operational use of automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, the Authority shall ensure that: a) the equipment meets the appropriate airworthiness certification requirements; b) the operator 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; c) the operator 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.
Electronic Flight Bags (EFBs) – EFB Equipment	**81.** Where portable EFBs are used on board an aeroplane, the operator shall ensure that they do not affect the performance of the aeroplane systems, equipment or the ability to operate the aeroplane.
EFB Functions	**82.** (1) An operator shall not use EFB on an aeroplane unless it is approved by the Authority.
	(2)Where EFBs are used on board an aeroplane 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.
EFB operational approval	**83.** For approval of EFB use on an aeroplane, the operator shall ensure that: a) the EFB equipment and its associated installation hardware, including interaction with aeroplane systems if applicable, meet the appropriate airworthiness certification requirements; b) the safety risks associated with the operations supported by the EFB function(s) are assessed; c) requirements for redundancy of the information (if appropriate) contained in and displayed by the EFB function(s) are established; d) documented procedures for the management of the EFB function(s) including any database it may use are established; and e) documented the procedures for the use of, and training requirements for, the EFB and the EFB function(s) are established.

AEROPLANE COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT	
Communication Equipment	**84.** (1) An aeroplane shall be provided with radio communication equipment capable of: a) conducting two-way communication for aerodrome control purposes; b) receiving meteorological information at any time during flight; and c) conducting two-way communication at any time during flight with at least one aeronautical station and with such other aeronautical stations and on such frequencies as may be prescribed by the appropriate Authority (State Communication Commission / Authority).
	(2) The requirements of sub-regulation (1) are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.
	(3)The radio communication equipment required in accordance with sub-regulation (1) shall provide for communications on the aeronautical emergency frequency 121.5 MHz.
	(4)For operations where communication equipment is required to meet an RCP specification for performance-based communication (PBC) , an aeroplane shall, in addition to the requirements specified in sub-regulation (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 aeroplane RCP specification capabilities listed in the flight manual or other aeroplane documentation approved by the State of Design or State of Registry; and c) have information relevant to the aeroplane RCP specification capabilities included in the MEL.
	(5) The State of the Operator shall, for operations where an RCP specification for PBC has been prescribed, ensure that 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.
	(6) The State of the Operator shall ensure that, in respect of those aeroplanes mentioned in sub-regulation (4), adequate provisions exist for: (a) receiving the reports of observed communication performance issued by monitoring programmes established in accordance with Civil Aviation (Air Traffic Services) Regulations, and (b) taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RCP specification(s).

	(7) An Operator shall not operate an Aeroplane under Instrument Flight Rules, or Visual Flight Rules over routes that cannot be navigated by reference to visual landmarks, unless the Aeroplane is equipped with communication and navigation equipment in accordance with the requirements of air traffic services in the area of operation, but not less than 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.
	(8)Where an operator is required to use more than one communication equipment unit, each unit shall be independent of the other or others to the extent that a failure in any one shall not result in failure of any other.
Crewmember interphone system	**85.** (1)An Operator shall not operate an Aeroplane of which a flight crew of more than one is required unless it is equipped with a flight crew interphone system, including headsets and microphones, not of a handheld type, for use by all members of the flight crew.
	(2) An Operator shall not operate an Aeroplane with a maximum certified take-off mass exceeding 15,000 kg or having a maximum approved passenger seating configuration of more than nineteen unless it is equipped with a crewmember interphone system that— (a)operates independently of the public address system except for handsets, headsets, microphones, selector switches and signalling 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 cockpit level; (iii) remote crew compartment that is not on the passenger cockpit and is not easily accessible from a passenger compartment; (c) 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 exits; (d) has an alerting system incorporating aural or visual signals for use by flight crew members to alert the cabin crew and for use by cabin crew members to alert the flight crew in the event of suspicious activity or security breaches in the cabin; (e) has a means for the recipient of a call to determine whether it is a normal call or an emergency call; and (f) provides on the ground a means of two-way communication between ground personnel and at least two flight crewmembers.
Public address system	**86.** An Operator shall not operate a passenger carrying Aeroplane with a maximum approved passenger seating configuration of more than nineteen unless a public address system is installed that— (a)operates independently of the interphone systems except for handsets, headsets, microphones, selector switches and signalling 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 crewmember, 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 ten seconds by a cabin crewmember 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) be readily accessible for immediate use from each required flight crew member station.
Navigation Equipment	**87.** (1) An operator shall not operate an aeroplane unless it is equipped with navigation equipment which will enable it to proceed: a) in accordance with its operational flight plan; and b) in accordance with the requirements of air traffic services.
	(2) Notwithstanding sub-regulation (1), the equipment requirements shall not apply in instances where the Authority has authorized VFR by visual reference to landmarks.
	(3) The aeroplane shall be sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the aeroplane to navigate in accordance with this regulation.
	(4) The failure of any single unit required for either communications or navigation purposes or both will not result in the failure of another unit required for communications or navigation purposes
Performance-Based Navigation (PBN)	**88.** (1) For operations where a navigation specification for Performance-Based Navigation (PBN) has been prescribed, an aeroplane shall, in addition to the requirements specified in regulation 60: 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 aeroplane navigation specification capabilities listed in the flight manual or other aeroplane 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.
	(2)The Authority shall, for operations where a navigation specification for PBN has been prescribed, ensure that the operator has established and documented: a) normal and abnormal procedures including contingency procedures; b) flight crew qualification and proficiency requirements in accordance with the appropriate navigation 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 the appropriate navigation specifications.
	(3) The Authority shall issue a specific approval for operations based on PBN authorization required (AR) navigation specifications.
Minimum Navigation	**89.** (1) An operator shall not operate an aeroplane in MNPS airspace unless it is equipped with navigation equipment which:

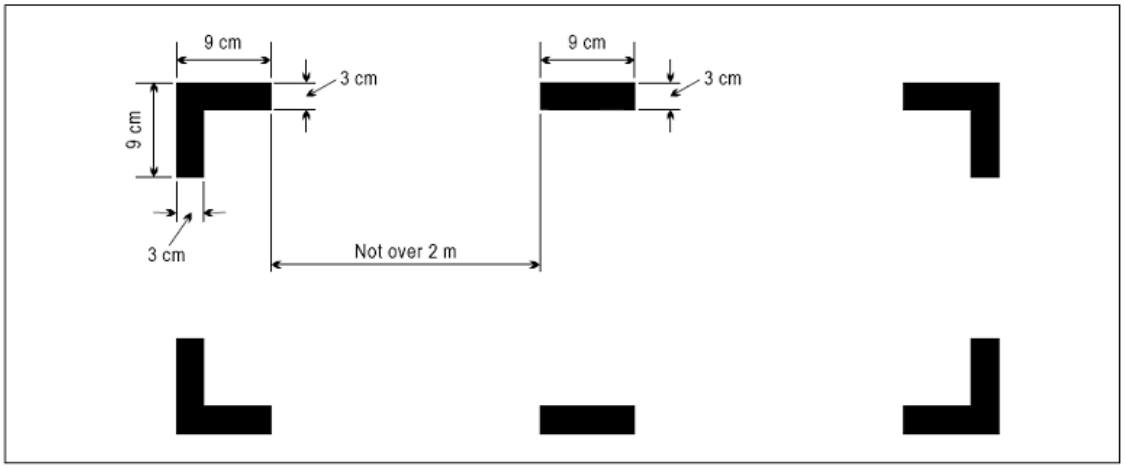
Performance Specifications (MNPS)	a) continuously provides indications to the flight crew of adherence to or departure from track to the required degree of accuracy at any point along that track; and b) has been authorized by the Authority for the MNPS operations concerned.
	(2) The navigation equipment required for operations in MNPS airspace shall be visible and usable by either pilot seated at his duty station.
	(3) For unrestricted operation in MNPS airspace, an aeroplane shall be equipped with two independent Long-Range Navigation Systems (LRNS).
	(4) For operation in MNPS airspace along notified special routes, an aeroplane shall be equipped with one LRNS, unless otherwise specified.
Reduced Vertical Separation Minimum (RVSM)	**90.** (1) An operator shall not operate an aeroplane for flights in defined portions of airspace where, based on Regional Air Navigation Agreement, a Reduced Vertical Separation Minimum (RVSM) of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive, unless the aeroplane: a) is provided with equipment which is capable of: i) indicating to the flight crew the flight level being flown; ii) automatically maintaining a selected flight level; iii) providing an alert to the flight crew when a deviation occurs from the selected flight level and the threshold for the alert shall not exceed ± 90 m (300 ft); and iv) automatically reporting pressure-altitude; b) is authorized by the State of the Operator for operation in the airspace concerned; and c) demonstrates a vertical navigation performance in accordance with Second Schedule of these Regulations.
	(2)Prior to granting the RVSM approval required in accordance with sub-regulation (1) the Authority shall be satisfied that: a) the vertical navigation performance capability of the aeroplane satisfies the requirements specified in Second Schedule of these Regulations; 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.
	(3) An RVSM 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 State of the Operator, in consultation with the State of Registry if appropriate, shall ensure that, in respect of those aeroplanes mentioned in sub-regulation (1), adequate provisions exist for: a) receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with Civil Aviation (Air Traffic Services) Regulations; and

	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.
	(5) An operator with RVSM approval shall ensure that a minimum of two aeroplanes of each aircraft type grouping of the operator have their height-keeping performance monitored, at least once every 2 years or within intervals of 1000 flight hours per aeroplane, whichever period is longer. If an operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.
	(6) Subject to sub-regulation (1) above, if the operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.
	(7) Monitoring data from any regional monitoring programme established in accordance with Civil Aviation (Air Traffic Services) Regulations, may be used to satisfy the requirement.
	(8) The Authority shall take appropriate action with respect to aircraft and operators found to be operating in RVSM airspace in [STATE] without a valid RVSM approval.
	(9)An Operator shall ensure that each aeroplane is sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the aeroplane to navigate in accordance with these regulations.
Instrument Meteorological Conditions (IMC)	**91.** (1) An operator shall not operate an aeroplane for flights in which it is intended to land in Instrument Meteorological Conditions (IMC), unless it is provided with radio equipment capable of receiving signals providing guidance to a point from which a visual landing can be effected.
	(2) Subject to sub-regulation (1), the equipment shall be capable of providing such guidance for each aerodrome at which it is intended to land in instrument meteorological conditions and for any designated alternate aerodromes.
Surveillance Equipment	**92.** (1) An operator shall not operate an aeroplane unless it is provided with surveillance equipment which will enable it to operate in accordance with the requirements of air traffic services.
	(2) For operations where surveillance equipment is required to meet an RSP specification for performance-based surveillance (PBS), an aeroplane shall, in addition to the requirements specified in sub-regulation (1): a) be provided with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specification(s); b) have information relevant to the aeroplane RSP specification capabilities listed in the flight manual or other aeroplane documentation approved by the State of Design or State of Registry;

	and c) have information relevant to the aeroplane RSP specification capabilities included in the MEL.
	(3) Where an RSP specification for PBS has been prescribed, the operator shall establish and document: 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.
	(4) An operator shall not operate an aeroplane mentioned in sub-regulation (2), unless adequate provisions exist for: a) receiving the reports of observed surveillance performance issued by monitoring programmes established in accordance with with Civil Aviation (Air Traffic Services) Regulations; and b) taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RSP specification(s).
Installation	**93.** The equipment installation shall be such that the failure of any single unit required for communication, navigation or surveillance purposes or any combination thereof will not result in the failure of another unit required for communication, navigation or surveillance purposes.
Electronic Navigation Data Management	**94.** (1) The operator shall not employ electronic navigation data products that have been processed for application in the air and on the ground unless the State of the Operator has approved 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 existing equipment.
	(2) The Authority shall ensure that the operator continues to monitor both the process and products.
	(3) The operator shall implement procedures that ensure the timely distribution and insertion of current and unaltered electronic navigation data to all necessary aeroplane.

PART IV: GENERAL AVIATION — AEROPLANES (GENERAL AVIATION OPERATIONS)

AEROPLANE INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS	
Aeroplanes on all flights	**95.** (1)An operator shall not operate an aeroplane unless it is equipped with or carries on board: a) an accessible first-aid kit; b) portable fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the aeroplane and at least one shall be located in: i. the pilot's compartment; and ii. each passenger compartment that is separate from the pilot's compartment and that is not readily accessible to the flight crew; c) a seat or berth for each person over the age of two years; d) a seat belt for each seat and restraining belts for each berth; e) the following manuals, charts and information: i. the flight manual or other documents or information concerning any operating limitations prescribed for the aeroplane by the Authority, required for the application of Aeroplane performance operating limitations in accordance with Civil Aviation (Operation of Aircraft General Aviation- Aeroplane) Regulations. ii. any specific approval issued by the Authority, if applicable, for the operation(s) to be conducted; iii. current and suitable charts for the route of the proposed flight and all routes along which it is reasonable to expect that the flight may be diverted; iv. procedures in accordance with the Civil Aviation (Rules of the Air) Regulations, for pilots-in-command of intercepted aircraft; v. visual signals for use by intercepting and intercepted aircraft in accordance with the Civil Aviation (Rules of the Air) Regulations; and vi. the journey log book for the aeroplane; f) spare electrical fuses equal to atleast ten percent of the number of fuses of each rating or three of each rating whichever is the greater, for aeroplanes fitted with fuses that are accessible in flight.
	(2) Aeroplanes on all flights should be equipped with the ground air signal codes for search and rescue purposes.
	(3) All aeroplanes on all flights should be equipped with a safety harness for each flight crew member seat.
Marking of break-in points	**96.** (1) Where areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on an aeroplane, such areas shall be marked

	as shown below (see Figure (2).
	(2) The colour of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.
	(3) Where the corner markings are more than 2 m apart, intermediate lines 9 cm × 3 cm shall be inserted so that there is no more than 2 m between adjacent markings. Figure (2). Marking of break-in Points 
VFR Operations	**97.** (1) All aeroplanes when operated as VFR flights shall be: a) a magnetic compass; b) an accurate timepiece indicating the time in hours, minutes and seconds; c) Sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight; d) An airspeed indicating system calibrated in knots, miles per hour or kilometers per hour; and e) such additional instruments or equipment as may be prescribed by the appropriate Authority.
	(2)VFR flights which are operated as controlled flights should be equipped in accordance with Instrument Flight rules (IFR).
Instruments for operations requiring two pilots in day VFR	**98.** An operator shall not operate an aeroplane that requires two pilots to operate unless each pilot's station is equipped with separate instruments as follows: (a) an airspeed indicator calibrated in knots, miles per hour or kilometers per hour; (b) a sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals/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 co-coordinator incorporating a

	slip indicator; (e) an attitude indicator; (f) a stabilised direction indicator, and (g) any other equipment as required by the Authority.
Aeroplanes on flights over water - Seaplanes	**99.** (1)Seaplanes for all flights shall be equipped with: a)one life jacket, or equivalent individual floatation device, for each person on board, stowed in a position readily accessible from the seat or berth; b)equipment for making the sound signals prescribed in the International Regulations for Preventing Collisions at Sea, where applicable; c)one anchor; and d)one sea anchor (drogue), when necessary to assist in manoeuvring.
	(2)For purposes of sub regulation (1) above, the term "Seaplanes" includes amphibians operated as seaplanes.
Landplanes	**100.** (1) An operator shall not operate a single-engined landplane unless it carries one life jacket or equivalent individual floatation device for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided: a)when flying en route over water beyond gliding distance from the shore; or b)when taking off or landing at an aerodrome where, in the opinion of the pilot-in-command, the take-off or approach path is so disposed over water that in the event of a mishap there would be a likelihood of a ditching.
	(2)For purposes of sub regulation (1) above, the term "landplanes" includes amphibians operated as landplanes.
Aeroplanes on extended flights over water.	**101.** (1) An operator shall not operate an aeroplane on extended flights over water unless it is equipped with, at a minimum, one life jacket or equivalent individual floatation device for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided.
	(2) The pilot-in-command of an aeroplane operated on an extended flight over water shall determine the risks to survival of the occupants of the aeroplane in the event of a ditching.
	(3) The pilot-in-command shall take into account the operating environment and conditions such as, but not limited to, sea state and sea and air temperatures, the distance from land suitable for making an emergency landing, and the availability of search and rescue facilities.
	(4) Based upon the assessment of these risks, the pilot-in-command shall, in addition to the equipment required in sub-regulation (1), ensure that the aeroplane is equipped with: 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 equipment, including means of sustaining life, as is appropriate to the flight to be undertaken; and b) equipment for making the distress signals described in the Civil Aviation (Rules of the Air) Regulations.
Aeroplanes on flights over designated land areas	**102.** An operator shall not operate an aeroplane across land areas which have been designated by the State concerned as areas in which search and rescue would be especially difficult, unless it is equipped with such signalling devices and life-saving equipment (including means of sustaining life) as may be appropriate to the area overflown.
Aeroplanes on high altitude flights	**103.** (1) An operator shall not operate an aeroplane at high altitudes unless it is equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in Civil Aviation (Operation of Aircraft – General Aviation Aeroplanes) Regulations.
	(2)Pressurized aeroplanes intended to be operated at flight altitudes at which the atmospheric pressure is less than 376 hPa shall be equipped with a device to provide positive warning to the flight crew of any dangerous loss of pressurization.
All aeroplanes operated in accordance with the Instrument Flight Rules (IFR)	**104.** (1) An operator shall not operate an aeroplane in accordance with the instrument flight rules, or when the aeroplane cannot be maintained in a desired attitude without reference to one or more flight instruments, unless it is : a) equipped with a means of measuring and displaying: i) magnetic heading (standby compass); ii) barometric altitude; iii) indicated airspeed, with a means of preventing malfunctioning due to either condensation or icing; iv) turn and slip; v) aircraft attitude; vi) stabilized aircraft heading; vii) whether the supply of power to the gyroscopic instruments is adequate; viii) the outside air temperature; ix) rate-of-climb and descent; b) equipped with, or carries a means of measuring and displaying time in hours, minutes and seconds; and c) equipped with such additional instruments or equipment as may be prescribed by the Authority.
	(2)The requirements in sub-regulation (1)(a)(iv), (v) and (vi) may be met by combinations of instruments or by integrated flight director systems provided that the safeguards against total failure, inherent in the three separate instruments, are retained.

Aeroplanes when operated at night	**105.** An operator shall not operate an aeroplane at night, unless it is equipped with: a) the equipment specified in the Regulation 78; b) the lights required by Civil Aviation (Rules of the Air) Regulations and First Schedule of these Regulations, for aircraft in flight or operating on the movement area of an aerodrome; and the general characteristics of which are specified in Civil Aviation (Airworthiness) Regulations; c) a landing light; d) illumination for all flight instruments and equipment that are essential for the safe operation of the aeroplane that are used by the flight crew; e) lights in all passenger compartments; and **f)** an independent portable light for each crew member station.
Noise Certification compliance	**106.** (1) An aeroplane shall carry a document attesting noise certification in accordance with the Civil Aviation (Airworthiness) Regulations.
	(2)The attestation in sub-regulation (1) above may be contained in any document, carried on board, and approved by the Authority.
Mach Number Indicator	**107.** Aeroplanes with speed limitations expressed in terms of Mach number shall be equipped with a means of displaying Mach number.
Aircraft required to be equipped with Ground Proximity Warning System (GPWS)	**108.** (1) All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system which has a forward-looking terrain avoidance function.
	(2) All turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less or authorized to carry more than five passengers but not more than nine passengers shall be equipped with a ground proximity warning system which has a forward-looking terrain avoidance function.
	(3) All piston engine Aeroplane of maximum certificated take-off mass in excess of 5700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system which has a forward-looking terrain avoidance function.
	(4) A ground proximity warning system shall provide automatically a timely and distinctive warning to the flight crew when the aeroplane is in potentially hazardous proximity to the earth's surface.
	(5) A ground proximity warning system shall provide, at a minimum,

	warnings of at least 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; d) unsafe terrain clearance while not in landing configuration; i) gear not locked down; ii) flaps not in a landing position; and e) excessive descent below the instrument glide path.
	(6)A ground proximity warning system installed in turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers for which the individual certificate of airworthiness was first issued after 1 January 2011 shall provide, as a minimum, warnings of at least 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; i. gear not locked down; ii. flaps not in a landing position; and e) excessive descent below the instrument glide path.
Emergency Locator Transmitter (ELT)	**109.** (1) An operator shall not operate an aeroplane unless it carries an automatic ELT.
	(2) All aeroplanes shall be equipped with at least one ELT of any type capable of transmitting on 121.5 MHz and 406 MHz.
	(3)All aeroplanes authorised to carry more than 19 passengers shall be equipped with at least one automatic ELT or two ELTs of any type.
	(4) An operator shall not operate an aircraft in flights over water away from land suitable for making an emergency landing at a distance of more than 185 km or 100 nautical miles, in the case of single–engine aircraft, and more than 370 km 200 nautical miles, in the case of multiengine aircrafts capable of continuing flight with one engine inoperative unless the aircraft has one survival automatic emergency locator transmitter that transmits simultaneously on 121.5 MHz and 406 MHz.
	(4) An operator operating over water flights shall not operate an aircraft at a distance away from land, which is suitable for making an emergency landing, greater than that corresponding to one hundred and twenty minutes at cruising speed or four hundred nautical miles, whichever is the lesser, for aircrafts capable of continuing the flight to an aerodrome with the critical power unit becoming inoperative at any point along the route or planned diversions, unless that aircraft has two survival type emergency locator transmitters, one of which shall be automatic, that transmits simultaneously on 121.5 and 406 MHz.
	(5) An operator shall not operate an aircraft on flights over designated land areas unless the aircraft has one automatic emergency locator transmitter that can transmit simultaneously on 121.5 and 406 MHz.
	(6) ELT equipment carried to satisfy the requirements of this

	regulation shall operate in accordance with the Civil Aviation (Communication Systems) Regulations.
	(7) An operator operating an aircraft in over water operations shall install at least one survival type emergency locator transmitter referred to in sub regulation (3) in each life raft carried.
	(8) An operator shall ensure that an emergency locator transmitter that is capable of transmitting on 406 MHZ shall be coded as prescribed by the Authority and registered with the national agency responsible for initiating search and rescue or any other nominated agency.
	(9) For all aircraft, the useful life of a battery or useful life of charge requirements shall not apply to batteries such as water-activated batteries that are essentially unaffected during probable storage intervals.
Aeroplanes required to be equipped with a Pressure Altitude Reporting Transponder	**110.** (1)An operator shall not operate an aeroplane unless it is equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of the Civil Aviation (Surveillance Radar and Collision Avoidance Systems) Regulations.
	(2)Unless exempted, aeroplanes operating as VFR flights shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of the Civil Aviation (Surveillance Radar and Collision Avoidance Systems) Regulations.
Microphones	**111.** When operating under the Instrument Flight Rules, all fight crew members required to be on flight deck duty shall communicate through boom or throat microphones below the transition level/altitude.
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).	**112.** (1)Where aeroplanes are equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, or any combination of those systems into a hybrid system, criteria for the use of such systems for the safe operation of an aeroplane shall be established by the Authority.
	(2)In establishing operational criteria for the use of automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, the Authority shall ensure that: (a) the equipment meets the appropriate airworthiness certification requirements; (b) the operator/owner has carried out a safety risk assessment associated with the operations supported by the automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS;

	(c) the operator/owner 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.
Flight Recorders	**113.** (1) Crash-protected flight recorders 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.
	(2) 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.
	(3) Detailed requirements on flight recorders and parameters to be recorded are provided in Sixth Schedule of these regulations.
FDR and ADRS – Applicability	**114.** (1) All turbine-engined aeroplanes with a seating configuration of more than five passenger seats and a maximum certificated take-off mass of 5 700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2016 should be equipped with: a) an FDR which should record at least the first 16 parameters in Table A2.3-1 of Sixth Schedule; or b) a Class C AIR or AIRS which should record at least the flight path and speed parameters displayed to the pilot(s) as defined in 2.2.2 of Sixth Schedule; or c) an ADRS which should record at least first 7 parameters listed in Table A2.3-3 in Sixth Schedule.
	(1) All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the application for type certification is submitted to a Contracting State on or after 1 January 2023 shall be equipped with an FDR capable of recording at least the 82 parameters listed in Table A2.3-1 of Sixth Schedule.
	(2) All aeroplanes 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 2023 should be equipped with an FDR capable of recording at least the 82 parameters listed in Table A2.3-1 of Sixth Schedule.
FDR and ADRS – Recording Technology	**115.** FDRs, ADRS, AIRs or AIRS shall not use engraving metal foil frequency modulation (FM), photographic film or magnetic tape.
FDR and ADRS -	**116.** All FDRs shall retain the information recorded during at least

Duration	the last 25 hours of their operation.
CVR and CARS – Applicability	**117.** All turbine-engined aeroplanes with a seating configuration of more than five passenger seats and a maximum certificated take-off mass of 5 700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2016 and required to be operated by more than one pilot shall be equipped with either a CVR or a CARS.
CVR and CARS – Recording Technology	**118.** CVRs and CARS shall not use magnetic tape or wire.
CVR and CARS - Duration	**119.** (1) All CVRs shall retain the information recorded during at least the last 2 hours of their operation.
Data link recorders – Applicability	**120.** (1) All aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which utilize any of the data link communications applications listed in Sixth Schedule and are required to carry a cockpit voice recorder (CVR), shall record on a crash-protected flight recorder all data link communications messages.
	(2) All aeroplanes which are modified on or after 1 January 2016 to install and utilize any of the data link communications applications listed in Sixth Schedule and are required to carry a CVR shall record on a crash-protected flight recorder the data link communications messages.
	(3) A Class B AIR may be used as a means for recording data link communications applications messages to and from the aeroplanes where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.
Data link recorders – Duration	**121.** The minimum recording duration shall be equal to the duration of the CVR.
Data link recorders – Correlation	**122.** Data link recording shall allow correlation with the recorded cockpit audio.
Flight recorders — general	**123.** (1) ***Construction and installation:*** a) 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. b) Flight recorders shall meet the prescribed crashworthiness and fire

	protection specifications.
	(2) ***Operation:*** a) Flight recorders shall not be switched off during flight time. b) To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident. c) The flight recorders shall not be reactivated before their disposition as determined in accordance with Civil Aviation (Aircraft Accident and Incident Investigation) Regulations. d) The need for removal of the flight recorder records from the aircraft shall 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 operation
Flight recorder records	**124.** The pilot-in-command, and/or the owner/operator, shall ensure, to the extent possible, in the event the aeroplane becomes involved in an accident or incident, the preservation of all related flight recorder records, and if necessary the associated flight recorders, and their retention in safe custody pending their disposition as determined in accordance with Civil Aviation (Aircraft Accident and Incident Investigation) Regulations.
Continued serviceability	**125.** (1) Operational checks and evaluations of recordings from the flight recorder systems shall be conducted to ensure the continued serviceability of the recorders in accordance with Sixth Schedule.
	(2)Procedures for the inspections of the flight recorder systems shall be in accordance with Sixth Schedule.
Flight recorder electronic documentation	**126.** 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.
Electronic flight bags (EFBs) - Equipment	**127.** Where portable EFBs are used on board an aeroplane, the pilot-in-command and/or the operator/owner shall ensure that they do not affect the performance of the aeroplane systems, equipment or the ability to operate the aeroplane.
(EFBs) - Functions	**128.** Where EFBs are used on board an aeroplane the pilot-in-command and/or the owner/operator shall: a) assess the safety risk(s) associated with each EFB function; b) establish 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.

EFB operational criteria:	**129.** The criteria for the operational use of EFB functions to be used for the safe operation of aeroplanes and approval of EFB use shall include: a) the EFB equipment and its associated installation hardware, including interaction with aeroplane systems if applicable, meet the appropriate airworthiness certification requirements; b) assessment of the safety risks associated with the operations supported by the EFB function(s); c) establishment of requirements for redundancy of the information (if appropriate) contained in and displayed by the EFB function(s) ae established; d) establishment of documented procedures for the management of the EFB function(s) including any database it may use; and e) establishment of documented procedures for the use of, and training requirements for, the EFB and the EFB function(s).

AEROPLANE COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT

Communication Equipment	**130.** (1) An operator shall not operate an aeroplane in accordance with the instrument flight rules or at night unless it is provided with radio communication equipment.
	(2)Such equipment shall be capable of conducting two-way communication with those aeronautical stations and on those frequencies prescribed by the appropriate Authority (State Communication Commission / Authority).
	(3)The requirements of sub-regulation (1) and (2) are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.
	(4)When compliance with the sub-regulation (1) requires that more than one communication equipment unit be provided, 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)An operator shall not operate an aeroplane in VFR, except as a controlled flight, unless it is equipped with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the State Communication Commission / Authority.
	(6)An operator shall not operate an aeroplane on a flight to which the provisions of Regulations 70 and 74 apply, unless it is equipped with

	radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the State Communication Commission / Authority.
	(7)The radio communication equipment required in accordance with this regulation shall provide for communication on the aeronautical emergency frequency 121.5 MHz.
	(8)For operations where communication equipment is required to meet an RCP specification for performance-based communication (PBC), an aeroplane shall, in addition to the requirements specified in this regulation: 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 aeroplane RCP specification capabilities listed in the flight manual or other aeroplane documentation approved by the State of Design or State of Registry; and c) have information relevant to the aeroplane RCP specification capabilities included in the MEL, for aeroplane operated in accordance with a MEL.
	(9) The State of Registry shall, for operations where an RCP specification for PBC has been prescribed ensure that the operator has established and documented: a)normal and abnormal procedures, including contingency procedures; b) flight crew qualification and proficiency requirements, in accordance with the 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
	(10) The State of Registry shall ensure that, in respect of aeroplanes mentioned in sub-regulation (8), adequate provisions exist for: a) receiving the reports of observed communication performance issued by monitoring programmes established in accordance with Civil Aviation (Air Traffic Services) Regulations; and b) taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RCP specification(s).

Navigation Equipment	**131.** An aeroplane shall be provided with navigation equipment which will enable it to proceed: a) in accordance with its flight plan; and b) in accordance with the requirements of air traffic services except when, if not so precluded by the Authority, navigation for flights under VFR is accomplished by visual reference to landmarks.
Performance-Based Navigation (PBN)	**132.** (1)For operations where a navigation specification for performance-based navigation (PBN) has been prescribed, an aeroplane shall, in addition to the requirements specified in Regulation 103: a) be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification(s); and b) have information relevant to the aeroplane navigation specification capabilities listed in the flight manual or other aeroplane documentation approved by the State of Design or State of Registry; and c) have information relevant to the aeroplane navigation specification capabilities included in the MEL, for aeroplane operated in accordance with a MEL.
	(2)The State of Registry shall, for operations where a navigation specification for PBN has been prescribed ensure that the operator has established and documented: 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
	(2) The Authority shall issue a specific approval for operations based on PBN authorization required (AR) navigation specifications.
Minimum Navigation Performance Specifications (MNPS)	**133.** For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, minimum navigation performance specifications (MNPS) are prescribed, an aeroplane shall be provided with navigation equipment which: a) continuously provides indications to the flight crew of adherence

	to or departure from track to the required degree of accuracy at any point along that track; and b) has been authorized by the State of Registry for the MNPS operations concerned.
	(2) The navigation equipment required for operations in MNPS airspace shall be visible and usable by either pilot seated at his duty station.
	(3) For unrestricted operation in MNPS airspace, an aeroplane shall be equipped with two independent Long-Range Navigation Systems (LRNS).
	(4) For operation in MNPS airspace along notified special routes, an aeroplane shall be equipped with one LRNS, unless otherwise specified.
Reduced Vertical Separation Minimum (RVSM)	**134.** (1) For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, a reduced vertical separation minimum (RVSM) of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive, an aeroplane: a) shall be provided with equipment which is capable of; (i) indicating to the flight crew the flight level being flown; (ii) automatically maintaining a selected flight level; (iii)providing an alert to the flight crew when a deviation occurs from the selected flight level and the threshold for the alert shall not exceed ±90 m (300 ft); and (iv)automatically reporting pressure-altitude; b) shall be authorized by the State of Registry for operation in the airspace concerned; and c) shall demonstrate a vertical navigation performance in accordance with Fifth Schedule of these regulations.
	(2)Prior to granting the RVSM approval required in accordance with sub-regulation (1) (b), the Authority shall be satisfied that: a) the vertical navigation performance capability of the aeroplane satisfies the requirements specified in the Fifth Schedule; b) the owner/operator has instituted appropriate procedures in respect of continued airworthiness (maintenance and repair) practices and programmes; and c) the owner/operator has instituted appropriate flight crew procedures for operations in RVSM airspace.

	(3) An RVSM 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.
	(3) The State of Registry shall ensure that, in respect of those aeroplanes mentioned in sub-regulation (1), adequate provisions exist for: a) receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with Civil Aviation (Air Traffic Services) Regulations; and 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.
	(4)The State of Registry shall establish a requirement which ensures that a minimum of two aeroplanes of each aircraft type grouping of the owner/operator have their height-keeping performance monitored, at least once every two years or within intervals of 1 000 flight hours per aeroplane, whichever period is longer.
	(5)Where an owner/operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.
	(6)The State of Registry, shall establish provisions and procedures which ensure that appropriate action will be taken in respect of aircraft and owners/operators found to be operating in RVSM airspace without a valid RVSM approval.
	(7) The aeroplane shall be sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the aeroplane to navigate in accordance with this regulation.
Instrument Meteorological Conditions (IMC)	**135.** (1)On flights in which it is intended to land in instrument meteorological conditions, an aeroplane shall be provided with radio equipment capable of receiving signals providing guidance to a point from which a visual landing can be effected.
	(2)This equipment shall be capable of providing such guidance for each aerodrome at which it is intended to land in Instrument Meteorological Conditions and for any designated alternate aerodromes.
Surveillance Equipment	**136.** (1) An operator shall not operate an aeroplane unless it is provided with surveillance equipment which will enable it to operate in accordance with the requirements of Civil Aviation (Air Traffic Services) Regulations.
	(2)For operations where surveillance equipment is required to meet an

	RSP specification for performance-based surveillance (PBS), an aeroplane shall, in addition to the requirements specified in sub-regulation (1): a) be provided with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specification(s); b) have information relevant to the aeroplane RSP specification capabilities listed in the flight manual or other aeroplane documentation approved by the State of Design or the State of Registry; and c) have information relevant to the aeroplane RSP specification capabilities included in the MEL, for aeroplanes operated in accordance with a MEL.
	(3) The State of Registry shall, for operations where an RSP specification for PBS has been prescribed ensure that 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.
	(4)The State of Registry shall ensure that, in respect of those aeroplanes mentioned sub-regulation(2), adequate provisions exist for: a) receiving the reports of observed surveillance performance issued by monitoring programmes established in accordance with Civil Aviation (Air Traffic Services) Regulations, and b) taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RSP specification(s).

PART V: GENERAL AVIATION — AEROPLANES (LARGE AND TURBOJET AEROPLANES)

AEROPLANE INSTRUMENTS AND EQUIPMENT	
General	**137.** (1) An operator shall not operate a large and turbojet aeroplane for general aviation unless it complies with all requirements for general aviation aeroplanes covered in Part IV.
	(2) Where a master minimum equipment list (MMEL) is established for the

	aircraft type, the operator shall include in the operations manual a minimum equipment list (MEL) approved by the State of Registry of the aeroplane which will enable the pilot-in-command to determine whether a flight may be commenced or continued from any intermediate stop should any instrument, equipment or systems become inoperative.
	(3)The operator shall provide operations staff and flight crew with an aircraft operating manual, for each aircraft type operated, containing the normal, abnormal and emergency procedures relating to the operation of the aircraft.
	(4) The operating manual shall be consistent with the aircraft flight manual and checklists to be used and its design of the manual should observe Human Factors principles.
Aeroplanes on all flights	**138.** In addition to the requirements contained in Regulation 68 (2), an operator shall not operate an aeroplane unless it is equipped with: a) accessible and adequate medical supplies appropriate to the number of passengers the aeroplane is authorized to carry; b) medical supplies shall comprise one or more first-aid kits; c) a safety harness for each flight crew seat incorporating a device which will automatically restrain the occupant's torso in the event of rapid deceleration; d) the safety harness for each pilot seat should incorporate a device to prevent a suddenly incapacitated pilot from interfering with the flight controls; e) means of ensuring that the following information and instructions are conveyed to passengers: i) when seat belts are to be fastened; ii) when and how oxygen equipment is to be used if the carriage of oxygen is required; iii) restrictions on smoking; iv) location and use of life jackets or equivalent individual flotation devices where their carriage is required; v) location of emergency equipment; and vi) location and method of opening emergency exits.
Flight recorders – FDR	**139.** (1) All aeroplanes 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 2005 shall be equipped with an FDR which shall record at least 78 parameters listed in Table A2.3-1 of the Sixth Schedule. (2) All aeroplanes 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 1989 shall be equipped with an FDR which shall record at least the first 32 parameters listed in Table A2.3-1 of the Sixth Schedule. (3)All aeroplanes of a maximum certificated take-off mass of over 5 700 kg, up to and including 27 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1989, should be equipped with an FDR which shall record at least the first 16 parameters listed in Table A2.3-1 of the Sixth Schedule..

Cockpit Voice Recorders (CVR)	**140.** (1) All turbine-engined aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the application for type certification is submitted to a Contracting State on or after 1 January 2016 and required to be operated by more than one pilot shall be equipped with a CVR. (2) All aeroplanes 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 1987 shall be equipped with a CVR. (3)All aeroplanes of a maximum certificated take-off mass of over 5 700 kg, up to and including 27 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1987, should be equipped with a CVR.
Cockpit Voice Recorders (CVR)- Duration	**141.** All aeroplanes 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 2021 shall be equipped with a CVR capable of retaining the information recorded during at least the last 25 hours of its operation.
Combination recorders	**142.** All aeroplanes of a maximum certificated take-off mass over 5 700 kg, required to be equipped with an FDR and a CVR, may alternatively be equipped with two combination recorders (FDR/CVR).
Aeroplanes on long-range over-water flights	**143.** (1) The operator of an aeroplane operated on an extended flight over water shall determine the risks to survival of the occupants of the aeroplane in the event of a ditching.
	(2) The operator shall take into account the operating environment and conditions such as, but not limited to: (a) sea state; (b) sea and air temperatures; (c) the distance from land suitable for making an emergency landing; and (d) the availability of search and rescue facilities.
	(3) Subject to sub-regulation (2), based upon the assessment of the risks, the operator shall, in addition to the equipment required in Regulation 73, ensure that the aeroplane is appropriately equipped with: 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 lifesaving equipment, including means of sustaining life, as is appropriate to the flight to be undertaken; and ***b)*** equipment for making the distress signals described in Civil Aviation (Rules of the Air) Regulations.
	(4) Each life jacket and equivalent individual flotation device, when carried in accordance with Regulation 73, shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons, except where the requirement of Regulation 73 is met by the provision of individual flotation devices other than life jackets.

Aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 1990	**144.** (1) Pressurized aeroplanes intended to be operated at flight altitudes at which the atmospheric pressure is less than 376 hPa shall be equipped with a device to provide positive warning to the flight crew of any dangerous loss of pressurization.
	(2) An aeroplane 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 supplies required in Civil Aviation (Operation Aircraft – General Aviation) Regulations.
	(3) An aeroplane intended to be operated at flight altitudes at which the atmospheric pressure is less than 700 hPa but which is provided with means of maintaining pressures greater than 700 hPa in personnel compartments shall be provided with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in Civil Aviation (Operation Aircraft – General Aviation) Regulations.
Aeroplanes operated in accordance with the instrument flight rules	**145.** In addition to the requirements contained in Civil Aviation (Operation Aircraft – General Aviation) Regulations, aeroplanes when operated in accordance with the instrument flight rules, or when the aeroplane cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with two independent altitude measuring and display systems.
Aeroplanes over 5 700 kg — Emergency power supply for electrically operated attitude indicating instruments	**146.** (1) Aeroplanes of a maximum certificated take-off mass of over 5 700 kg shall be fitted with an emergency power supply, independent of the main electrical generating system, for the purpose of operating and illuminating, for a minimum period of 30 minutes, an attitude indicating instrument (artificial horizon), clearly visible to the pilot-in-command.
	(2) The emergency power supply shall be automatically operative after the total failure of the main electrical generating system and clear indication shall be given on the instrument panel that the attitude indicator(s) is being operated by emergency power.
	(3) Aircraft with advanced cockpit automation systems (glass cockpits) shall have system redundancy that provides the flight crew with attitude, heading, airspeed and altitude indications in case of failure of the primary system or display.
	(4) Instruments that are used by any one pilot shall be so arranged as to permit the pilot to see their indications readily from his or her station, with the minimum practicable deviation from the position and line of vision normally assumed when looking forward along the flight path.

Pressurized aeroplanes when carrying passengers — weather-detecting equipment	**147.** Pressurized aeroplanes when carrying passengers shall be equipped with operative weather-detecting equipment capable of detecting thunderstorms whenever such aeroplanes are being operated in areas where such conditions may be expected to exist along the route either at night or under instrument meteorological conditions.
Aeroplanes operated above 15 000 m (49 000 ft) — radiation indicator	**148.** (1) Aeroplanes intended to be primarily 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.
	(2) The display unit of the equipment shall be readily visible to a flight crew member.
Aeroplanes carrying passengers — cabin crew seats	**149.** (1) Aeroplanes shall be equipped with a forward or rearward facing seat (within 15 degrees of the longitudinal axis of the aeroplane), fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of Civil Aviation (Operation Aircraft – General Aviation) Regulations in respect of emergency evacuation.
	(2) Cabin crew seats provided in accordance with sub-regulation (1) shall be located near floor level and other emergency exits as required by the State of Registry for emergency evacuation.
Aeroplanes required to be equipped with an airborne collision avoidance system (ACAS)	**150.** (1) An operator shall not operate an aeroplane installed with airborne collision avoidance system unless in accordance with the relevant provisions of Civil Aviation (Aeronautical Telecommunications – Surveillance and Collision Avoidance Systems) Regulations (2)Any airborne collision avoidance system installed on an aeroplane shall be approved by the Authority. (3) An operator operating an aeroplane equipped with an airborne collision avoidance system shall have that system on and operating. (4)All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 15 000 kg, or authorized to carry more than 30 passengers, for which the individual airworthiness certificate is first issued after 24 November 2005, shall be equipped with an airborne collision avoidance system (ACAS II).
	(5) All turbine-engined aeroplanes of a maximum certificated take-off mass in

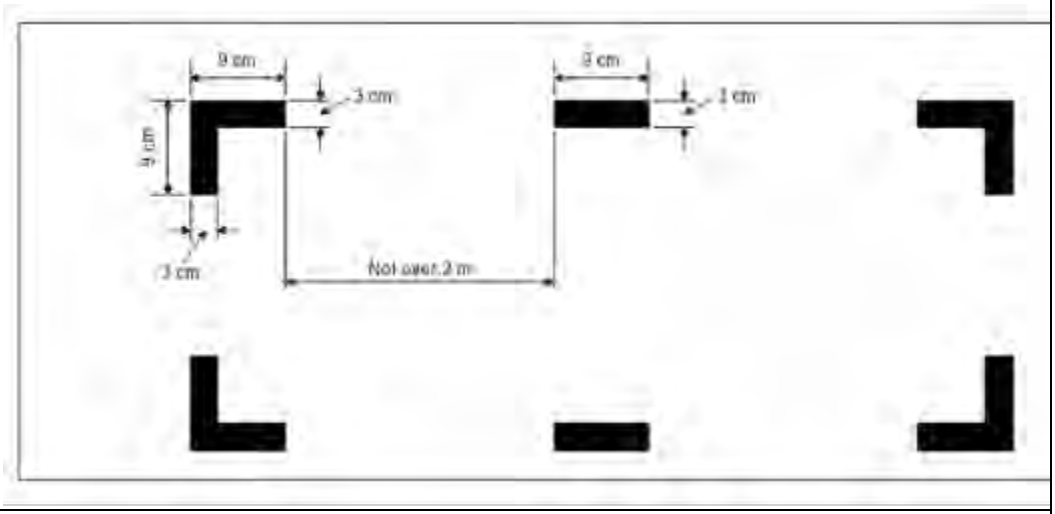
	excess of 5 700 kg but not exceeding 15 000 kg, or authorized to carry more than 19 passengers, for which the individual airworthiness certificate is first issued after 1 January 2008, shall be equipped with an airborne collision avoidance system (ACAS II).
Aeroplanes required to be equipped with a pressure-altitude reporting transponder	**151.** Aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with Civil Aviation (Aeronautical Telecommunication - Surveillance Radar and Collision Avoidance Systems) Regulations.
Microphones	**152.** All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones below the transition level/altitude.
AEROPLANE COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT	
Communication equipment	**153.** In addition to the requirements of Civil Aviation (Operation of Aircraft – General Aviation Aeroplanes) Regulations, an aeroplane shall be provided with radio communication equipment capable of: a) conducting two-way communication for aerodrome control purposes; b) receiving meteorological information at any time during flight; and c) conducting two-way communication at any time during flight with at least one aeronautical station and with such other aeronautical stations and on such frequencies as may be prescribed by the appropriate authority(State Communication Commission / Authority).
Installation	**154.** The equipment installation shall be 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.
Electronic navigation data management	**155.** (1) The operator of an aeroplane shall not employ electronic navigation data products that have been processed for application in the air and on the ground unless the State of Registry has approved 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 existing equipment.
	(2) The State of Registry shall ensure that the operator continues to monitor both the process and products.
	(3) The operator shall implement procedures that ensure the timely distribution and insertion of current and unaltered electronic navigation data to all necessary aeroplanes.

PART VI: HELICOPTER OPERATIONS – (COMMERCIAL AIR TRANSPORT)

HELICOPTER INSTRUMENTS AND EQUIPMENT	
General	**156.** (1) In addition to the minimum equipment necessary for the issuance of a certificate of airworthiness, the instruments, equipment and flight documents prescribed in the these regulations shall be installed or carried, as appropriate, in helicopters according to the helicopter used and to the circumstances under which the flight is to be conducted.
	(2)The prescribed instruments and equipment, including their installation, shall be approved or accepted by the State of Registry.
Air Operator Certificate (AOC)	**157.** (1) A helicopter shall carry a certified true copy of the air operator certificate specified in Civil Aviation (Air Operator Certification and Administration) Regulations, and a copy of the operations specifications relevant to the helicopter type, issued in conjunction with the certificate.
	(2) When the certificate and the associated operations specifications are issued by the State of the Operator in a language other than English, an English translation shall be included.
Minimum Equipment List (MEL)	**158.** (1)The operator shall include in the operations manual a minimum equipment list (MEL), approved by the State of the Operator which will enable the pilot-in-command to determine whether a flight may be commenced or continued from any intermediate stop should any instrument, equipment or systems become inoperative.
	(2)Where the State of the Operator is not the State of Registry, the State of the Operator shall ensure that the MEL does not affect the helicopter's compliance with the airworthiness requirements applicable in the State of Registry.
Operating Manual	**159.** (1)The operator shall make available to operations staff and crew members an aircraft operating manual, for each aircraft type operated, containing the normal, abnormal and emergency procedures relating to the operation of the aircraft
	(2)The manual shall include details of the aircraft systems and of the checklists to be used and the design of the manual shall observe Human Factors principles.
	(3)The manual shall be easily accessible to the flight crew during all flight operations.
All helicopters on all flights	**160.** A helicopter shall be equipped with instruments that will enable the flight crew to control the flight path of the helicopter, carry out any required procedural manoeuvres and observe the operating limitations of the helicopter in the

	expected operating conditions.
Medical Supplies	**161.** A helicopter shall be equipped with: a) accessible and adequate medical supplies which shall include; i)a first-aid kit; and ii) 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.
Portable Fire extinguishers	**162.** A helicopter shall be equipped with : portable fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the helicopter and at least located in: a)the pilot's compartment; and b)each passenger compartment that is separate from the pilot's compartment and that is not readily accessible to the flight crew.
Seat / berth and seat belt / safety harness	**163.** (1) A helicopter shall be equipped with: a) a seat or berth for each person over two years of age and above; b) a seat belt for each seat and restraining belts for each berth; and c) a safety harness for each flight crew seat. d)a safety harness for each pilot seat incorporating a device which will automatically restrain the occupant's torso in the event of rapid deceleration.
	(2)When dual controls are fitted, the safety harness for each pilot seat shall incorporate a restraining device to prevent the upper body of an incapacitated occupant from interfering with the flight controls.
Fasten seat belt, use of oxygen, no smoking, life jackets and emergency exit	**164.** A helicopter shall be equipped with means of ensuring that the following information and instructions are conveyed to passengers: a) when seat belts or harnesses are to be fastened; b) when and how oxygen equipment is to be used if the carriage of oxygen is required; c) restrictions on smoking; d) location and use of life jackets or equivalent individual flotation devices where their carriage is required; and e) location and method of opening emergency exits; and
Spare electrical fuses	**165.** Where fuses are used, an helicopter shall have spare electrical fuses of appropriate ratings for replacement of those accessible in flight.
Required helicopter lights and instrument illumination	**166.** An operator shall not operate a helicopter in commercial air transport operations unless it is equipped with- (a) Two landing lights or a single light having two separately energised filaments; (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; (e) A flashlight for each crew member station; (f) Navigation/position lights; and (g) Lights to conform to the International regulations for preventing collisions at sea if the aircraft is a seaplane or an amphibian aircraft; (h) A landing light that is trainable, at least in the vertical plane
Lavatory fire Extinguisher	**167.** (1)Any agent used in a built-in fire extinguisher for each lavatory disposal receptacle for towels, paper or waste in a helicopter for which the individual certificate of airworthiness is first issued on or after 31 December 2011 and any extinguishing agent used in a portable fire extinguisher in a helicopter for which the individual certificate of airworthiness is first issued on or after 31 December 2018 shall: a) meet the applicable minimum performance requirements of the State of Registry; and b) Not contain Halon 1211, Halon 1301, or Halon 2402.
	(2)Built-in lavatory fire extinguishers shall be designed to discharge automatically into each disposal receptacle upon occurrence of a fire in the receptacle.
Public address system	**168.** (1)An Operator shall not operate a passenger carrying helicopter with a maximum approved passenger seating configuration of more than nineteen unless a public address system is installed that— (a)operates independently of the interphone systems except for handsets, headsets, microphones, selector switches and signalling 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 crewmember, 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 ten seconds by a cabin crewmember 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) be readily accessible for immediate use from each required flight crew member station; (f) following a total failure of the normal electrical generating system, provide reliable operation for a minimum of 10 minutes.
	(2) An Operator shall not operate a passenger carrying helicopter with a maximum approved passenger seating configuration of more than nine but less than nineteen without a public address system installed unless — (a) the helicopter is designed without a bulkhead between pilot and passengers; (b) the operator is able to demonstrate in a manner acceptable to the Authority that when in flight, the pilot's voice is audible and intelligible at all passenger seats.
Operations Manual / Flight Manual and Charts.	**169.** A helicopter shall carry: a) the operations manual prescribed in Civil Aviation (Helicopter Operations) Regulations, or those parts of it that pertain to flight operations; b) the helicopter flight manual for the helicopter, or other documents

	containing performance data required for the application of Civil Aviation (Helicopter Operations) Regulations and any other information necessary for the operation of the helicopter within the terms of its certificate of airworthiness, unless these data are available in the operations manual; and c) current and suitable charts to cover the route of the proposed flight and any route along which it is reasonable to expect that the flight may be diverted.
Marking of break-in points	**170.** (1) If areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on a helicopter, such areas shall be marked as shown below (see figure3).
	(2) The colour of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.
	(3) If the corner markings are more than 2 m apart, intermediate lines 9 cm × 3 cm shall be inserted so that there is no more than 2 m between adjacent markings.
	FIGURE 3- MARKING ON BREAK-IN POINTS 
Engine instruments	**171.** In addition to the listed equipment requirements in regulation 10, an operator shall not operate a powered helicopter without the following engine instruments: (a) A carburettor air temperature indicator for each piston engine. (b) A cylinder head temperature indicator for each air-cooled piston engine. (c) A fuel pressure indicator for each engine. (d) A fuel flowmeter or fuel mixture indicator for each engine not equipped with an automatic altitude mixture control; (e) An oil quantity indicator for each oil-tank when a transfer or separate oil reserve supply is used. (f) 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. (g) A device for each reversible propeller, to indicate to the pilot when the propeller is in reverse pitch, which 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.

Flight Recorders	**172.** (1) Crash- protected flight recorders 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).
	(2) Image and data link information may be recorded on either the CVR or the FDR.
	(3) Combination recorders (FDR/CVR) may be used to meet the flight recorder equipage requirements in these regulations.
	(4)Detailed requirements on flight recorders are contained in Seventh Schedule.
	(5)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) and/or a data link recording system (DLRS).
	(6) Image and data link information may be recorded on either the CARS or the ADRS.
Flight Data Recorders (FDR) and Aircraft Data Recording Systems (ADRS)	**173.** Parameters to be recorded shall be those listed in the Seventh Schedule.
FDR and ADRS - Applicability	**174.** (1) 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 an FDR which shall record at least the first 48 parameters listed in Table A4-1 of the Seventh Schedule.
	(2) All helicopters of a maximum certificated take-off mass of over 7 000 kg, or having a passenger seating configuration of more than nineteen, for which the individual certificate of airworthiness is first issued on or after 1 January 1989 shall be equipped with an FDR which shall record at least the first 30 parameters listed in Table A4-1 of the Seventh Schedule.
	(3) All helicopters of a maximum certificated take-off mass of over 3 175 kg, up to and including 7 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1989, shall be equipped with an FDR which shall record at least the first 15 parameters listed in Table A4-1 of the Seventh Schedule.
	(4) All turbine-engined helicopters of a maximum certificated take-off mass of over 2 250 kg, up to and including 3 175 kg for which the application for type certification was submitted to a Contracting State on or after 1 January 2018 shall be equipped with: a) an FDR which shall record at least the first 48 parameters listed in

	Table A4-1 of Seventh Schedule.; or b) a Class C AIR or AIRS which shall record at least flight path and speed parameters displayed to the pilot(s), as defined in Table A4-3 of Seventh Schedule of these regulations; or c) an ADRS which shall record the 7 parameters listed in Table A4-3 of Seventh Schedule of these Regulations.
	(5) 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: a) an FDR which shall record at least the first 48 parameters listed in Table A4-1 of Seventh Schedule of these regulations; or b) a Class C AIR or AIRS which shall record at least flight path and speed parameters displayed to the pilot(s), as defined in Table A4-3 of Seventh Schedule of these regulations; or c) an ADRS which shall record the first 7 parameters listed in Table A4-3 of Seventh Schedule of these Regulations.
	(6) All helicopters of a maximum certificated take-off mass of over 3 175 kg for which the application for type certificate is submitted to a Contracting State on or after 1 January 2023 shall be equipped with an FDR capable of recording at least the first 53 parameters listed in Table A4-1 of Seventh Schedule of these regulations.
	(7) 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 2023 shall be equipped with an FDR capable of recording at least the first 53 parameters listed in Table A4-1 of Seventh Schedule of these regulations.
FDR and ADRS – Recording Technology	**175.** FDRs, ADRS, AIRs or AIRS shall not use engraving metal foil, frequency modulation (FM), photographic film or magnetic tape.
FDR and ADRS - Duration	**176.** All FDRs shall retain the information recorded during at least the last 10 hours of their operation.
Cockpit Voice Recorders (CVR) and cockpit audio recording systems- Applicability	**177.** (1) All helicopters of a maximum certificated take-off mass of over 7 000 kg shall be equipped with a CVR, for helicopters not equipped with an FDR, at least main rotor speed shall be recorded on the CVR.
	(2)All helicopters of a maximum certificated take-off mass of over 3175 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1987 shall be equipped with a CVR, for helicopters not equipped with an FDR, at least main rotor speed shall be recorded on the CVR.
CVR- Record Technology	**178.** CVRs and CARS shall not use magnetic tape or wire.

CVR-Duration	**179.** (1) All helicopters required to be equipped with a CVR shall be equipped with a CVR which shall retain the information recorded during at least the last 2 hours of its operation.
Data link recorders-Applicability	**180.** (1) All helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which utilize any of the data link communications applications listed in the Seventh Schedule and are required to carry a CVR, shall record on a crash-protected flight recorder the data link communications messages.
	(2) All helicopters which are modified on or after 1 January 2016 to install and utilize any of the data link communications applications listed in the Seventh Schedule and are required to carry a CVR shall record on a crash-protected flight recorder the data link communications messages.
	(3) A Class B AIR may be a means for recording data link communications applications messages to and from the helicopters where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.
Data link recorders-Duration	**181.** The minimum recording duration shall be equal to the duration of the CVR.
Data link recorders-Correlation	**182.** Data link recording shall allow correlation with the recorded cockpit audio.
Flight recorders - Construction and installation	**183.** (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 meet the prescribed crashworthiness and fire protection specifications.
Flight recorders — Operation	**184.** (1) Flight recorders shall not be switched off during flight time.
	(2) To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident.
	(3) The flight recorders shall not be reactivated before their disposition as determined in accordance with Civil Aviation (Aircraft Accident and Incident Investigation) Regulations.
	(4) The need for removal of the flight recorder records 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 operation.
Continued	**185.** Operational checks and evaluations of recordings from the flight recorder

serviceability	systems shall be conducted annually to ensure the continued serviceability of the recorders.
Flight recorders electronic documentation	**186.** The documentation requirement concerning FDR parameters provided by operators to accident investigation authorities shall be in electronic format and take account of industry specifications.
Instruments and equipment for flights operated under VFR and IFR	**187.** The flight instrument requirements in this regulation may be met by combinations of instruments or by electronic displays.
VFR by day	**188.** All helicopters when operating in accordance with VFR by day shall be equipped with: a) a magnetic compass; b) an accurate timepiece indicating the time in hours, minutes and seconds; c) a sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight; d) an airspeed indicating system calibrated in knots, miles per hour or kilometers per hour; and e) such additional instruments or equipment as may be prescribed by the appropriate Authority.
Instruments for operations requiring two pilots in day VFR	**189.** An operator shall not operate an aeroplane that requires two pilots to operate unless each pilot's station is equipped with separate instruments as follows: (a) an airspeed indicator calibrated in knots, miles per hour or kilometers per hour; (b) a sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals/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 co-coordinator incorporating a slip indicator; (e) an attitude indicator; (f) a stabilised direction indicator, and (g) any other equipment as required by the Authority.
VFR by night	**190.** (1) All helicopters when operating in accordance with VFR at night shall be equipped with: a) the equipment specified in regulation 160;

	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 may be prescribed by the Authority; and the following lights: g) the lights required by Civil Aviation (Rules of the Air) Regulations for aircraft in flight or operating on the movement area of a heliport; h) two landing lights; i) illumination for all instruments and equipment that are essential for the safe operation of the helicopter that are used by the flight crew; j) lights in all passenger compartments; and k) a flashlight for each crew member station.
	(2) One of the landing lights shall be trainable, at least in the vertical plane.
Instrument Flight Rules (IFR)	**191.** All helicopters when operating in accordance with IFR, or when the helicopter cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with: a) a magnetic compass; b) an accurate timepiece indicating the time in hours, minutes and seconds; c) two sensitive pressure altimeters; d) an airspeed indicating system with means of preventing malfunctioning due to either condensation or icing; e) a slip indicator; f) an attitude indicator (artificial horizon) for each required pilot and one additional attitude indicator; g) a heading indicator (directional gyroscope); h) a means of indicating whether the power supply to the gyroscope instrument is adequate; i) a means of indicating on the flight deck the outside air temperature; j) a rate of climb and descent indicator; k) a stabilization system, unless it has been demonstrated to the satisfaction of the certificating authority that the helicopter possesses, by nature of its design, adequate stability without such a system; l) such additional instruments or equipment as may be prescribed by the Authority; and m) if operated at night, the lights specified in regulation 159(1)(g) to (k) and (2).
	(2) All helicopters when operating in accordance with IFR shall be fitted with an emergency power supply, independent of the main electrical generating system, for the purpose of operating and illuminating, for a minimum period of 30 minutes, an attitude indicating instrument (artificial horizon), clearly visible to the pilot-in-command.
	(3) The emergency power supply shall be automatically operative after the total failure of the main electrical generating system and clear indication shall be given on the instrument panel that the attitude indicator(s) is being operated by

	emergency power.
Ground Proximity Warning System (GPWS)	**192.** 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 shall be equipped with a ground proximity warning system - forward-looking terrain avoidance function.
All helicopters on flights over water - Means of flotation	**193.** (1) All helicopters intended to be flown over water shall be fitted with a permanent or rapidly deployable means of flotation so as to ensure a safe ditching of the helicopter when: a) engaged in offshore operations, or other overwater operations as prescribed by the State of Operator; or b) flying over water in a hostile environment at a distance from land corresponding to more than 10 minutes 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 autorotational or safe forced landing distance from land when operating in performance Class 3.
	(2) 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.
	(3) When considering the distance beyond which flotation equipment is required, the State shall take into consideration the certification standard of the helicopter.
Emergency equipment	**194.** (1) Helicopters operating in performance Class 1 or 2 and operating in accordance with the provisions of regulation 162 shall be equipped with: a) one life jacket, or equivalent individual flotation device, for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided. b) for offshore operations the life jacket shall be worn constantly unless the occupant is wearing an integrated survival suit that includes the functionality of the life jacket; c) 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 equipment including means of sustaining life as is appropriate to the flight to be undertaken; d) when two life rafts are fitted, each shall be able to carry all occupants in the overload state; and e) equipment for making the pyrotechnical distress signals described in Civil Aviation (Rules of the Air) Regulations.
	(2) Helicopters operating in performance Class 3 when operating beyond autorotational distance from land but within a distance from land specified by the appropriate authority of the responsible State shall be equipped with one life

	jacket, or equivalent individual flotation device, for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided.
	(3) When determining the distance from land referred to in sub-regulation (2), consideration shall be given to environmental conditions and the availability of search and rescue facilities.
	(4) For offshore operations, when operating beyond autorotational 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**.**
	(5) Helicopters operating in performance Class 3 when operating beyond the distance specified in sub-regulation (2) shall be equipped as in sub-regulation (1).
	(5) 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 State of the Operator, 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 sub-regulation (1) (a) shall be carried.
	(6) Each life jacket and equivalent individual flotation device, when carried in accordance with these regulations, shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons.
	(7) On any helicopter 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 this regulation shall be deployable by remote control.
	(8) Rafts which are not deployable by remote control and which have a mass of more than 40 kg shall be equipped with some means of mechanically assisted deployment.
	(9) On any helicopter for which the individual certificate of airworthiness was first issued before 1 January 1991, the provisions of sub-regulations (7) and (8) shall be complied with.
All helicopters on flights over designated sea areas	**195.** (1) Helicopters, when operating over sea areas which have been designated by the State concerned 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.
	(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.
	(3) When the elevation and strength of the sun results in a high temperature hazard on the flight deck, consideration shall be given to alleviating the flight

<table>
<tr><td></td><td>crew from this regulation.</td></tr>
<tr><td></td><td>(4) When establishing rescue time, the sea state and the ambient light conditions shall be taken into consideration.</td></tr>
<tr><td></td><td></td></tr>
<tr><td>All helicopters on flights over designated land areas</td><td>196. Helicopters, when operated across land areas which have been designated by the State concerned as areas in which search and rescue would be especially difficult, shall be equipped with such signalling devices and life-saving equipment (including means of sustaining life) as may be appropriate to the area overflown.</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Emergency Locator Transmitter (ELT)</td><td>197. (1) From 1 July 2008, all helicopters operating in performance Class 1 and 2 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in regulation 162(1)(a) with at least one automatic ELT and one ELT(S) in a raft or life jacket.</td></tr>
<tr><td></td><td>(2)From 1 July 2008, all helicopters operating in performance Class 3 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in regulation 162(1)(b) with at least one automatic ELT and one ELT(S) in a raft or life jacket.</td></tr>
<tr><td></td><td>(3)All helicopters on all flights shall be equipped with an automatically activated ELT that transmit simultaneously on both 406 MHz and 121.5.</td></tr>
<tr><td></td><td>(4)All helicopters operating on flights over water or a hostile environment, designated as a land area where search and rescue would be especially difficult shall be equipped with at least one automatic ELT and one ELT(s) in each life raft carried on board.</td></tr>
<tr><td></td><td>(5) ELT equipment carried to satisfy the requirements of sub-regulations (1) and (2) shall operate in accordance with the relevant provisions of Civil Aviation (Communication Systems) Regulations.</td></tr>
<tr><td></td><td></td></tr>
<tr><td>All helicopters on high altitude flights</td><td>198. (1) Approximate altitude in the Standard Atmosphere corresponding to the value of absolute pressure used in this text is as follows:

<table>
<tr><th>Absolute pressure</th><th>Metres</th><th>Feet</th></tr>
<tr><td>700 hPa</td><td>3 000</td><td>10 000</td></tr>
<tr><td>620 hPa</td><td>4 000</td><td>13 000</td></tr>
<tr><td>376 hPa</td><td>7 600</td><td>25 000</td></tr>
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<tr><td></td><td></td></tr>
<tr><td></td><td>(2) 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 supplies required in Civil Aviation (Helicopter Operations) Regulations.</td></tr>
<tr><td></td><td>(3) A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is less than 700 hPa but which is provided with means of maintaining pressures greater than 700 hPa in personnel compartments shall be provided with oxygen storage and dispensing apparatus capable of storing and</td></tr>
</table>

	dispensing the oxygen supplies required in Civil Aviation (Helicopter Operations) Regulations.
	(4) A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is less than 376 hPa, or which, if 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, shall be provided with automatically deployable oxygen equipment to satisfy the requirements of Civil Aviation (Helicopter Operations) Regulations.
	(5) The total number of oxygen dispensing units shall exceed the number of passenger and cabin crew seats by at least 10 per cent.
Helicopters when carrying passengers — Significant-weather detection	**199.** 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.
All helicopters required to comply with the Noise certification standards in Civil Aviation (Environmental Protection – Noise Certification) Regulations	**200.** (1) All helicopters required to comply with the noise certification Standards of Civil Aviation (Environmental Protection – Noise Certification) Regulations shall carry a document attesting noise certification.
	(2) When the document, or a suitable statement attesting noise certification as contained in another document approved by the State of Registry, is issued in a language other than English, it shall include an English translation.
	(3) The various noise certification Standards of Civil Aviation (Environmental Protection – Noise Certification) Regulations which are applicable to helicopters are determined according to the date of application for a type certificate, or the date of acceptance of an application under an equivalent prescribed procedure by the certificating authority.
	(4) Some helicopters are not required to comply with any noise certification Standard in accordance to Civil Aviation (Environmental Protection – Noise Certification) Regulations.
Helicopters carrying passengers — cabin crew seats	**201.** (1) All helicopters shall be equipped with a forward or rearward facing (within 15 degrees of the longitudinal axis of the helicopter) seat, fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of Civil Aviation (Helicopter Operation) Regulations, in respect of emergency evacuation.
	(2) In accordance with regulation 137, a seat and seat belt shall be provided for the use of each additional cabin crew member.
	(3) Cabin crew seats shall be located near floor level and other emergency exits as required by the State of Registry for emergency evacuation.

Helicopters required to be equipped with a Pressure-altitude reporting transponder	**202.** Except as may be otherwise authorized by the Authority, all helicopters shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the provisions of Civil Aviation (Surveillance Radar and Collision Avoidance Systems) Regulations.
Microphones	**203.** All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones.
Vibration health monitoring system	**204.** 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.
Helicopters 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)	**205.** (1) Where helicopters are equipped with automatic landing systems, HUD or equivalent displays, EVS, SVS or CVS, or any combination of those systems into a hybrid system, the use of such systems for the safe operation of a helicopter shall be approved by the State of the Operator.
	(2) In approving the operational use of automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, the State of the Operator shall ensure that: a) the equipment meets the appropriate airworthiness certification requirements; b) the operator 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) the operator 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.
Electronic Flight Bags (EFBS) - equipment	**206.** Where portable EFBs are used on board a helicopter, the operator shall ensure that they do not affect the performance of the helicopter systems, equipment or the ability to operate the helicopter.
EFB functions	**207.** (1) Where EFBs are used on board a helicopter, 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.
	(2) The State of the Operator shall approve the operational use of EFB functions to be used for the safe operation of helicopters.
EFB operational approval	**208.** For approval of EFB use on an aeroplane, the operator shall ensure that: a) the EFB equipment and its associated installation hardware, including interaction with aeroplane systems if applicable, meet the appropriate airworthiness certification requirements; b) the safety risks associated with the operations supported by the EFB function(s) are assessed; c) requirements for redundancy of the information (if appropriate) contained in and displayed by the EFB function(s) are established; d) procedures for the management of the EFB function(s) including any database it may use are established and documented; and e) procedures for the use of, and training requirements for, the EFB and the EFB function(s) are established and documented.
HELICOPTER COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT	
Communication Equipment	**209.** (1) A helicopter shall be provided with radio communication equipment capable of: a) conducting two-way communication for heliport control purposes; b) receiving meteorological information at any time during flight; and c) conducting two-way communication at any time during flight with at least one aeronautical station and with such other aeronautical stations and on such frequencies as may be prescribed by the appropriate authority (State Communication Commission /Authority).
	(2) The requirements of sub-regulation (1) are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.
	(3)The radio communication equipment required in accordance with sub-regulation(1) shall provide for communications on the aeronautical emergency frequency 121.5 MHz.
	(4) For operations where communication equipment is required to meet an RCP specification for performance-based communication (PBC), a helicopter shall, in addition to the requirements specified in sub-regulation (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 helicopter RCP specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and c) have information relevant to the helicopter RCP specification capabilities included in the MEL.
	(5)The State of the Operator shall, for operations where an RCP specification for PBC has been prescribed, ensure that 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.
	(6)The State of the Operator shall ensure that, in respect of those helicopters mentioned in sub-regulation(4), adequate provisions exist for: a) receiving the reports of observed communication performance issued by monitoring programmes established in accordance with Civil Aviation (Air Traffic Services) Regulations. b) taking immediate corrective action for individual helicopters, helicopter types or operators, identified in such reports as not complying with the RCP specification(s).
Navigation Equipment	**210.** (1) A helicopter shall be provided with navigation equipment which will enable it to proceed: a) in accordance with its operational flight plan; and b) in accordance with the requirements of air traffic services; except when, if not so precluded by the appropriate authority, navigation for flights under VFR is accomplished by visual reference to landmarks.
	(2) For operations where a navigation specification for performance-based navigation (PBN) has been prescribed, a helicopter shall, in addition to the requirements specified in sub-regulation (1): a) be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification(s); and b) have information relevant to the helicopter navigation specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and c) have information relevant to the helicopter navigation specification capabilities included in the MEL.
	(3)The State of the Operator shall, for operations where a navigation specification for PBN has been prescribed, ensure that the operator has

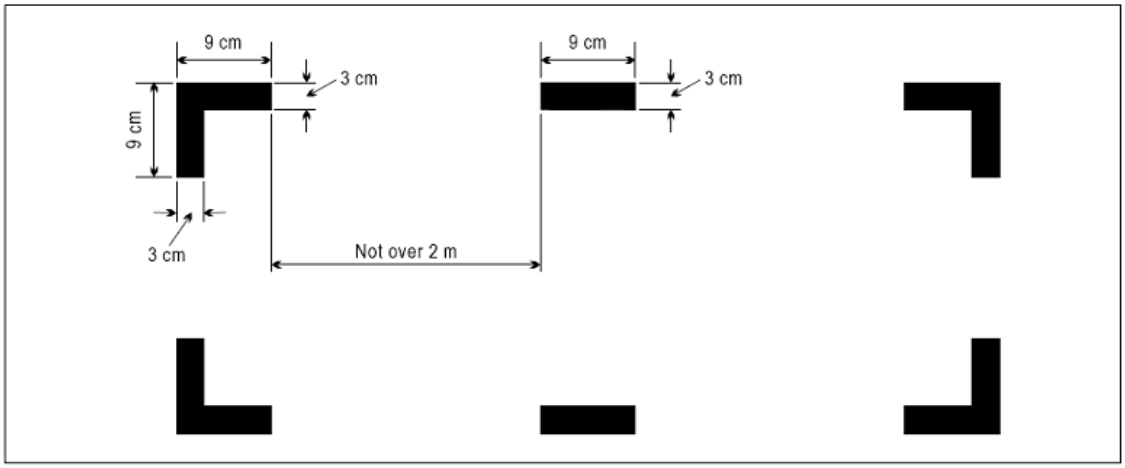
	established and documented: a) normal and abnormal procedures, including contingency procedures; b) flight crew qualification and proficiency requirements, in accordance with the appropriate navigation specifications; c) a training programme for relevant personnel consistent with the intended operations; and d) appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate navigation specifications.
	(4)The State of the Operator shall issue a specific approval for operations based on PBN authorization required (AR) navigation specifications.
	(5)The helicopter shall be sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the helicopter to navigate in accordance with this regulation.
	(6)On flights in which it is intended to land in instrument meteorological conditions, a helicopter shall be provided with appropriate navigation equipment providing guidance to a point from which a visual landing can be effected.
	(7)The equipment in sub-regulation (6) shall be capable of providing such guidance at each heliport at which it is intended to land in instrument meteorological conditions and at any designated alternate heliports.
Surveillance Equipment	**211.** (1) A helicopter shall be provided with surveillance equipment which will enable it to operate in accordance with the requirements of Civil Aviation (air Traffic Services) Regulations.
	(2) For operations where surveillance equipment is required to meet an RSP specification for performance-based surveillance (PBS), a helicopter shall, in addition to the requirements specified in Sub-regulation(1): a) be provided with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specification(s); b) have information relevant to the helicopter RSP specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and c) have information relevant to the helicopter RSP specification capabilities included in the MEL.
	(3)The State of the Operator shall, for operations where an RSP specification for PBS has been prescribed, ensure that 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.

	(4) The State of the Operator shall ensure that, in respect of those helicopters mentioned in sub-regulation (2), adequate provisions exist for: a) receiving the reports of observed surveillance performance issued by monitoring programmes established in accordance with Civil Aviation (Air Traffic Services) Regulations, and b) taking immediate corrective action for individual helicopter, helicopter types or operators, identified in such reports as not complying with the RSP specification(s).
Installation	**212.** The equipment installation shall be such that the failure of any single unit required for communication, navigation or surveillance purposes or any combination thereof will not result in the failure of another unit required for communication, navigation or surveillance purposes.
Electronic Navigation Data Management	**213.** (1) The operator shall not employ electronic navigation data products that have been processed for application in the air and on the ground, unless the Authority has approved 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 existing equipment.
	(2) The Authority shall ensure that the operator continues to monitor both the process and products.
	(3) The operator shall implement procedures that ensure the timely distribution and insertion of current and unaltered electronic navigation data to all necessary aircraft.

PART VII: HELICOPTER OPERATIONS - (GENERAL AVIATION)

HELICOPTER INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS	
ALL HELICOPTERS ON ALL FLIGHTS	
General	**214.** (1) In addition to the minimum equipment necessary for the issuance of a certificate of airworthiness, the instruments, equipment and flight documents prescribed in the following regulations shall be installed or carried, as appropriate, in helicopters according to the helicopter used and to the circumstances under which the flight is to be conducted.
	(2)The prescribed instruments and equipment, including their installation, shall be approved or accepted by the State of Registry.
Instruments	**215.** A helicopter shall be equipped with instruments which will enable the flight crew to control the flight path of the helicopter, carry out any required procedural manoeuvre, and observe the operating limitations of the helicopter

	in the expected operating conditions.
Equipment – First Aid	**216.** A helicopter shall be equipped with or carry on board an accessible first-aid kit.
portable fire extinguishers	**217.** A helicopter shall be equipped with or carry on board a portable fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the helicopter and at least one shall be located in: a) the pilot's compartment; and b) each passenger compartment that is separate from the pilot's compartment and that is not readily accessible to the flight crew.
Seat / berth and seat belt / safety harness	**218.** A helicopter shall be equipped with : a) a seat or berth for each person of 2 years of age and above to be determined by the State of Registry; and b) a seat belt for each seat and restraining belts for each berth.
Operations Manual / Flight Manual and Charts.	**219.** A helicopter shall carry: a) the flight manual or other documents or information concerning any operating limitations prescribed for the helicopter by the certificating authority of the State of Registry, required for the application of Civil Aviation (Helicopter Operations)Regulations; b) any specific approval issued by the State of Registry, if applicable, for the operation(s) to be conducted; c) current and suitable charts for the route of the proposed flight and all routes along which it is reasonable to expect that the flight may be diverted; d) procedures, as prescribed Civil Aviation (Rules of the Air) Regulations, for pilots-in-command of intercepted aircraft; e) a list of visual signals for use by intercepting and intercepted aircraft, as contained in Civil aviation (Rules of the Air) Regulations; f) the journey log book for the helicopter;
Spare electrical fuses	**220.** Where fuses are used, an helicopter shall have spare electrical fuses of appropriate ratings for replacement of those accessible in flight.
Lavatory fire Extinguisher	**221.** (1) Any agent used in a built-in fire extinguisher for each lavatory disposal receptacle for towels, paper or waste in a helicopter for which the individual certificate of airworthiness is first issued on or after 31 December 2011 and any extinguishing agent used in a portable fire extinguisher in a helicopter for which the individual certificate of airworthiness is first issued on or after 31 December 2018 shall: a) meet the applicable minimum performance requirements of the State

	of Registry; and b) not contain Halon 1211, Halon 1301, or Halon 2402.
	(2)All helicopters on all flights shall be equipped with the ground-air signal codes for search and rescue purposes.
	(3)All helicopters on all flights shall be equipped with a safety harness for each flight crew member seat.
	(4)Built-in lavatory fire extinguishers shall be designed to discharge automatically into each disposal receptacle upon occurrence of a fire in the receptacle.
Marking of break-in points	**222.** (1) Where areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on a helicopter, such areas shall be marked as shown below (see figure4).
	(2) The colour of the markings shall be red or yellow, and where necessary they shall be outlined in white to contrast with the background.
	(3) Where the corner markings are more than 2 m apart, intermediate lines 9 cm × 3 cm shall be inserted so that there is no more than 2 m between adjacent markings.  **Figure 4. Marking of break-in points**
Instruments and equipment for flights operated VFR and IFR	**223.** The flight instrument requirements in this regulation may be met by combinations of instruments or by electronic displays.
VFR by day	**224.** All helicopters when operating in accordance with VFR by day shall be equipped with: a) a magnetic compass; b) an accurate timepiece indicating the time in hours, minutes and seconds; c) Sensitive pressure altimeter calibrated in feet with a sub-scale setting

	calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight; d) An airspeed indicating system calibrated in knots, miles per hour or kilometers per hour; and e) such additional instruments or equipment as may be prescribed by the appropriate Authority.
Instruments for operations requiring two pilots in day VFR	**225.** An operator shall not operate an helicopter that requires two pilots to operate unless each pilot's station is equipped with separate instruments as follows: (a) an airspeed indicator calibrated in knots, miles per hour or kilometers per hour; (b) a sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals/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 co-coordinator incorporating a slip indicator; (e) an attitude indicator; (f) a stabilised direction indicator, and (g) any other equipment as required by the Authority.
VFR by night	**226.** (1) All helicopters when operating in accordance with VFR at night shall be equipped with: a) the equipment specified in regulation 194; 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 may be prescribed by the Authority; and the following lights: g) the lights required by Civil Aviation (Rules of the Air) Regulations for aircraft in flight or operating on the movement area of a heliport; h) landing lights; i) illumination for all instruments and equipment that are essential for the safe operation of the helicopter that are used by the flight crew; j) lights in all passenger compartments; and k) a flashlight for each crew member station.
	(2)The General characteristics of the lights shall be as specified in the Civil Aviation (Airworthiness) Regulations.
	(3) The landing light shall be trainable, at least in the vertical plane.
Instrument Flight Rules (IFR)	**227.** All helicopters when operating in accordance with IFR, or when the helicopter cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with: a) a magnetic compass; b) two sensitive pressure altimeters;

	d) an airspeed indicating system with means of preventing malfunctioning due to either condensation or icing; e) a slip indicator; f) an attitude indicator (artificial horizon) for each required pilot and one additional attitude indicator; g) a heading indicator (directional gyroscope); h) a means of indicating whether the power supply to the gyroscope instrument is adequate; i) a means of indicating on the flight deck the outside air temperature; j) a rate of climb and descent indicator; l) such additional instruments or equipment as may be prescribed by the Authority; m) if operated at night, the lights specified in regulation 195 (1)(g) to k and (3) n) means of measuring and displaying the time in hours, minutes and seconds.
All helicopters on flights over water - Means of flotation	**228.** (1) All helicopters intended to be flown over water shall be fitted with a permanent or rapidly deployable means of flotation so as to ensure a safe ditching of the helicopter when: a) engaged in offshore operations, or other overwater operations as prescribed by the State of Registry; or b) flying at a distance from land specified the appropriate State Authority.
	(2)When determining the distance from land referred to in sub-regulation(1), consideration shall be given to environmental conditions and the availability of search and rescue facilities.
Emergency equipment	**229.** (1) Helicopters operating in accordance with the provisions of regulation 197 shall be equipped with: a) one life jacket, or equivalent individual flotation device, for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided; b) when not precluded by consideration related to the type of helicopter used, 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 equipment including means of sustaining life as is appropriate to the flight to be undertaken; and c) equipment for making the pyrotechnical distress signals described in Civil Aviation (Rules of the Air) Regulations.
	(2) 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 sub-regulation(1) (a) shall be carried.

	(3) Each life jacket and equivalent individual flotation device, when carried in accordance with this these regulations, shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons.
	(4) On any helicopter 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 this regulation shall be deployable by remote control.
	(5) Rafts which are not deployable by remote control and which have a mass of more than 40 kg should be equipped with some means of mechanically assisted deployment.
	(6) On any helicopter for which the individual certificate of airworthiness was first issued before 1 January 1991, the provisions of sub-regulations (4) and (5) shall be complied with.
All helicopters on flights over designated land areas	**230.** Helicopters, when operated across land areas which have been designated by the State concerned as areas in which search and rescue would be especially difficult, shall be equipped with such signalling devices and life-saving equipment (including means of sustaining life) as may be appropriate to the area overflown.
All helicopters on high altitude flights	**231.** ***(1)***Unpressurized helicopters intended to be operated at high altitudes shall carry equipment for storing and dispensing the oxygen supplies required in Civil Aviation (Helicopter Operations) Regulations.
	(2)Pressurized helicopters intended to be operated at high altitudes shall carry emergency oxygen storage and dispensing equipment capable of storing and dispensing the oxygen supplies required in Civil Aviation (Helicopter Operations) Regulations.
All helicopters required to comply with the Noise certification standards in Civil Aviation (Environmental Protection – Noise Certification) Regulations	**232.** (1) All helicopters required to comply with the noise certification Standards of Civil Aviation (Environmental Protection – Noise Certification) Regulations shall carry a document attesting noise certification.
	(2) When the document, or a suitable statement attesting noise certification as contained in another document approved by the Authority, is issued in a language other than English, it shall include an English translation.
	(3) The various noise certification Standards of Civil Aviation (Environmental Protection – Noise Certification) Regulations which are applicable to helicopters are determined according to the date of application for a type certificate, or the date of acceptance of an application under an equivalent prescribed procedure by the certificating authority.
	(4) Some helicopters are not required to comply with any noise certification

	Standard in accordance to Civil Aviation (Environmental Protection – Noise Certification) Regulations.
Flight Recorders	**233.** (1) Crash-protected flight recorders 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).
	(2) Image and data link information may be recorded on either the CVR or the FDR.
	(3) Combination recorders (FDR/CVR) may be used to meet the flight recorder equipage requirements in **these regulations** and Ninth Schedule.
	(4)Detailed requirements on flight recorders are contained in Ninth Schedule.
	(5) Lightweight flight recorders comprise one or more of the following systems: (a) an aircraft data recording system (ADRS); (b) a cockpit audio recording system (CARS); (c) an airborne image recording system (AIRS); (d) a data link recording system (DLRS).
	(6)Image and data link information may be recorded on either the CARS or the ADRS.
FDR and ADRS	**234.** Parameters to be recorded shall be those listed in the Ninth Schedule.
FDR and ADRS – Applicability	**235.** (1) 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 an FDR which shall record at least the first 48 parameters listed in Table A4-1 of Ninth Schedule.
	(2) All helicopters of a maximum certificated take-off mass of over 7 000 kg, or having a passenger seating configuration of more than nineteen, for which the individual certificate of airworthiness is first issued on or after 1 January 1989 shall be equipped with an FDR which shall record at least the first 30 parameters listed in Table A4-1 of Ninth Schedule.
	(3) All helicopters of a maximum certificated take-off mass of over 3 175 kg, up to and including 7 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1989, shall be equipped with an FDR which shall record at least the first 15 parameters listed in Table A4-1 of Ninth Schedule.
FDR and ADRS – Recording	**236.** FDRs shall not use engraving metal foil, frequency modulation (FM), photographic film or magnetic tape.

Technology	
FDR and ADRS - Duration	**237.** All FDRs shall retain the information recorded during at least the last 10 hours of their operation.
Cockpit Voice Recorders (CVR) – Cockpit Audio Recording Systems (CARS) – Applicability	**238.** (1) All helicopters of a maximum certificated take-off mass of over 7 000 kg shall be equipped with a CVR.
	(2) For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on the CVR.
	(3) 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 1987 shall be equipped with a CVR.
CVR- Recording Technology	**239.** CVRs shall not use magnetic tape or wire.
CVR- Duration	**240.** All helicopters required to be equipped with a CVR which shall be equipped with a CVR which shall retain the information recorded during at least the last 2 hours of its operation.
Data link recorders- Applicability	**241.** (1) All helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which utilize any of the data link communications applications listed Ninth Schedule and are required to carry a CVR, shall record on a crash-protected flight recorder the data link communications messages.
	(2) All helicopters which are modified on or after 1 January 2016 to install and utilize any of the data link communications applications listed in Ninth Schedule and are required to carry a CVR, shall record on a crash-protected flight recorder the data link communications messages.
	(3) A Class B AIR may be a means for recording data link communications applications messages to and from the helicopters where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.
Data link recorders- Duration	**242.** The minimum recording duration shall be equal to the duration of the CVR.
Data link recorders- Correlation	**243.** Data link recording shall allow correlation with the recorded cockpit audio.
Flight recorders —	**244.** (1) Flight recorders shall be constructed, located and installed so as to provide maximum practical protection for the recordings in order that the recorded

Construction and installation	information may be preserved, recovered and transcribed.
	(2) Flight recorders shall meet the prescribed crashworthiness and fire protection specifications.
Flight recorders — Operation	**245.** (1) Flight recorders shall not be switched off during flight time.
	(2) To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident.
	(3) The flight recorders shall not be reactivated before their disposition as determined in accordance with Civil Aviation (Aircraft Accident and Incident Investigation) Regulations.
	(4) The need for removal of the flight recorder records 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 operation.
Continued serviceability	**246.** Operational checks and evaluations of recordings from the flight recorder systems shall be conducted to ensure the continued serviceability of the recorders.
Flight recorders electronic documentation	**247.** The documentation requirement concerning FDR parameters provided by operators to accident investigation authorities shall be in electronic format and take account of industry specifications.
Emergency Locator Transmitter (ELT)	**248.** (1) From 1 July 2008, all helicopters operating in performance Class 1 and 2 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in regulation 197(1)(a) with at least one automatic ELT and one ELT(S) in a raft or life jacket.
	(2)From 1 July 2008, all helicopters operating in performance Class 3 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in regulation 197(1)(b) with at least one automatic ELT and one ELT(S) in a raft or life jacket.
	(3) ELT equipment carried to satisfy the requirements of sub-regulation (1) shall operate in accordance with the relevant provisions of Civil Aviation (Communication Systems) Regulations.
Helicopters required to be equipped with a Pressure-altitude	**249.** All helicopters shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the provisions of Civil Aviation (Surveillance Radar and Collision Avoidance Systems) Regulations.

reporting transponder	
Microphones	**250.** All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones.
Helicopters 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)	**251.** (1) Where helicopters are equipped with automatic landing systems, HUD or equivalent displays, EVS, SVS or CVS, or any combination of those systems into a hybrid system, the use of such systems for the safe operation of a helicopter shall be approved by the State of Registry.
	(2) In establishing operational criteria for the use of automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, the State of Registry shall require that: a) the equipment meets the appropriate airworthiness certification requirements; b) the operator/owner 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) the operator/owner 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.
Electronic Flight Bags (EFBS) - equipment	**252.** Where portable EFBs are used on board a helicopter, the pilot-in-command and the owner shall ensure that they do not affect the performance of the helicopter systems, equipment or the ability to operate the helicopter.
EFB functions	**253.** (1) Where EFBs are used on board a helicopter the pilot-in-command and / or the owner 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.
	(2) The State of Registry shall approve the operational use of EFB functions to be used for the safe operation of helicopters.
EFB operational approval	**254.** In establishing the operational use of EFBs, the State of Registry shall ensure that: a) the EFB equipment and its associated installation hardware, including interaction with helicopter systems if applicable, meet the appropriate

	airworthiness certification requirements; b) the owner has assessed the safety risks associated with the operations supported by the EFB function(s); c) the owner has established requirements for redundancy of the information (if appropriate) contained and displayed by the EFB function(s); d) the owner has established and documented procedures for the management of the EFB function(s) including any databases it may use; and e) the owner has established and documented the procedures for the use of, and training requirements for the EFB function(s).
HELICOPTER COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT	
Communication Equipment	**255.** (1) A helicopter to be operated in accordance with IFR or at night shall be provided with radio communication equipment.
	(2) The equipment in sub-regulation (1) shall be capable of conducting two-way communication with those aeronautical stations and on those frequencies prescribed by the appropriate authority (State Communication Commission / Authority).
	(3) The requirements of sub-regulation(1) shall be considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.
	(4) When compliance with sub-regulation (1) requires that more than one communication equipment unit be provided, 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) A helicopter to be operated in accordance with VFR, but as a controlled flight, shall, unless exempted by the appropriate authority, be provided with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the appropriate Authority (State Communication Commission / Authority).
	(6) A helicopter to be operated on a flight to which the provisions of regulations 198 or 200 apply shall, unless exempted by the appropriate authority, be provided with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the appropriate Authority (State Communication Commission / Authority).
	(7) The radio communication equipment required in accordance with this regulation shall provide for communication on the aeronautical emergency frequency 121.5 MHz.
	(8) For operations where communication equipment is required to meet an

	RCP specification for performance-based communication (PBC), a helicopter shall, in addition to the requirements specified in this regulation: 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 helicopter RCP specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and c) have information relevant to the helicopter RCP specification capabilities included in the MEL.
	(9) The State of Registry shall establish criteria for operations where an RCP specification for PBC has been prescribed.
	(10) The State of Registry shall, for operations where an RCP specification for PBC has been prescribed, ensure that 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 State of Registry shall ensure that, in respect of those helicopters mentioned in sub-regulation(8), adequate provisions exist for: a) receiving the reports of observed communication performance issued by monitoring programmes established in accordance with Civil Aviation (Air Traffic Services) Regulations. b) taking immediate corrective action for individual helicopters, helicopter types or operators, identified in such reports as not complying with the RCP specification(s).
Navigation Equipment	**256.** (1) A helicopter shall be provided with navigation equipment which will enable it to proceed: a) in accordance with its operational flight plan; and b) in accordance with the requirements of Civil Aviation (Air Traffic Services) Regulations; except when, if not so precluded by the appropriate authority, navigation for flights under VFR is accomplished by visual reference to landmarks. For international general aviation, landmarks shall be located at least every 110 km (60 NM).
	(2) For operations where a navigation specification for performance-based navigation (PBN) has been prescribed, a helicopter shall, in addition to the requirements specified in sub-regulation (1):

	a) be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification(s); and b) have information relevant to the helicopter navigation specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and c) have information relevant to the helicopter navigation specification capabilities included in the MEL.
	(3) The State of Registry shall establish criteria for operations where a navigation specification for PBN has been prescribed.
	(4) The State of Registry shall, for operations where a navigation specification for PBN has been prescribed, ensure that the operator has established and documented: a) normal and abnormal procedures, including contingency procedures; b) flight crew qualification and proficiency requirements, in accordance with the appropriate navigation 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 navigation specifications.
	(4)The State of Registry shall issue a specific approval for operations based on PBN authorization required (AR) navigation specifications.
	(5)The helicopter shall be sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the helicopter to navigate in accordance with sub-regulations (1) and (2).
	(6) For international general aviation, sub-regulation (5) may be met by means other than the duplication of equipment.
	(7)On flights in which it is intended to land in instrument meteorological conditions, a helicopter shall be provided with appropriate navigation equipment providing guidance to a point from which a visual landing can be effected.
	(8)The equipment in sub-regulation (7) shall be capable of providing such guidance at each heliport at which it is intended to land in instrument meteorological conditions and at any designated alternate heliports.
Surveillance Equipment	**257.** (1) A helicopter shall be provided with surveillance equipment which will enable it to operate in accordance with the requirements of air traffic services.
	(2) For operations where surveillance equipment is required to meet an RSP specification for performance-based surveillance (PBS), a helicopter shall, in addition to the requirements specified in sub-regulation(1): a) be provided with surveillance equipment which will enable it to

	operate in accordance with the prescribed RSP specification(s); b) have information relevant to the helicopter RSP specification capabilities listed in the flight manual or other helicopter documentation approved by the State of Design or State of Registry; and c) have information relevant to the helicopter RSP specification capabilities included in the MEL.
	(3) The State of Registry shall establish criteria for operations where an RSP specification for PBS has been prescribed.
	(4) The State of the Operator shall, for operations where an RSP specification for PBS has been prescribed, ensure that the operator/ owner 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.
	(4) The State of Registry shall ensure that, in respect of those helicopters mentioned in sub-regulation (2), adequate provisions exist for: a) receiving the reports of observed surveillance performance issued by monitoring programmes established in accordance with Civil Aviation (Air Traffic Services) Regulations, and b) taking immediate corrective action for individual helicopter, helicopter types or operators, identified in such reports as not complying with the RSP specification(s).

FIRST SCHEDULE: LIGHTS TO BE DISPLAYED BY AEROPLANE (COMMERCIAL AIR TRANSPORT — AEROPLANES)

(Regulation 66, refers)

1. TERMINOLOGY

Where the following terms are used in this Schedule, they have the following meanings:

Angles of coverage.

a) Angle of coverage A is formed by two intersecting vertical planes making angles of 70 degrees to the right and 70 degrees to the left respectively, looking aft along the longitudinal axis to a vertical plane passing through the longitudinal axis.

b) Angle of coverage F is formed by two intersecting vertical planes making angles of 110 degrees to the right and 110 degrees to the left respectively, looking forward along the longitudinal axis to a vertical plane passing through the longitudinal axis.

c) Angle of coverage L is formed by two intersecting vertical planes, one parallel to the longitudinal axis of the aeroplane, and the other 110 degrees to the left of the first, when looking forward along the longitudinal axis.

d) Angle of coverage R is formed by two intersecting vertical planes, one parallel to the longitudinal axis of the aeroplane, and the other 110 degrees to the right of the first, when looking forward along the longitudinal axis.

Horizontal plane. The plane containing the longitudinal axis and perpendicular to the plane of symmetry of the aeroplane.

Longitudinal axis of the aeroplane. A selected axis parallel to the direction of flight at a normal cruising speed, and passing through the centre of gravity of the aeroplane.

Making way. An aeroplane on the surface of the water is "making way" when it is under way and has a velocity relative to the water.

Under command. An aeroplane on the surface of the water is "under command" when it is able to execute manoeuvres as required by the International Regulations for Preventing Collisions at Sea for the purpose of avoiding other vessels.

Under way. An aeroplane on the surface of the water is "under way" when it is not aground or moored to the ground or to any fixed object on the land or in the water.

Vertical planes. Planes perpendicular to the horizontal plane.

Visible. Visible on a dark night with a clear atmosphere.

2. NAVIGATION LIGHTS TO BE DISPLAYED IN THE AIR

Note.— The lights specified herein are intended to meet the requirements of Annex 2 for navigation lights.

As illustrated in Figure 1, the following unobstructed navigation lights shall be displayed:

a) a red light projected above and below the horizontal plane through angle of coverage L;

b) a green light projected above and below the horizontal plane through angle of coverage R;

c) a white light projected above and below the horizontal plane rearward through angle of coverage A.

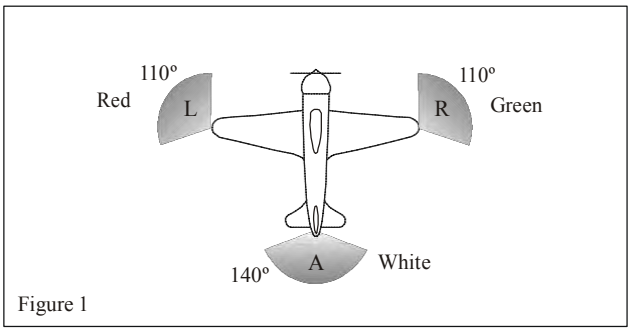


Figure 1

3. LIGHTS TO BE DISPLAYED ON THE WATER

3.1 General

Note.— The lights specified herein are intended to meet the requirements of Annex 2 for lights to be displayed by aeroplanes on the water.

The International Regulations for Preventing Collisions at Sea require different lights to be displayed in each of the following circumstances:

a) when under way;

b) when towing another vessel or aeroplane;

c) when being towed;

d) when not under command and not making way;

e) when making way but not under command;

f) when at anchor;

g) when aground.

The lights required by aeroplanes in each case are described below.

3.2 When under way

As illustrated in Figure 2, the following appearing as steady unobstructed lights:

a) a red light projected above and below the horizontal through angle of coverage L;

b) a green light projected above and below the horizontal through angle of coverage R;

c) a white light projected above and below the horizontal through angle of coverage A; and

d) a white light projected through angle of coverage F.

The lights described in 3.2 a), b) and c) should be visible at a distance of at least 3.7 km (2 NM). The light described in 3.2 d) should be visible at a distance of 9.3 km (5 NM) when fitted to an aeroplane of 20 m or more in length or visible at a distance of 5.6 km (3 NM) when fitted to an aeroplane of less than 20 m in length.

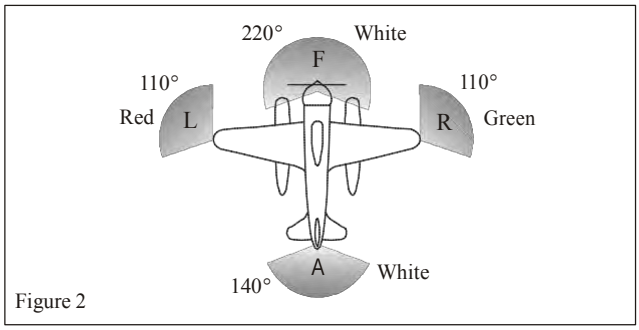


Figure 2

3.3 When towing another vessel or aeroplane

As illustrated in Figure 3, the following appearing as steady, unobstructed lights:

a) the lights described in 3.2;

b) a second light having the same characteristics as the light described in 3.2 d) and mounted in a vertical line at least 2 m above or below it; and

c) a yellow light having otherwise the same characteristics as the light described in 3.2 c) and mounted in a vertical line at least 2 m above it.

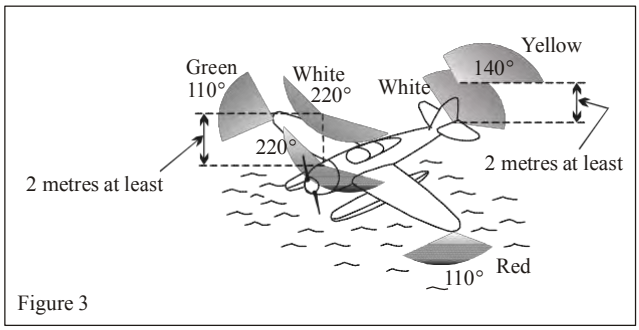


Figure 3

3.4 When being towed

The lights described in 3.2 a), b) and c) appearing as steady, unobstructed lights.

3.5 When not under command and not making way

As illustrated in Figure 4, two steady red lights placed where they can best be seen, one vertically over the other and not less than 1 m apart, and of such a character as to be visible all around the horizon at a distance of at least 3.7 km (2 NM).

3.6 When making way but not under command

As illustrated in Figure 5, the lights described in 3.5 plus the lights described in 3.2 a), b) and c).

Note.— The display of lights prescribed in 3.5 and 3.6 is to be taken by other aircraft as signals that the aeroplane showing them is not under command and cannot therefore get out of the way. They are not signals of aeroplanes in distress and requiring assistance.

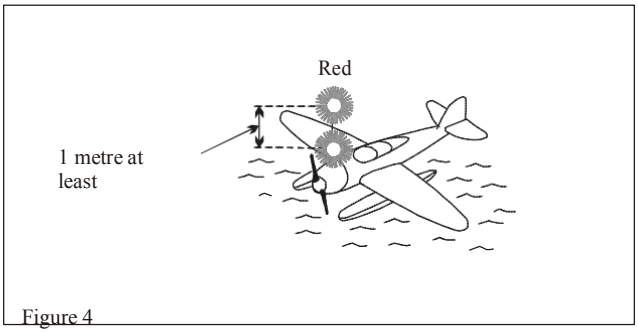


Figure 4

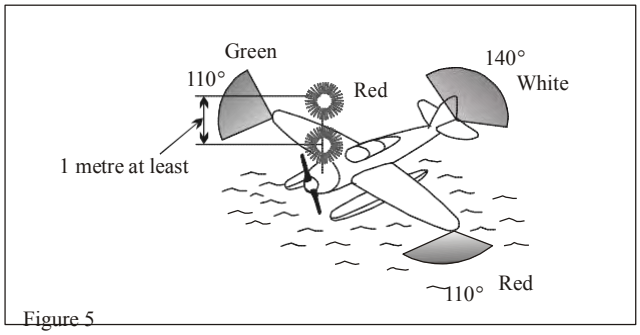


Figure 5

3.7 When at anchor

a) If less than 50 m in length, where it can best be seen, a steady white light (Figure 6), visible all around the horizon at a distance of at least 3.7 km (2 NM).

b) If 50 m or more in length, where they can best be seen, a steady white forward light and a steady white rear light (Figure 7) both visible all around the horizon at a distance of at least 5.6 km (3 NM).

c) If 50 m or more in span a steady white light on each side (Figures 8 and 9) to indicate the maximum span and visible, so far as practicable, all around the horizon at a distance of at least 1.9 km (1 NM).

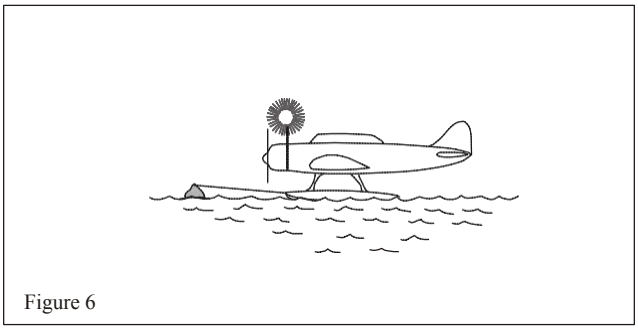


Figure 6

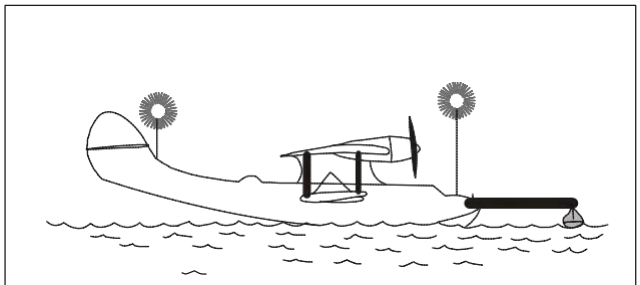


Figure 7

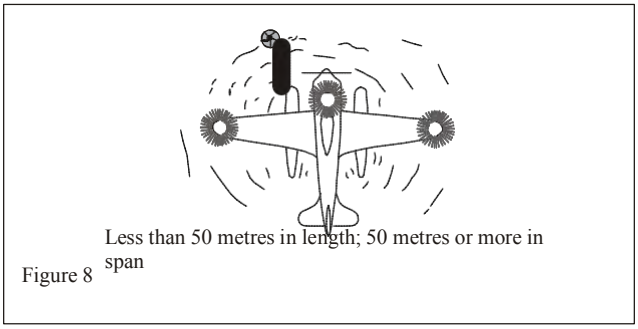

Less than 50 metres in length; 50 metres or more in span

Figure 8

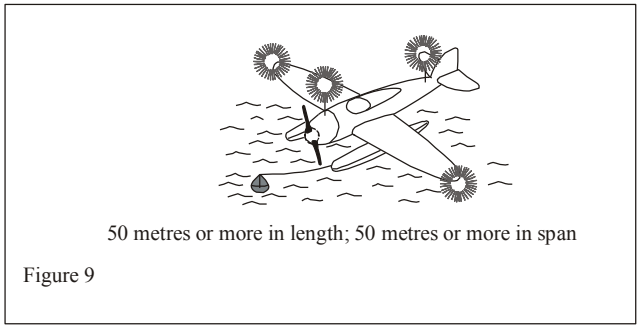

50 metres or more in length; 50 metres or more in span

Figure 9

3.8 When aground

The lights prescribed in 3.7 and in addition two steady red lights in vertical line, at least 1 m apart so placed as to be visible all around the horizon.

SECOND SCHEDULE: ALTIMETRY SYSTEM PERFORMANCE REQUIREMENTS FOR OPERATIONS IN RVSM AIRSPACE (COMMERCIAL AIR TRANSPORT — AEROPLANES)

(Regulation 90, refers)

1. In respect of groups of aeroplanes that are nominally of identical design and build with respect to all details that could influence the accuracy of height-keeping performance, the height-keeping performance capability shall be such that the total vertical error (TVE) for the group of aeroplanes shall have a mean no greater than 25 m (80 ft) in magnitude and shall have a standard deviation no greater than $28 - 0.013z^2$ for $0 \leq z \leq 25$ when z is the magnitude of the mean TVE in metres, or $92 - 0.004z^2$ for $0 \leq z \leq 80$ where z is in feet. In addition, the components of TVE shall have the following characteristics:

a) the mean altimetry system error (ASE) of the group shall not exceed 25 m (80 ft) in magnitude;

b) the sum of the absolute value of the mean ASE and of three standard deviations of ASE shall not exceed 75 m (245 ft); and

c) the differences between cleared flight level and the indicated pressure altitude actually flown shall be symmetric about a mean of 0 m, with a standard deviation no greater than 13.3 m (43.7 ft), and in addition, the decrease in the frequency of differences with increasing difference magnitude shall be at least exponential.

2. In respect of aeroplanes for which the characteristics of the airframe and altimetry system fit are unique and so cannot be classified as belonging to a group of aeroplanes encompassed by paragraph 1, the height-keeping performance capability shall be such that the components of the TVE of the aeroplane have the following characteristics:

a) the ASE of the aeroplane shall not exceed 60 m (200 ft) in magnitude under all flight conditions; and

b) the differences between the cleared flight level and the indicated pressure altitude actually flown shall be symmetric about a mean of 0 m, with a standard deviation no greater than 13.3 m (43.7 ft), and in addition, the decrease in the frequency of differences with increasing difference magnitude shall be at least exponential.

THIRD SCHEDULE: FLIGHT RECORDERS (COMMERCIAL AIR TRANSPORT — AEROPLANES)

(Regulation 42, refers)

The material in this Schedule concerns flight recorders intended for installation in aeroplanes engaged in international air navigation. Crash-protected flight recorders 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).

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).

1. GENERAL REQUIREMENTS

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

1.2 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. At the earliest practicable date, but not later than 1 January 2018, this device shall operate for a minimum of 90 days.

1.3 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.

1.4 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

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.

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

1.6 The flight recorder systems, when tested by methods approved by the appropriate certificating authority, shall be demonstrated to be suitable for the environmental extremes over which they are designed to operate.

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

1.8 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.

2. FLIGHT DATA RECORDER (FDR) AND AIRCRAFT DATA RECORDING SYSTEMS (ADRS)

2.1 Start and stop logic

The FDR or ADRS shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power.

2.2 Parameters to be recorded

Note.— In previous editions of Annex 6, Part I, types of recorders were defined to capture the first evolutions of FDRs.

2.2.1 The parameters that satisfy the requirements for FDRs are listed in Table A8-1. The number of parameters to be recorded shall depend on aeroplane complexity. The parameters without an asterisk (*) are mandatory parameters which shall be recorded regardless of aeroplane complexity. In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by aeroplane systems or the flight crew to operate the aeroplane. However, other parameters may be substituted with due regard to the aeroplane type and the characteristics of the recording equipment.

2.2.2 If further FDR recording capacity is available, recording of the following additional information shall be considered:

a) 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:

   1) 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;

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

   3) warnings and alerts; and

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

b) retardation information including brake application for use in the investigation of landing overruns and rejected take-offs.

2.2.3 The parameters that satisfy the requirements for flight path and speed as displayed to the pilot(s) are listed below. The parameters without an (*) are mandatory parameters which shall be recorded. In addition, the parameters designated by an (*) shall be recorded if an information source for the parameter is displayed to the pilot and is practicable to record:

— Pressure altitude
— Indicated airspeed or calibrated airspeed
— Heading (primary flight crew reference)
— Pitch attitude
— Roll attitude
— Engine thrust/power
— Landing-gear status*
— Total or outside air temperature*
— Time*
— Navigation data*: drift angle, wind speed, wind direction, latitude/longitude
— Radio altitude*

2.2.4 The parameters that satisfy the requirements for ADRS are listed in Table A8-3.

2.3 Additional information

2.3.1 The measurement range, recording interval and accuracy of parameters on installed equipment shall be verified by methods approved by the appropriate certificating authority.

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

3. COCKPIT VOICE RECORDER (CVR) AND COCKPIT AUDIO RECORDING SYSTEM (CARS)

3.1 Start and stop logic

The CVR or CARS shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the CVR or CARS shall start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

3.2 Signals to be recorded

3.2.1 The CVR shall record simultaneously on four separate channels, or more, at least the following:

a) voice communication transmitted from or received in the aeroplane by radio;

b) aural environment on the flight deck;

c) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed;

d) voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and

e) voice communication of flight crew members using the passenger address system, if installed.

3.2.2 The preferred CVR audio allocation should be as follows:

a) pilot-in-command audio panel;

b) co-pilot audio panel;

c) additional flight crew positions and time reference; and

d) cockpit area microphone.

3.2.3 The CARS shall record simultaneously on two separate channels, or more, at least the following:

a) voice communication transmitted from or received in the aeroplane by radio;

b) aural environment on the flight deck; and

c) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed.

3.2.4 The preferred CARS audio allocation should be as follows:

a) voice communication; and

b) aural environment on the flight deck.

4. AUTOMATIC DEPLOYABLE FLIGHT RECORDER (ADFR)

4.1 Operation

The following requirements shall apply to an ADFR:

— deployment shall take place when the aeroplane structure has been significantly deformed;

— deployment shall take place when an aeroplane sinks in water;

— ADFR shall not be capable of manual deployment;

— the ADFR shall be able to float on water;

— the ADFR deployment shall not compromise the safe continuation of the flight;

— the ADFR deployment shall not significantly reduce the chance of survival of the recorder and of successful transmission by its ELT;

— the ADFR deployment shall not release more than one piece;

— an alert shall be made to the flight crew when the ADFR is no longer captive to the aircraft;

— the flight crew shall have no means to disable ADFR deployment when the aircraft is airborne;

— the ADFR shall contain an integrated ELT, which shall activate automatically during the deployment sequence. Such ELT may be of a type that is activated in-flight and provides information from which a position can be determined; and

— the integrated ELT of an ADFR shall satisfy the same requirements as an ELT required to be installed on an aeroplane. The integrated ELT shall at least have the same performance as the fixed ELT to maximize detection of the transmitted signal.

Note 1.— Refer to the Manual on Location of Aircraft in Distress and Flight Recorder Data Recovery *(Doc 10054) for more information on ADFR.*

Note 2.— If an integrated ELT of a type that is activated in flight is used within an ADFR, it could be a means to comply with the requirements of Regulation 51.

5. DATA LINK RECORDER (DLR)

5.1 Applications to be recorded

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

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

5.1.2 Messages applying to the applications listed in Table A8-2 shall be recorded. Applications without the asterisk (*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (*) shall be recorded only as far as is practicable given the architecture of the system.

6. FLIGHT CREW-MACHINE INTERFACE RECORDINGS

6.1 Start and stop logic

The AIR or AIRS shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the AIR or AIRS shall start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

6.2 Classes

6.2.1 A Class A AIR or AIRS captures the general cockpit area in order to provide data supplemental to conventional flight recorders.

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

Note 2.— There are no provisions for Class A AIR or AIRS in this document.

6.2.2 A Class B AIR or AIRS captures data link message displays.

6.2.3 A Class C AIR or AIRS captures instruments and control panels.

Note.— A Class C AIR or AIRS may be considered as a means for recording flight data where it is not practical or is prohibitively expensive to record on an FDR or an ADRS, or where an FDR is not required.

6.3 Applications to be recorded

6.3.1 The operation of switches and selectors and the information displayed to the flight crew from electronic displays shall be captured by sensors or other electronic means.

6.3.2 The recording of operation of switches and selectors by the flight crew shall include the following:

— any switch or selector that will affect the operation and the navigation of the aircraft; and
— selection of normal and alternate systems.

6.3.3 The recording of the information displayed to the flight crew from electronic displays shall include the following:

— primary flight and navigation displays;
— aircraft system monitoring displays;
— engine indication displays;
— traffic, terrain, and weather displays;
— crew alerting systems displays;
— stand-by instruments; and
— installed EFB to the extent it is practical.

6.3.4 If image sensors are used, the recording of such images shall not capture the head and shoulders of the flight crew members while seated in their normal operating position.

7. INSPECTIONS OF FLIGHT RECORDER SYSTEMS

7.1 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 and/or automatic checks.

7.2 FDR systems or ADRS, CVR systems or CARS, and AIR systems or AIRS shall have recording inspection intervals of one year; subject to the approval from the appropriate regulatory 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 inspection intervals of two years; subject to the approval from the appropriate regulatory authority, this period may be extended to four years provided these systems have demonstrated high integrity of serviceability and self-monitoring.

7.3 Recording 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) the analysis of the FDR or ADRS recording shall evaluate the quality of the recorded data to determine if the bit error rate (including those errors introduced by recorder, the acquisition unit, the source of the data on the aeroplane and by the tools used to extract the data from the recorder) is within acceptable limits and to determine the nature and distribution of the errors;

c) the FDR or ADRS recording from a complete flight 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;

d) 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;

e) 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;

f) 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

g) 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.

7.4 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.

7.5 A report of the recording inspection shall be made available on request to regulatory authorities for monitoring purposes.

7.6 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.

Table A8-1. Parameter characteristics for flight data recorders

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	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 +1 500 m (+5 000 ft)	1	±30 m to ±200 m (±100 ft to ±700 ft)	1.5 m (5 ft)
3	Indicated airspeed 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°	1	±2°	0.5°
5	Normal acceleration (*Note 8*)	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° or usable range whichever is greater	0.25	±2°	0.5°
7	Roll attitude		±180°	0.25	±2°	0.5°
8	Radio transmission keying		On-off (one discrete)	1		
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 and cockpit control selection		Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
11*	Leading edge flap and cockpit		Full range or each discrete position	2	±5% or as pilot's	0.5% of full range or the

	control selection				indicator	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°C	0.3°C
15*	Autopilot/auto throttle/AFCS mode and engagement status		A suitable combination of discretes	1		
16	Longitudinal 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
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
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)	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	Each NAV receiver 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		
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		0.5% of full range
31*	Navigation data (latitude/longitude, ground speed and drift angle) *(Note 7)*	As installed	1	As installed	
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

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, N_1, indicated vibration level, N_2, EGT, fuel flow, fuel cut-off lever position, N_3, 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
36*	TCAS/ACAS (traffic alert and collision avoidance system)		Discretes	1	As installed	
37*	Wind shear warning		Discrete	1	As installed	
38*	Selected barometric setting (pilot, co-pilot)		As installed	64	As installed	0.1 mb (0.01 in-Hg)
39*	Selected altitude (all pilot selectable modes of operation)		As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)		As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all pilot 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
44*	Selected flight path (all pilot selectable modes of operation) (course/DSTRK, path angle, final approach path (IRNAV/IAN))			1	As installed	
45*	Selected decision height		As installed	64	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot, co-pilot)		Discrete(s)	4	As installed	
47*	Multi-function/engine/alerts display format		Discrete(s)	4	As installed	
48*	AC electrical bus status		Discrete(s)	4	As installed	
49*	DC electrical bus status		Discrete(s)	4	As installed	
50*	Engine bleed valve position		Discrete(s)	4	As installed	
51*	APU bleed valve position		Discrete(s)	4	As installed	
52*	Computer failure		Discrete(s)	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
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
67*	Roll trim surface position	Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
68*	Yaw or sideslip angle	Full range	1	±5%	0.5°
69*	De-icing and/or anti-icing systems selection	Discrete(s)	4		
70*	Hydraulic pressure (each system)	Full range	2	±5%	100 psi
71*	Loss of cabin pressure	Discrete	1		
72*	Cockpit trim control input position, Pitch	Full range	1	±5%	0.2% of full range or as installed

73*	Cockpit trim control input 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 forces (control wheel, control column, rudder pedal)		Full range (±311 N (±70 lbf), ± 378 N (±85 lbf), ± 734 N (±165 lbf))	1	±5%	0.2% of full range or as installed
76*	Event marker		Discrete	1		
77*	Date		365 days	64		
78*	ANP or EPE or EPU		As installed	4	As installed	
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 ful l 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

Notes.—

1. V_{So} stalling speed or minimum steady flight speed in the landing configuration is in Section “Abbreviations and Symbols”.

2. V_D design diving speed.

3. Record sufficient inputs to determine power.

4. For aeroplanes with control systems in which movement of a control surface will back drive the pilot’s control, ‘‘or’’ applies. For aeroplanes with control systems in which movement of a control surface will not back drive the pilot’s control, ‘‘and’’ applies. In aeroplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately. 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 Schedule.

Table A8-2. Description of Applications for Data Link Recorders

Item No.	Application type	Application description	Recording content
1	Data link initiation	This includes any applications used to log on to or initiate data link service. In FANS-1/A and ATN, these are ATS facilities notification (AFN) and context management (CM) respectively.	C
2	Controller/pilot communication	This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the CPDLC application. It also includes applications used for the exchange of oceanic (OCL) and departure clearances (DCL) as well as data link delivery of taxi clearances.	C
3	Addressed surveillance	This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A and ATN, this includes the automatic dependent surveillance — contract (ADS-C) application. Where parametric data are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	C
4	Flight information	This includes any service used for delivery of flight information to specific aircraft. This includes, for example, data link aviation weather report service (D-METAR), data link-automatic terminal service (D-ATIS), digital Notice to Airmen (D-NOTAM) and other textual data link services.	C
5	Aircraft broadcast surveillance	This includes elementary and enhanced surveillance systems, as well as automatic dependent surveillance — broadcast (ADS-B) output data. Where parametric data sent by the aeroplane are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	M*
6	Aeronautical operational control data	This includes any application transmitting or receiving data used for aeronautical operational control purposes (per the ICAO definition of operational control).	M*

Key:

C: Complete contents recorded.

M: Information that enables correlation to any associated records stored separately from the aeroplane.

*: Applications to be recorded only as far as is practicable given the architecture of the system.

Table A8-3. Parameter Characteristics for Aircraft Data Recording Systems

		Minimum	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	
1	Heading					
	a) Heading (Magnetic or True)	±180º	1	±2°	0.5°	Heading is preferred, if not available, yaw rate shall be recorded
	b) Yaw rate	±300º/s	0.25	±1% + drift of 360°/h	2°/s	
2	Pitch					
	a) Pitch attitude	±90º	0.25	±2º	0.5°	Pitch attitude is preferred, if not available, pitch rate shall be recorded
	b) Pitch rate	±300º/s	0.25	±1% + drift of 360°/h	2°/s	
3	Roll					
	a) Roll attitude	±180º	0.25	±2º	0.5°	Roll attitude is preferred, if not available, roll rate shall be recorded
	b) Roll rate	±300º/s	0.25	±1% + drift of 360°/h	2°/s	
4	Positioning system:					
	a) Time	24 hours	1	±0.5 s	0.1 s	UTC time preferred where available.
	b) Latitude/longitude	Latitude:±90° Longitude:±180°	2 (1 if available)	As installed (0.00015° recommended)	0.00005°	
	c) Altitude	–300 m (–1 000 ft) to maximum certificated altitude of aeroplane +1 500 m (5 000 ft)	2	As installed recommended)	1.5 m (5 ft)	
	d) Ground speed	0–1 000 kt	2 (1 if available)	As installed (±5 kt recommended)	1 kt	
	e) Track	0–360º	2 (1 if available)	As installed (± 2º recommended)	0.5°	
	f) Estimated error	Available range	2 (1 if available)	As installed	As installed	Shall be recorded if readily available
5	Normal acceleration	–3 g to + 6 g (*)	0.25 (0.125 if available)	As installed (± 0.09 g excluding a datum error of ±0.45 g recommended)	0.004 g	
6	Longitudinal acceleration	±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	

7	Lateral acceleration	±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	
8	External static pressure (or pressure altitude)	34.4 mb (3.44 in-Hg) to 310.2 mb (31.02 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)	
9	Outside air temperature (or total air temperature)	–50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
10	Indicated air speed	As the installed pilot display measuring system or available sensor range	1	As installed (±3 % recommended)	1 kt (0.5 kt recommended)	
11	Engine RPM	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	
12	Engine oil pressure	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
13	Engine oil temperature	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
14	Fuel flow or pressure	Full range	Each engine each second	As installed	2% of full range	
15	Manifold pressure	Full range	Each engine each second	As installed	0.2% of full range	
16	Engine thrust/power/torque parameters required to determine propulsive thrust/power*	Full range	Each engine each second	As installed	0.1% of full range	* Sufficient parameters e.g. EPR/N1 or torque/Np as appropriate to the particular engine shall be recorded to determine power in both normal and reverse thrust. A margin for possible overspeed should be provided.
17	Engine gas generator speed (Ng)	0-150%	Each engine each second	As installed	0.2% of full range	
18	Free power turbine speed (Nf)	0-150%	Each engine each second	As installed	0.2% of full range	
19	Coolant temperature	Full range	1	As installed (±5°C recommended)	1° C	
20	Main voltage	Full range	Each engine each second	As installed	1 Volt	
21	Cylinder head temperature	Full range	Each cylinder each second	As installed	2% of full range	
22	Flaps position	Full range or each discrete position	2	As installed	0.5°	

23	Primary flight control surface position	Full range	0.25	As installed	0.2 % of full range	
24	Fuel quantity	Full range	4	As installed	1% of full range	
25	Exhaust gas temperature	Full range	Each engine each second	As installed	2% of full range	
26	Emergency voltage	Full range	Each engine each second	As installed	1 Volt	
27	Trim surface position	Full range or each discrete position	1	As installed	0.3% of full range	
28	Landing gear position	Each discrete position*	Each gear every two seconds	As installed		* Where available, record up-and- locked and down-and-locked position
29	Novel/unique aircraft features	As required	As required	As required	As required	

FOURTH SCHEDULE: LIGHTS TO BE DISPLAYED BY AEROPLANE (GENERAL AVIATION — AEROPLANES)

(*Regulation 105, refers*)

1. TERMINOLOGY

When the following terms are used in this Schedule, they have the following meanings:

Angles of coverage.

a) Angle of coverage A is formed by two intersecting vertical planes making angles of 70 degrees to the right and 70 degrees to the left respectively, looking aft along the longitudinal axis to a vertical plane passing through the longitudinal axis.

b) Angle of coverage F is formed by two intersecting vertical planes making angles of 110 degrees to the right and 110 degrees to the left respectively, looking forward along the longitudinal axis to a vertical plane passing through the longitudinal axis.

c) Angle of coverage L is formed by two intersecting vertical planes, one parallel to the longitudinal axis of the aeroplane, and the other 110 degrees to the left of the first, when looking forward along the longitudinal axis.

d) Angle of coverage R is formed by two intersecting vertical planes, one parallel to the longitudinal axis of the aeroplane, and the other 110 degrees to the right of the first, when looking forward along the longitudinal axis.

Horizontal plane. The plane containing the longitudinal axis and perpendicular to the plane of symmetry of the aeroplane.

Longitudinal axis of the aeroplane. A selected axis parallel to the direction of flight at a normal cruising speed, and passing through the centre of gravity of the aeroplane.

Making way. An aeroplane on the surface of the water is "making way" when it is under way and has a velocity relative to the water.

Under command. An aeroplane on the surface of the water is "under command" when it is able to execute manoeuvres as required by the International *Regulations for Preventing Collisions at Sea* for the purpose of avoiding other vessels.

Under way. An aeroplane on the surface of the water is "under way" when it is not aground or moored to the ground or to any fixed object on the land or in the water.

Vertical planes. Planes perpendicular to the horizontal plane.

Visible. Visible on a dark night with a clear atmosphere.

2. NAVIGATION LIGHTS TO BE DISPLAYED IN THE AIR

Note.— The lights specified herein are intended to meet the requirements of Annex 2 for navigation lights.

As illustrated in Figure 1, the following unobstructed navigation lights shall be displayed:

a) a red light projected above and below the horizontal plane through angle of coverage L;

b) a green light projected above and below the horizontal plane through angle of coverage R;

c) a white light projected above and below the horizontal plane rearward through angle of coverage A.

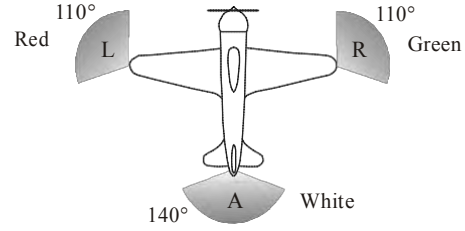


Figure 1

3. LIGHTS TO BE DISPLAYED ON THE WATER

3.1 General

Note.— The lights specified herein are intended to meet the requirements of Annex 2 for lights to be displayed by aeroplanes on the water.

The *International Regulations for Preventing Collisions at Sea* require different lights to be displayed in each of the following circumstances:

a) when under way;

b) when towing another vessel or aeroplane;

c) when being towed;

d) when not under command and not making way;

e) when making way but not under command;

f) when at anchor;

g) when aground.

The lights required by aeroplanes in each case are described below.

3.2 When under way

As illustrated in Figure 2, the following appearing as steady, unobstructed lights:

a) a red light projected above and below the horizontal through angle of coverage L;

b) a green light projected above and below the horizontal through angle of coverage R;

c) a white light projected above and below the horizontal through angle of coverage A; and

d) a white light projected through angle of coverage F.

The lights described in a), b) and c) should be visible at a distance of at least 3.7 km (2 NM). The light described in d) should be visible at a distance of 9.3 km (5 NM) when fitted to an aeroplane of 20 m or more in length or visible at a distance of 5.6 km (3 NM) when fitted to an aeroplane of less than 20 m in length.

3.3 When towing another vessel or aeroplane

As illustrated in Figure 3, the following appearing as steady, unobstructed lights:

a) the lights described in 3.2;

b) a second light having the same characteristics as the light described in 3.2 d) and mounted in a vertical line at least 2 m above or below it; and

c) a yellow light having otherwise the same characteristics as the light described in 3.2 c) and mounted in a vertical line at least 2 m above it.

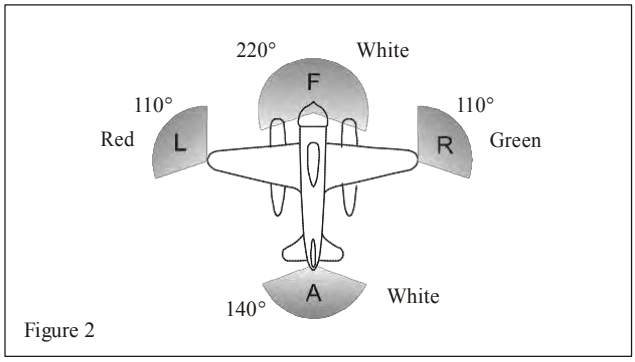


Figure 2

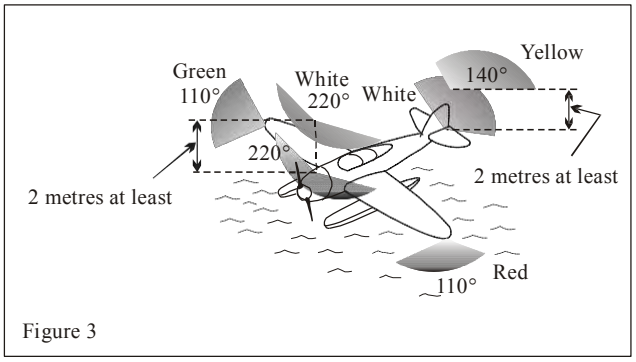


Figure 3

3.4 When being towed

The lights described in 3.2 a), b) and c) appearing as steady, unobstructed lights.

3.5 When not under command and not making way

As illustrated in Figure 4, two steady red lights placed where they can best be seen, one vertically over the other and not less than 1 m apart, and of such a character as to be visible all around the horizon at a distance of at least 3.7 km (2 NM).

3.6 When making way but not under command

As illustrated in Figure 5, the lights described in 3.5 plus the lights described in 3.2 a), b) and c).

Note.— The display of lights prescribed in 3.5 and 3.6 is to be taken by other aircraft as signals that the aeroplane showing them is not under command and cannot therefore get out of the way. They are not signals of aeroplanes in distress and requiring assistance.

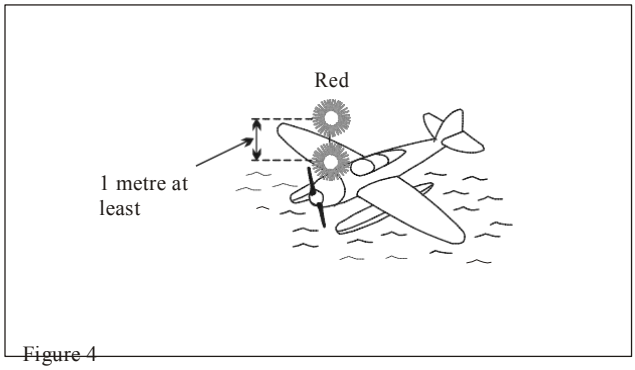


Figure 4

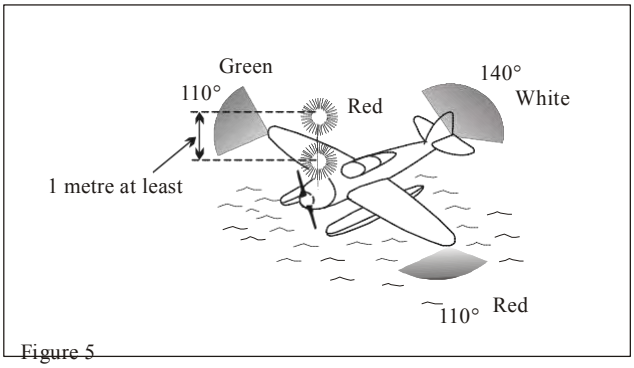


Figure 5

3.7 When at anchor

a) If less than 50 m in length, where it can best be seen, a steady white light (Figure 6), visible all around the horizon at a distance of at least 3.7 km (2 NM).

b) If 50 m or more in length, where they can best be seen, a steady white forward light and a steady white rear light (Figure 7) both visible all around the horizon at a distance of at least 5.6 km (3 NM).

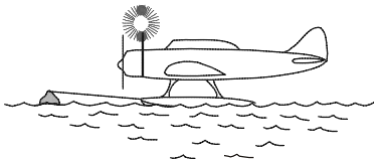


Figure 6

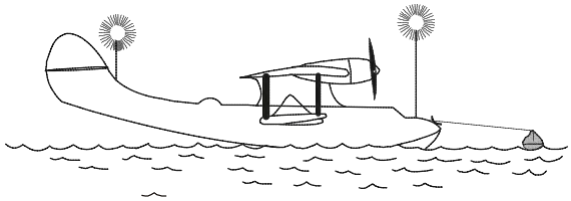
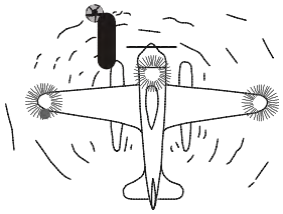


Figure 7

c) If 50 m or more in span a steady white light on each side (Figures 8 and 9) to indicate the maximum span and visible, so far as practicable, all around the horizon at a distance of at least 1.9 km (1 NM).

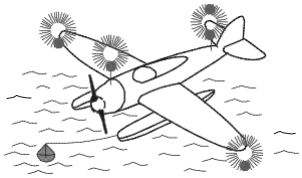
3.8 When aground

The lights prescribed in 3.7 and in addition two steady red lights in vertical line, at least 1 m apart so placed as to be visible all around the horizon.



Less than 50 metres in length; 50 metres or more in span

Figure 8



50 metres or more in length; 50 metres or more in span

Figure 9

FIFTH SCHEDULE: ALTIMETRY SYSTEM PERFORMANCE REQUIREMENTS FOR OPERATIONS IN RVSM AIRSPACE (GENERAL AVIATION — AEROPLANES)

(Regulation 134, *refers*)

1. In respect of groups of aeroplanes that are nominally of identical design and build with respect to all details that could influence the accuracy of height-keeping performance, the height-keeping performance capability shall be such that the total vertical error (TVE) for the group of aeroplanes shall have a mean no greater than 25 m (80 ft) in magnitude and shall have a standard deviation no greater than $28 - 0.013z^2$ for $0 \leq z \leq 25$ when z is the magnitude of the mean TVE in metres, or $92 - 0.004z^2$ for $0 \leq z \leq 80$ where z is in feet. In addition, the components of TVE shall have the following characteristics:

a) the mean altimetry system error (ASE) of the group shall not exceed 25 m (80 ft) in magnitude;

b) the sum of the absolute value of the mean ASE and of three standard deviations of ASE shall not exceed 75 m (245 ft); and

c) the differences between cleared flight level and the indicated pressure altitude actually flown shall be symmetric about a mean of 0 m, with a standard deviation no greater than 13.3 m (43.7 ft), and in addition, the decrease in the frequency of differences with increasing difference magnitude shall be at least exponential.

2. In respect of aeroplanes for which the characteristics of the airframe and altimetry system fit are unique and so cannot be classified as belonging to a group of aeroplanes encompassed by paragraph 1, the height-keeping performance capability shall be such that the components of the TVE of the aeroplane have the following characteristics:

a) the ASE of the aeroplane shall not exceed 60 m (200 ft) in magnitude under all flight conditions; and

b) the differences between the cleared flight level and the indicated pressure altitude actually flown shall be symmetric about a mean of 0 m, with a standard deviation no greater than 13.3 m (43.7 ft), and in addition, the decrease in the frequency of differences with increasing difference magnitude shall be at least exponential.

SIXTH SCHEDULE: FLIGHT RECORDERS (GENERAL AVIATION — AEROPLANES)

(Regulations 113 and 139, refer)

The material in this Schedule concerns flight recorders intended for installation in aeroplanes engaged in international air navigation. Crash-protected flight recorders 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).

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).

1. GENERAL REQUIREMENTS

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

1.2 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 kilohertz (kHz). At the earliest practical date, but not later than 1 January 2018, this device shall operate for a minimum of 90 days.

1.3 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.

1.4 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

d) 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.

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

1.6 The flight recorder systems, when tested by methods approved by the appropriate certificating authority, shall be demonstrated to be suitable for the environmental extremes over which they are designed to operate.

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

1.8 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.

2. FLIGHT DATA RECORDER (FDR) AND AIRCRAFT DATA RECORDING SYSTEM (ADRS)

2.1 Start and stop logic

The FDR or ADRS shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power.

2.2 Parameters to be recorded

Note.— In previous editions of Annex 6, Part II, types of recorders were defined to capture the first evolutions of FDRs.

2.2.1 The parameters that satisfy the requirements for FDRs are listed in Table A2.3-1. The number of parameters to be recorded shall depend on aeroplane complexity. The parameters without an asterisk (*) are mandatory parameters which shall be recorded regardless of aeroplane complexity. In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by aeroplane systems or the flight crew to operate the aeroplane. However, other parameters may be substituted with due regard to the aeroplane type and the characteristics of the recording equipment.

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

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

   1) 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;

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

   3) warnings and alerts; and

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

b) retardation information including brake application for use in the investigation of landing overruns and rejected take-offs.

2.2.2.3 The parameters that satisfy the recommendations for flight path and speed as displayed to the pilot(s) are listed below. The parameters without an (*) are mandatory parameters which shall be recorded. In addition, the parameters designated by an (*) are to be recorded if an information source for the parameter is displayed to the pilot and is practicable to record:

— Pressure altitude
— Indicated airspeed or calibrated airspeed
— Heading (primary flight crew reference)
— Pitch attitude
— Roll attitude
— Engine thrust/power
— Landing gear status*
— Total or outside air temperature*
— Time*
— Navigation data*: Drift angle, wind speed, wind direction, latitude/longitude
— Radio altitude*

2.2.4 The parameters that satisfy the requirements for ADRS are listed in Table A2.3-3.

2.3 Additional information

2.3.1 The measurement range, recording interval and accuracy of parameters on installed equipment shall be verified by methods approved by the appropriate certificating authority.

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

3. COCKPIT VOICE RECORDER (CVR) AND COCKPIT AUDIO RECORDING SYSTEM (CARS)

3.1 Start and stop logic

The CVR or CARS shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the CVR or CARS shall start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

3.2 Signals to be recorded

3.2.1 The CVR shall record simultaneously on four separate channels, or more, at least the following:

a) voice communication transmitted from or received in the aeroplane by radio;

b) aural environment on the flight deck;

c) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed;

d) voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and

e) digital communications with ATS, unless recorded by the FDR.

3.2.2 The preferred CVR audio allocation should be as follows:

a) pilot-in-command audio panel;

b) co-pilot audio panel;

c) additional flight crew positions and time reference; and

d) cockpit area microphone.

3.2.3 The CARS shall record simultaneously on two separate channels, or more, at least the following:

a) voice communication transmitted from or received in the aeroplane by radio;

b) aural environment on the flight deck; and

c) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed.

3.2.4 The preferred CARS audio allocation should be as follows:

a) voice communication; and

b) aural environment on the flight deck.

4. AIRBORNE IMAGE RECORDER (AIR) AND AIRBORNE IMAGE RECORDING SYSTEM (AIRS)

4.1 Start and stop logic

The AIR or AIRS shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the AIR or AIRS shall start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

4.2 Classes

4.2.1 A Class A AIR or AIRS captures the general cockpit area in order to provide data supplemental to conventional flight recorders.

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

Note 2.— There are no provisions for Class A AIR or AIRS in this document.

4.2.2 A Class B AIR or AIRS captures data link message displays.

4.2.3 A Class C AIR or AIRS captures instruments and control panels.

Note.— A Class C AIR or AIRS may be considered as a means for recording flight data where it is not practical or is prohibitively expensive to record on an FDR or an ADRS, or where an FDR is not required.

5. DATA LINK RECORDER (DLR)

5.1 Applications to be recorded

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

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

5.1.2 Messages applying to the applications listed in Table A2.3-2 shall be recorded. Applications without the asterisk (*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (*) shall be recorded only as far as is practicable given the architecture of the system.

6. INSPECTIONS OF FLIGHT RECORDER SYSTEMS

6.1 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 and/or automatic checks.

6.2 FDR systems or ADRS, CVR systems or CARS, and AIR systems or AIRS shall have recording inspection intervals of one year; subject to the approval from the appropriate regulatory 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 inspection intervals of two years; subject to the approval from the appropriate regulatory authority, this period may be extended to four years provided these systems have demonstrated high integrity of serviceability and self-monitoring.

6.3 Recording 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) the analysis of the FDR or ADRS recording shall evaluate the quality of the recorded data to determine if the bit error rate (including those errors introduced by recorder, the acquisition unit, the source of the data on the aeroplane and by the tools used to extract the data from the recorder) is within acceptable limits and to determine the nature and distribution of the errors;

c) the FDR or ADRS recording from a complete flight 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;

d) 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;

e) 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;

f) 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

g) 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.

6.4 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.

6.5 A report of the recording inspection shall be made available on request to regulatory authorities for monitoring purposes.

6.6 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.

Table A2.3-1 Parameter characteristics for flight data recorders

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	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 +1 500 m (+5 000 ft)	1	±30 m to ±200 m (±100 ft to ±700 ft)	1.5 m (5 ft)
3	Indicated airspeed or calibrated airspeed		95 km/h (50 kt) to max V_{s_o} (Note 1) V_{s_o} to 1.2 V_D (Note 2)	1	±5% ±3%	1 kt (0.5 kt recommended)
4	Heading (primary flight crew reference)		360°	1	±2°	0.5°
5	Normal acceleration		–3 g to +6 g	0.125	±1% of maximum range excluding datum error of ±5%	0.004 g
6	Pitch attitude		±75° or usable range whichever is greater	0.25	±2°	0.5°
7	Roll attitude		±180°	0.25	±2°	0.5°
8	Radio transmission keying		On-off (one discrete)	1		
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 and cockpit control selection		Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
11*	Leading edge flap and cockpit control selection		Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
12*	Thrust reverser position		Stowed, in transit, and reverse	1 (per engine)		
13*	Ground spoiler/speed brake 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°C	0.3°C
15*	Autopilot/auto throttle/AFCS mode and engagement status		A suitable combination of discretes	1		
16	Longitudinal acceleration		±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
17	Lateral acceleration (Note 3)		±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
18	Pilot input and/or control surface position-primary controls (pitch, roll, yaw) (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)

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
21*	Vertical beam deviation (ILS/GNSS/GLS glide path MLS elevation, IRNAV/IAN vertical 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	Each NAV receiver 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		
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		0.5% of full range

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
31*	Navigation data (latitude/longitude, ground speed and drift angle) (Note 7)		As installed	1	As installed	
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, N_1, indicated vibration level, N_2, EGT, fuel flow, fuel cut-off lever position, N_3 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
36*	TCAS/ACAS (traffic alert and collision avoidance system)		Discrete(s)	1	As installed	
37*	Wind shear warning		Discrete	1	As installed	
38*	Selected barometric setting (pilot, co-pilot)		As installed	64	As installed	0.1 mb (0.01 in-Hg)
39*	Selected altitude (all pilot selectable modes of operation)		As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)		As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all pilot 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 readout)	Recording resolution
44*	Selected flight path (all pilot selectable modes of operation) (course/DSTRK, path angle, final approach path (IRNAV/IAN))			1	As installed	As installed
45*	Selected decision height		As installed	64	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot, co-pilot)		Discrete(s)	4	As installed	
47*	Multi-function/engine/alerts display format		Discrete(s)	4	As installed	
48*	AC electrical bus status		Discrete(s)	4	As installed	
49*	DC electrical bus status		Discrete(s)	4	As installed	
50*	Engine bleed valve position		Discrete(s)	4	As installed	
51*	APU bleed valve position		Discrete(s)	4	As installed	
52*	Computer failure		Discrete(s)	4	As installed	
53*	Engine thrust command		As installed	2	As installed	2% of full range
54*	Engine thrust target		As installed	4	As installed	2% of full range
55*	Computed centre of gravity		As installed	64	As installed	1% of full range
56*	Fuel quantity in CG trim tank		As installed	64	As installed	1% of full range
57*	Head-up display in use		As installed	4	As installed	
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 glide slope)		As installed	4	As installed	
61*	Ice detection		As installed	4	As installed	

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
62*	Engine warning each engine vibration		As installed	1	As installed	
63*	Engine warning each engine over temperature		As installed	1	As installed	
64*	Engine warning each engine oil pressure low		As installed	1	As installed	
65*	Engine warning each engine over speed		As installed	1	As installed	
66*	Yaw trim surface position		Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
67*	Roll trim surface position		Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
68*	Yaw or sideslip angle		Full range	1	±5%	0.5°
69*	De-icing and/or anti-icing systems selection		Discrete(s)	4		
70*	Hydraulic pressure (each system)		Full range	2	±5%	100 psi
71*	Loss of cabin pressure		Discrete	1		
72*	Cockpit trim control input position, Pitch		Full range	1	±5%	0.2% of full range or as installed
73*	Cockpit trim control input 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 forces (control wheel, control column, rudder pedal)		Full range (±311 N (±70 lbf), ±378 N (±85 lbf), ±734 N (±165 lbf))	1	±5%	0.2% of full range or as installed
76*	Event marker		Discrete	1		
77*	Date		365 days	64		
78*	Actual navigation performance or estimated position error or estimated position uncertainty		As installed	4	As installed	

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
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 (left flight director pitch command, left flight director roll command, right flight director pitch command, right flight director roll command)	Application for type certification submitted to a Contracting State on or after 1 January 2023	Full range	1	± 2º	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

Notes.—

1. V_{S_o} *stalling speed or minimum steady flight speed in the landing configuration is in Section "Abbreviations and Symbols".*

2. V_D *design diving speed.*

3. *Record sufficient inputs to determine power.*

4. *For aeroplanes with control systems in which movement of a control surface will back drive the pilot's control, "or" applies. For aeroplanes with control systems in which movement of a control surface will not back drive the pilot's control, "and" applies. In aeroplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately. 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 intervals, accuracy limits or recording resolution guidance description detailed in this Schedule.*

Table A2.3-2. Description of applications for data link recorders

Item No.	Application type	Application description	Recording content
1	Data link initiation	This includes any applications used to log on to or initiate data link service. In FANS-1/A and ATN, these are ATS facilities notification (AFN) and context management (CM), respectively.	C
2	Controller-pilot communication	This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the CPDLC application. It also includes applications used for the exchange of oceanic (OCL) and departure clearances (DCL) as well as data link delivery of taxi clearances.	C
3	Addressed surveillance	This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A and ATN, this includes the automatic dependent surveillance — contract (ADS-C) application. Where parametric data are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	C
4	Flight information	This includes any service used for delivery of flight information to specific aircraft. This includes, for example, data link aviation weather report service (D-METAR), data link-automatic terminal service (D-ATIS), digital Notice to Airmen (D-NOTAM) and other textual data link services.	C
5	Aircraft broadcast surveillance	This includes elementary and enhanced surveillance systems, as well as automatic dependent surveillance — broadcast (ADS-B) output data. Where parametric data sent by the aeroplane are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	M*
6	Aeronautical operational control data	This includes any application transmitting or receiving data used for aeronautical operational control purposes (per the ICAO definition of operational control).	M*

Key:
C: Complete contents recorded.
M: Information that enables correlation to any associated records stored separately from the aeroplane.
*: Applications that are to be recorded only as far as is practicable given the architecture of the system.

Table A2.3-3. Parameter characteristics for aircraft data recording systems

No.	Parameter name	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
1	Heading:					
	a) Heading (Magnetic or True)	±180°	1	±2°	0.5°	* Heading is preferred, if not available, yaw rate shall be recorded
	b) Yaw rate	±300°/s	0.25	±1% + drift of 360°/h	2°/s	
2	Pitch:					
	a) Pitch attitude	±90°	0.25	±2°	0.5°	* Pitch altitude is preferred, if not available, pitch rate shall be recorded
	b) Pitch rate	300°/s	0.25	±1% + drift of 360°/h	2°/s	
3	Roll:					
	a) Roll attitude	±180°	0.25	±2°	0.5°	* If not available, roll rate shall be recorded
	b) Roll rate	300°/s	0.25	±1% + drift of 360°/h	2°/s	
4	Positioning system:					
	a) Time	24 hours	1	±0.5 s	0.1 s	UTC time preferred where available
	b) Latitude/longitude	Latitude: ±90° Longitude: ±180°	2 (1 if available)	As installed (0.00015° recommended)	0.00005°	
	c) Altitude	–300 m (–1 000 ft) to maximum certificated altitude of aircraft + 1 500 m (5 000 ft)	2 (1 if available)	As installed (±15 m (±50 ft) recommended)	1.5 m (5 ft)	
	d) Ground speed	0–1 000 kt	2 (1 if available)	As installed (±5 kt recommended)	1 kt	

No.	Parameter name	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
	e) Track	0-360°	2 (1 if available)	As installed (±2° recommended)	0.5°	
	f) Estimated error	Available range	2 (1 if available)	As installed	As installed	Shall be recorded if readily available
5	Normal acceleration	–3 g to +6 g (*)	0.25 (0.125 if available)	As installed (±0.09 g excluding a datum error of ±0.45 g recommended)	0.004 g	
6	Longitudinal acceleration	±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	
7	Lateral acceleration	±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	
8	External static pressure (or pressure altitude)	34.4 mb (3.44 in-Hg) to 310.2 mb (31.02 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)	
9	Outside air temperature (or total air temperature)	–50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
10	Indicated air speed	As the installed pilot display measuring system or available sensor range	1	As installed (±3% recommended)	1 kt (0.5 kt recommended)	
11	Engine RPM	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	
12	Engine oil pressure	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	

No.	Parameter name	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
13	Engine oil temperature	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
14	Fuel flow or pressure	Full range	Each engine each second	As installed	2% of full range	
15	Manifold pressure	Full range	Each engine each second	As installed	0.2% of full range	
16	Engine thrust/power/torque parameters required to determine propulsive thrust/power*	Full range	Each engine each second	As installed	0.1% of full range	* Sufficient parameters e.g. EPR/N_1 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.
17	Engine gas generator speed (Ng)	0–150%	Each engine each second	As installed	0.2% of full range	
18	Free power turbine speed (Nf)	0–150%	Each engine each second	As installed	0.2% of full range	
19	Coolant temperature	Full range	1	As installed (±5°C recommended)	1°C	
20	Main voltage	Full range	Each engine each second	As installed	1 Volt	
21	Cylinder head temperature	Full range	Each cylinder each second	As installed	2% of full range	
22	Flaps position	Full range or each discrete position	2	As installed	0.5°	
23	Primary flight control surface position	Full range	0.25	As installed	0.2% of full range	
24	Fuel quantity	Full range	4	As installed	1% of full range	
25	Exhaust gas temperature	Full range	Each engine each second	As installed	2% of full range	

No.	Parameter name	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
26	Emergency voltage	Full range	Each engine each second	As installed	1 Volt	
27	Trim surface position	Full range or each discrete position	1	As installed	0.3% of full range	
28	Landing gear position	Each discrete position*	Each gear every two seconds	As installed		* Where available, record up-and-locked and down-and-locked position
29	Novel/unique aircraft features	As required	As required	As required	As required	

SEVENTH SCHEDULE: FLIGHT RECORDERS (HELICOPTER OPERATIONS)

(Regulations 172 and 233, refer)

The material in this Schedule concerns flight recorders intended for installation in helicopters engaged in international air navigation. Crash-protected flight recorders 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).

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).

1. GENERAL REQUIREMENTS

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

1.2 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. At the earliest practical date, but not later than 1 January 2018, this device shall operate for a minimum of 90 days.

1.3 Automatic deployable flight recorder containers shall:

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

b) carry reflective material to facilitate their location; and c)

have an integrated automatically activated ELT.

1.4 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 preflight 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

d) helicopters 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.

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

1.6 The flight recorder systems, when tested by methods approved by the appropriate certificating authority, shall be demonstrated to be suitable for the environmental extremes over which they are designed to operate.

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

1.8 The manufacturer usually provides 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.

2. FLIGHT DATA RECORDER (FDR) AND AIRCRAFT DATA RECORDING SYSTEM (ADRS)

2.1 Start and stop logic

The FDR or ADRS shall start to record prior to the helicopter moving under its own power and record continuously until the termination of the flight when the helicopter is no longer capable of moving under its own power.

2.2 Parameters to be recorded

Note.— In previous editions of , , types of recorders were defined to capture the first evolutions of FDRs.

2.2.1 The parameters that satisfy the requirements for FDRs, are listed in Table A4-1. The number of parameters to be recorded shall depend on helicopter complexity. The parameters without an asterisk (*) are mandatory parameters which shall be recorded regardless of helicopter complexity. In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by helicopter systems or the flight crew to operate the helicopter. However, other parameters may be substituted with due regard to the helicopter type and the characteristics of the recording equipment.

2.2.2 The following parameters shall satisfy the requirements for flight path and speed:

— pressure altitude
— indicated airspeed
— outside air temperature
— heading
— normal acceleration
— lateral acceleration
— longitudinal acceleration (body axis)
— time or relative time count
— navigation data*: drift angle, wind speed, wind direction, latitude/longitude
— radio altitude*

2.2.3 If further FDR recording capacity is available, recording of the following additional information shall be considered:

a) additional operational information from electronic displays, such as electronic flight instrument systems (EFIS), electronic centralized aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS); and

b) additional engine parameters (EPR, N_1, fuel flow, etc.).

2.2.4 The parameters that satisfy the requirements for ADRS are listed in Table A4-3.

2.3 Additional information

2.3.1 The measurement range, recording interval and accuracy of parameters on installed equipment is usually verified by methods approved by the appropriate certificating authority.

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

3. COCKPIT VOICE RECORDER (CVR) AND COCKPIT AUDIO RECORDING SYSTEM (CARS)

3.1 Start and stop logic

The CVR or CARS shall start to record prior to the helicopter moving under its own power and record continuously until the termination of the flight when the helicopter is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the CVR or CARS shall start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

3.2 Signals to be recorded

3.2.1 The CVR shall record simultaneously on four separate channels, or more, at least the following:

a) voice communication transmitted from or received in the aircraft by radio;

b) aural environment on the flight deck;

c) voice communication of flight crew members on the flight deck using the interphone system, if installed;

d) voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and e)

voice communication of flight crew members using the passenger address system, if installed.

3.2.2 **Recommendation**.—*The preferred CVR audio allocation should be as follows:*

a) pilot-in-command audio panel;

b) co-pilot audio panel;

c) additional flight crew positions and time reference; and d)

cockpit area microphone.

3.2.3 The CARS shall record simultaneously on two separate channels, or more, at least the following:

a) voice communication transmitted from or received in the helicopter by radio;

b) aural environment on the flight deck; and

c) voice communication of flight crew members on the flight deck using the helicopter's interphone system, if installed.

3.2.4 **Recommendation**.— *The preferred CARS audio allocation should be as follows:*

a) voice communication; and

b) aural environment on the flight deck.

4. AIRBORNE IMAGE RECORDER (AIR) AND AIRBORNE IMAGE RECORDING SYSTEM (AIRS)

4.1 Start and stop logic

The AIR or AIRS shall start to record prior to the helicopter moving under its own power and record continuously until the termination of the flight when the helicopter is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the AIR or AIRS shall start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

4.2 Classes

4.2.1 A Class A AIR or AIRS captures the general cockpit area in order to provide data supplemental to conventional flight recorders.

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

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

4.2.2 A Class B AIR or AIRS captures data link message displays.

4.2.3 A Class C AIR or AIRS captures instruments and control panels.

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

5. DATA LINK RECORDER (DLR)

5.1 Applications to be recorded

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

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

5.1.2 Messages applying to the applications listed in Table A4-2 shall be recorded. Applications without the asterisk (*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (*) are to be recorded only as far as is practicable given the architecture of the system.

6. INSPECTIONS OF FLIGHT RECORDER SYSTEMS

6.1 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 and/or automatic checks.

6.2 FDR systems or ADRS, CVR systems or CARS, and AIR systems or AIRS shall have recording inspection intervals of one year; subject to the approval from the appropriate regulatory 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 inspection intervals of two years; subject to the approval from the appropriate regulatory authority, this period may be extended to four years provided these systems have demonstrated high integrity of serviceability and self-monitoring.

6.3 Recording 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) the analysis of the FDR or ADRS recording shall evaluate the quality of the recorded data to determine if the bit error rate (including those errors introduced by recorder, the acquisition unit, the source of the data on the helicopter and by the tools used to extract the data from the recorder) is within acceptable limits and to determine the nature and distribution of the errors;

c) the FDR or ADRS recording from a complete flight 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;

d) 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;

e) 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;

f) 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

g) 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.

6.4 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.

6.5 A report of the recording inspection shall be made available on request to regulatory authorities for monitoring purposes.

6.6 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.

Table A4-1. Parameter Characteristics for Flight Data Recorders

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	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 +1 500 m (+5 000 ft)	1	±30 m to ±200 m (±100 ft to ±700 ft)	1.5 m (5 ft)
3	Indicated airspeed		As the installed pilot display measuring system	1	±3%	1 kt
4	Heading		360°	1	±2°	0.5°
5	Normal acceleration		–3 g to +6 g	0.125	±0.09 g excluding a datum error of ±0.045 g	0.004 g
6	Pitch attitude		±75° or 100% of useable range whichever is greater	0.5	±2°	0.5°
7	Roll attitude		±180°	0.5	±2°	0.5°
8	Radio transmission keying		On-off (one discrete)	1	—	—
9	Power on each engine		Full range	1 (per engine)	±2%	0.1% of full range
10	Main rotor:					
	Main rotor speed		50–130%	0.51	±2%	0.3% of full range
	Rotor brake		Discrete		—	—
11	Pilot input and/or control surface position — primary controls (collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal)		Full range	0.5 (0.25 recommended)	±2% unless higher accuracy uniquely required	0.5% of operating range
12	Hydraulics, each system (low pressure and selection)		Discrete	1	—	—
13	Outside air temperature		Sensor range	2	±2°C	0.3°C

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
14*	Autopilot/ autothrottle/AFCS mode and engagement status		A suitable combination of discretes	1	—	—
15*	Stability augmentation system engagement		Discrete	1	—	—
16*	Main gearbox oil pressure		As installed	1	As installed	6.895 kN/m^2 (1 psi)
17*	Main gearbox oil temperature		As installed	2	As installed	1°C
18	Yaw rate		±400°/second	0.25	±1.5% maximum range excluding datum error of ±5%	±2°/s
19*	Sling load force		0 to 200% of certified Load	0.5	±3% of maximum range	0.5% for maximum certified load
20	Longitudinal acceleration		±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
21	Lateral acceleration		±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
22*	Radio altitude		–6 m to 750 m (–20 ft to 2 500 ft)	1	±0.6 m (±2 ft) or ±3% whichever is greater below 150 m (500 ft) and ±5% above 150 m (500 ft)	0.3 m (1 ft) below 150 m (500 ft), 0.3 m (1 ft) + 0.5% of full range above 150 m (500 ft)
23*	Vertical beam deviation		Signal range	1	±3%	0.3% of full range
24*	Horizontal beam deviation		Signal range	1	±3%	0.3% of full range
25	Marker beacon passage		Discrete	1	—	—
26	Warnings		Discrete(s)	1	—	—
27	Each navigation receiver frequency selection		Sufficient to determine selected frequency	4	As installed	—
28*	DME 1 and 2 distances		0–370 km (0–200 NM)	4	As installed	1 852 m (1 NM)

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
29*	Navigation data (latitude/longitude, ground speed, drift angle, wind speed, wind direction)		As installed	2	As installed	As installed
30*	Landing gear and gear selector position		Discrete	4	—	—
31*	Engine exhaust gas temperature (T_4)		As installed	1	As installed	
32*	Turbine inlet temperature (TIT/ITT)		As installed	1	As installed	
33*	Fuel contents		As installed	4	As installed	
34*	Altitude rate		As installed	1	As installed	
35*	Ice detection		As installed	4	As installed	
36*	Helicopter health and usage monitor system		As installed	—	As installed	—
37	Engine control modes		Discrete	1	—	—
38*	Selected barometric setting (pilot and co-pilot)		As installed	64 (4 recommended)	As installed	0.1 mb (0.01 in Hg)
39*	Selected altitude (all pilot selectable modes of operation)		As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)		As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all pilot selectable modes of operation)		As installed	1	As installed	Sufficient to determine crew selection
42*	Selected vertical speed (all pilot selectable modes of operation)		As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable modes of operation)		As installed	1	As installed	Sufficient to determine crew selection

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
44*	Selected flight path (all pilot selectable modes of operation)		As installed	1	As installed	Sufficient to determine crew selection
45*	Selected decision height		As installed	4	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot and co-pilot)		Discrete(s)	4	—	—
47*	Multi-function/ engine/alerts display format		Discrete(s)	4	—	—
48*	Event marker		Discrete	1	—	—
49*	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) and (operational status)	Application for type certification is submitted to a Contracting State on or after 1 January 2023	Discrete(s)	1	As installed	
50*	TCAS/ACAS (traffic alert and collision avoidance system) and (operational status)	Application for type certification is submitted to a Contracting State on or after 1 January 2023	Discrete(s)	1	As installed	
51*	Primary flight controls – pilot input forces	Application for type certification is submitted to a Contracting State on or after 1 January 2023	Full range	0.125 (0.0625 recommended)	± 3% unless higher accuracy is uniquely required	0.5% of operating range

Serial number	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
52*	Computed centre of gravity	Application for type certification is submitted to a Contracting State on or after 1 January 2023	As installed	64	As installed	1% of full range
53*	Helicopter computed weight	Application for type certification is submitted to a Contracting State on or after 1 January 2023	As installed	64	As installed	1% of full range

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Table A4-2. Description of Applications for Data Link Recorders

Item No.	Application type	Application description	Recording content
1	Data link initiation	This includes any applications used to log on to or initiate data link service. In FANS-1/A and ATN, these are ATS facilities notification (AFN) and context management (CM) respectively.	C
2	Controller/pilot communication	This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the CPDLC application. It also includes applications used for the exchange of oceanic (OCL) and departure clearances (DCL) as well as data link delivery of taxi clearances.	C
3	Addressed surveillance	This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A and ATN, this includes the automatic dependent surveillance — contract (ADS-C) application. Where parametric data are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	C
4	Flight information	This includes any service used for delivery of flight information to specific aircraft. This includes, for example, data link aviation weather report service (D-METAR), data link-automatic terminal service (D-ATIS), digital Notice to Airmen (D-NOTAM) and other textual data link services.	C
5	Aircraft broadcast surveillance	This includes elementary and enhanced surveillance systems, as well as automatic dependent surveillance — broadcast (ADS-B) output data. Where parametric data sent by the helicopter are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	M*
6	Aeronautical operational control data	This includes any application transmitting or receiving data used for aeronautical operational control purposes (per the ICAO definition of operational control).	M*

Key:
C: Complete contents recorded.
M: Information that enables correlation to any associated records stored separately from the helicopter.
*: Applications that are to be recorded only as far as is practicable given the architecture of the system.

Table A4-3. Parameter Characteristics for Aircraft Data Recording Systems

N°	Parameter name	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
1	Heading:					
	a) Heading (Magnetic or True)	±180°	1	±2°	0.5°	*Heading is preferred, if not available, yaw rate shall be recorded
	b) Yaw rate	±300°/s	0.25	±1% + drift of 360°/h	2°/s	
2	Pitch:					
	a) Pitch attitude	±90°	0.25	±2°	0.5°	*Pitch attitude is preferred, if not available, pitch rate shall be recorded
	b) Pitch rate	±300°/s	0.25	±1% + drift of 360°/h	2°/s	
3	Roll:					
	a) Roll attitude	±180°	0.25	±2°	0.5°	*-Roll attitude is preferred, if not available, roll rate shall be recorded
	b) Roll rate	±300°/s	0.25	±1% + drift of 360°/h	2°/s	
4	Positioning system:					
	a) Time	24 hours	1	±0.5°	0.1°	UTC time preferred where available
	b) Latitude/longitude	Latitude:±90° Longitude:±180°	2 (1 if available)	As installed (0.00015° recommended)	0.00005°	
	c) Altitude	–300 m (–1 000 ft) to maximum certificated altitude of aircraft +1 500 m (5 000 ft)	2 (1 if available)	As installed (±15 m (±50 ft) recommended)	1.5 m (5 ft)	
	d) Ground speed	0–1 000 kt	2 (1 if available)	As installed (±5 kt recommended)	1 kt	
	e) Track	0–360°	2 (1 if available)	As installed (± 2° recommended)	0.5°	
	f) Estimated error	Available range	2 (1 if available)	As installed	As installed	Shall be recorded if readily available

		Minimum	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
5	Normal acceleration	–3 g to + 6 g	0.25 (0.125 if available)	As installed (±0.09 g excluding a datum error of ±0.05 g recommended)	0.004 g	
6	Longitudinal acceleration	±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	
7	Lateral acceleration	±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	
8	External static pressure (or pressure altitude)	34.4 hPa (1.02 in-Hg) to 310.2 hPa (9.16 in-Hg) or available sensor range	1	As installed (±1 hPa (0.3 in-Hg) or ±30 m (±100 ft) to ±210 m (±700	0.1 hPa (0.03 in-Hg) or 1.5 m (5 ft)	
9	Outside air temperature (or total air temperature)	–50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
10	Indicated air speed	As the installed pilot display measuring system or available sensor range	1	As installed (±3% recommended)	1 kt (0.5 kt recommended)	
11	Main rotor speed (Nr)	50% to 130% or available sensor range	0.5	As installed	0.3% of full range	
12	Engine RPM (*)	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	*For piston-engined helicopters
13	Engine oil pressure	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
14	Engine oil temperature	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
15	Fuel flow or pressure	Full range	Each engine each second	As installed	2% of full range	
16	Manifold pressure (*)	Full range	Each engine each second	As installed	0.2% of full range	*For piston-engined helicopters

N°	Parameter name	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
17	Engine thrust/power/ torque parameters required to determine propulsive thrust/power*	Full range	Each engine each second	As installed	0.1% of full range	*Sufficient parameters e.g. EPR/N1 or torque/Np as appropriate to the particular engine shall be recorded to determine power. A margin for possible overspeed should be provided. Only for turbine-engined helicopters.
18	Engine gas generator speed (Ng) (*)	0–150%	Each engine each second	As installed	0.2% of full range	*Only for turbine-engined helicopters
19	Free power turbine speed (Nf) (*)	0–150%	Each engine each second	As installed	0.2% of full range	*Only for turbine-engined helicopters
20	Collective pitch	Full range	0.5	As installed	0.1% of full range	
21	Coolant temperature (*)	Full range	1	As installed (±5°C recommended)	1° C	*Only for piston-engined helicopters
22	Main voltage	Full range	Each engine each second	As installed	1 Volt	
23	Cylinder head temperature (*)	Full range	Each cylinder each second	As installed	2% of full range	*Only for piston-engined helicopters
24	Fuel quantity	Full range	4	As installed	1% of full range	
25	Exhaust gas temperature	Full range	Each engine each second	As installed	2% of full range	
26	Emergency voltage	Full range	Each engine each second	As installed	1 Volt	
27	Trim surface position	Full range or each discrete position	1	As installed	0.3% of full range	
28	Landing gear position	Each discrete position*	Each gear every two seconds	As installed		*Where available, record up-and-locked and down-and-locked position
29	Novel/unique aircraft features	As required	As required	As required	As required	

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EIGTH SCHEDULE: LOCATION OF AN AEROPLANE IN DISTRESS
(*Regulation 74, refers***)**

1. PURPOSE AND SCOPE

Location of an aeroplane in distress aims at establishing, to a reasonable extent, the location of an accident site within a 6 NM radius.

2. OPERATION

2.1 An aeroplane in distress shall automatically activate the transmission of information from which its position can be determined by the operator and the position information shall contain a time stamp. It shall also be possible for this transmission to be activated manually. The system used for the autonomous transmission of position information shall be capable of transmitting that information in the event of aircraft electrical power loss, at least for the expected duration of the entire flight.

Note.— Guidance on the location of an aeroplane in distress is provided in Attachment K.

2.2 An aircraft is in a distress condition when it is in a state that, if the aircraft behaviour event is left uncorrected, can result in an accident. Autonomous transmission of position information shall be active when an aircraft is in a distress condition. This will provide a high probability of locating an accident site to within a 6 NM radius. The operator shall be alerted when an aircraft is in a distress condition with an acceptable low rate of false alerts. In case of a triggered transmission system, initial transmission of position information shall commence immediately or no later than five seconds after the detection of the activation event.

Note 1.— Aircraft behaviour events can include, but are not limited to, unusual attitudes, unusual speed conditions, collision with terrain and total loss of thrust/propulsion on all engines and ground proximity warnings.

Note 2.— A distress alert can be triggered using criteria that may vary as a result of aircraft position and phase of flight. Further guidance regarding in-flight event detection and triggering criteria may be found in the EUROCAE ED-237, Minimum Aviation System Performance Specification (MASPS) for Criteria to Detect In-Flight Aircraft Distress Events to Trigger Transmission of Flight Information.

2.3 When an aircraft operator or an air traffic service unit (ATSU) has reason to believe that an aircraft is in distress, coordination shall be established between the ATSU and the aircraft operator.

2.4 The State of the Operator shall identify the organizations that will require the position information of an aircraft in an emergency phase. These shall include, as a minimum:

a) air traffic service unit(s) (ATSU); and

b) SAR rescue coordination centre(s) (RCC) and sub-centres.

Note 1.— Refer to Annex 11 for emergency phase criteria.

Note 2.— Refer to Annex 12 for required notifications in the event of an emergency phase.

2.5 When autonomous transmission of position information has been activated, it shall only be able to be deactivated using the same mechanism that activated it.

2.6 The accuracy of position information shall, as a minimum, meet the position accuracy requirements established for ELTs.