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| **SADC AVIATION SAFETY ORGANIZATION (SASO)**  **REGULATIONS** |



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| **INSTRUMENTS AND EQUIPMENT**  **First Edition**  **Month 202x** |

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# PART I

# PRELIMINARY PROVISIONS

## Citation

These Regulations may be cited as the SASO Model Civil Aviation (Instruments and Equipment) Regulations, 2022

## Interpretation

In these Regulations, unless the context otherwise requires:

1. 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, patrol, aerial, fire fighting, advertisement, search and rescue;

***“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;

**“*Agreement summary”*** means, when an aircraft is operating under an Article 83 bis agreement between the State of Registry and another State, the document transmitted with the Article 83 bis Agreement registered with the ICAO Council that identifies succinctly and clearly which functions and duties are transferred by the State of Registry to that other State.

***“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 or 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 or AOC”*** means a certificate authorising an operator to carry out specified commercial air transport operations;

***“Altimetry system error or 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:

1. ***“Take-off alternate”***Means an alternate aerodrome at which an aircraft would be able to land should this become necessaryshortly after take-off and it is not possible to use the aerodrome of departure;
2. ***“En-route alternate” means*** an alternate aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while en route; and
3. **“*Destination alternate”*** Means 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:

1. ***“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;
2. ***“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; and
3. ***“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 or 1000 ft above the elevation of the FATO, where 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:

1. in relation to an aircraft, the Authority which is responsible for approval of design and issuance of a type certificate;
2. in relation to the content of a medical kit, the Stateof Registry;
3. in relation to the Republic of (state), the Director General/ Chief Executive Officer/ Director of the Authority;

***“Approved standard”*** means a manufacturing, design, maintenance, or quality standard approved by the Authority;

***“Area navigation or 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 or 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:

1. ***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;
2. ***Class B***, one in which:
3. 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;
4. 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
5. there is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station.
6. ***Class C***, one in which:
7. there is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station;
8. there is an approved built-in fire extinguishing or suppression system controllable from the cockpit;
9. there is means to exclude hazardous quantities of smoke, flames, or extinguishing agent, from any compartment occupied by the crew or passengers; and
10. 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.
11. ***Class E***, one on airplanes used only for the carriage of cargo and in which:
12. there is a separate approved smoke or fire detector system to give warning at the pilot or flight engineer station;
13. 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;
14. there are means to exclude hazardous quantities of smoke, flames, or noxious gases, from the flight crew compartment; and
15. the required crew emergency exits are accessible under any cargo loading condition.

***“Category II or CAT II operations”*** means, a precision instrument approach and landing with a decision height lower than 60m or 200 ft, but not lower than 30m or 10 ft, and a runway visual range not less than 350m.

***“Category IIIA or CAT IIIA operations”*** means, a precision instrument approach and landing with:

1. a decision height lower than 30m or 100ft or no decision; and
2. a runway visual range not less than 200m.

***“Category IIIB or CAT IIIB operations”*** means, a precision instrument approach and landing with:

1. a decision height lower than 15m or50ft or no decision height; and
2. a runway visual range less than 200m but not less than 50m.

***“Category IIIC or 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 or CVS”*** means a system to display images from a combination of an enhanced vision system or 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 or 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;

***“Contaminated”*** runway means A runway is contaminated when a significant portion of the runway surface area, whether in isolated areas or not within the length and width being used is covered by one or more of the substances listed in the runway surface condition descriptors.

***“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;

***“Corporate aviation operation”*** means the non-commercial operation or use of aircraft by a company for the carriage of passengers or goods as an aid to the conduct of company business, flown by a professional pilot or pilots employed to fly the aircraft.

***“Continuous descent final approach or CDFA”***means a technique,consistent with stabilized approach procedures, for flying the final approach segment or FAS of an instrument non-precision approach or NPA procedure as a continuous descent, without level-off, from an altitudeor height at or above the final approach fix altitude/height to a point approximately 15 m or 50 ft above the landing runway threshold or the point where the flare maneuver begins for the type of aircraft flown; for the FAS of an NPA procedure followed by a circling approach, the CDFA technique applies until circling approach minima circling OCA or H or visual flight manoeuvre altitude or height are reached;

***“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 or DA, or decision height or D”*** means a specified altitude or height in a 3D instrument approach operation at which a missed approach shall be initiated where the required visual reference to continue the approach has not been established:

1. Decision altitude or DA is referenced to mean sea level and decision height or DH is referenced to the threshold elevation;
2. 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; and
3. 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 or 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 or 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;

***“Dry runway”*** means a runway surface free of visible moisture and not

contaminated within the area intended to be used.

***“Duty”*** means any task that flight or cabin crew members are required by the operator to perform, including 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 or EF”*** 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 or ELT”*** means ageneric 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:

1. ***“Automatic fixed ELT or ELT-AF”*** means an automatically activated ELT which is permanently attached to an aircraft;
2. ***“Automatic portable ELT or ELT-AP”*** means an automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft;
3. ***“Automatic deployable ELT or 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; and
4. ***“Survival ELT or 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 where applicable;

***“Enhanced vision system or 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 or 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 or FAS”*** means that segment of an instrument approach procedure in which alignment and descent for landing are accomplished;

***“Flight crew member”*** means a licensed crewmember charged with duties essential to the operation of an aircraft during a flight duty period;

“***Fight 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 which finishes when the aircraft finally comes to rest and the engine or 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 or HUD”*** means a display system that presents flight information into the pilot’s forward external field of view;

***“Helicopter or Rotorcraft”*** 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:

1. a safe forced landing cannot be accomplished because the surface and surrounding environment are inadequate;
2. the helicopter occupants cannot be adequately protected from the elements;
3. search and rescue response or capability is not provided consistent with anticipated exposure; or
4. 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:

1. (a) a two-dimensional or 2D instrument approach operation, using lateral navigation guidance only; and
2. (b) a three-dimensional or 3D instrument approach operation, using both lateral and vertical navigation guidance.

Lateral and vertical navigation guidance refers to the guidance provided either by:

1. a ground-based radio navigation aid; or
2. computer-generated navigation data from ground-based, space-based, self-contained navigation aids or a combination of these.

***“Instrument approach procedure or 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, where a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply;

1. *Non-precision approach or NPA procedure-* An instrument approach procedure designed for 2D instrument approach operations Type A;
2. *Approach procedure with vertical guidance or APV-* A performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A; and
3. *Precision approach or PA procedure*- An instrument approach procedure based on navigation systems, ILS, MLS, GLS and SBAS CAT I designed for 3D instrument approach operations Type A or B.

***“Instrument meteorological conditions or IMC”*** means meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling as defined in the Civil Aviation (Rules of the Air) Regulations, 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”*** means an aeroplane of a maximum certificated take-off mass of over 5,700 kg;

***“Low-visibility operations or LVO***” means approach operations in RVRs less than 550 m or with a DH less than 60 m or 200 ft or take-off operations in RVRs less than 400 m.

***“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;

***“Maintenance release”*** means a document which contains a certification confirming that the maintenance work to which it relates has been completed in a satisfactory manner in accordance with appropriate airworthiness requirements.

***“Master minimum equipment list or 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;

***“Maximum mass”*** means maximum certificated take-off mass.

***“Meteorological information”*** means meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions;

***“Minimum Equipment List or 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 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:

1. “***Required navigation performance or RNP specification”*** means a navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP; and
2. ***“Area navigation or RNAV specification”*** means a navigation specification based on area navigation that does not include therequirement for performance monitoring and alerting, designated by the prefix RNAV, such 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:

1. a safe forced landing can be accomplished because the surface and surrounding environment are adequate;
2. the helicopter occupants can be adequately protected from the elements;
3. search and rescue response and capability is provided consistent with anticipated exposure; and
4. 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 and 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, the regularity and efficiency of the flight;

***“Operational flight plan- helicopter”*** 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-aeroplane”*** 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***” means 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 or TDP or after passing the landing decision point or LDP, in which cases the helicopter must be able to land within the rejected take-off or landing area;

***“Operations in performance Class 2”*** means 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 a forced landing may be required;

***“Operations in performance Class 3”*** means 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 including specific approvals, 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 or PBC”*** means communication based on performance specifications applied to the provision of air traffic services;

***“Performance-based navigation or PBN”*** means area navigation based on performance requirements for aircraft operating along an airspace;

***“Performance-based surveillance or PBS”* means** 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 an 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 or 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 or 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 or 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 consecutive flights that:

1. begin and end within a period of 24 hours; and
2. 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;

**“*Specific approval”.*** means an approval which is documented in the operations specifications for commercial air transport operations or in the list of specific approvals for non-commercial operations;

***“State of the Aerodrome”*** means the state in whose territory the aerodrome is located.

***“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 or SVS”*** means a system to display data-derived synthetic images of the external scene from the perspective of the flight deck;

“***Threshold time”*** means the range, expressed in time, established by the Authority, to an en-route alternate aerodrome, whereby any time beyond requires a specific approval for EDTO from the Authority;

***“Total vertical error or TVE”*** means the vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude or flight level;

***“Overhaul”*** means the restoration of an aircraft or aircraft component using methods, techniques, and practices acceptable to the Authority, including disassembly, cleaning, inspection as permitted, repair as necessary, 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 or Technical Standard Order;

***“VFR”*** means the abbreviation used to designate the Visual Flight Rules; and

***“Visual meteorological conditions or VMC”*** means meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima.

## Applicability

1. 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 INSTRUMENTS AND EQUIPMENT

## General instruments and equipment requirements

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 required 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. The instruments and equipment, including their installation, shall be approved or accepted by the Authority.
6. An aircraft shall be equipped with instruments to 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. Prior to operation in the (state) of any foreign registered aircraft that uses an airworthiness inspection 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.
8. An operator shall ensure that a flight does not commence unless the required equipment:
9. meets the minimum performance standard, the operational and airworthiness requirements in accordance with the Civil Aviation (Airworthiness of Aircraft) Regulations;
10. 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
11. is in operable condition for the kind of operation being conducted, except as provided for in the minimum equipment list.
12. Where equipment is to be used by one flight crew member at his or her station during flight, that equipment shall be installed so as to be readily operable from his or her station.
13. Where a single item of equipment is required to be operated by more than one flight crew member, the equipment shall be installed so as to be readily operable from any station at which it is required to be operated.

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# PART III

# COMMERCIAL AIR TRANSPORT — AEROPLANES

# AEROPLANE INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS

## Air operator certificate

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, 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 or MEL

1. The operator shall include in the operations manual an 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

## Operating manual

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.

## Aeroplane operated under an Article 83 bis agreement

1. An aeroplane, when operating under an Article 83 bis agreement entered into between the State of Registry and the State of the Operator, shall carry a certified true copy of the agreement summary, in either an electronic or hard copy format.
2. When the agreement summary specified in sub-regulation (a) is issued in a language other than English, an English translation shall be included.
3. The ag
4. reement summary of the Article 83 bis agreement shall be accessible to a civil aviation safety inspector to determine which functions and duties are transferred under the agreement by the State of Registry to the State of the Operator, when conducting surveillance activities such as ramp checks.
5. The agreement summary shall be transmitted to ICAO together with the Article 83 bis Agreement for registration with the ICAO Council by the State of Registry or the State of the Operator.
6. The agreement summary shall contain the information for the specific aircraft and should follow the layout provided in the Eighth Schedule of these Regulations.

## Aeroplane on all flights

1. 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

1. An aeroplane shall be equipped with adequate and accessible medical supplies comprising of:
2. one or more first-aid kits for the use of cabin crew in managing incidents of ill health;
3. 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
4. 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.

## Portable fire extinguishers

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:
2. the pilot’s compartment; and
3. 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 or safety harness

1. An aeroplane shall be equipped with:
2. a seat or berth with safety belt for each person on board over the age of two y
3. ears;
4. a seat belt for each seat and restraining belts for each berth; and
5. a safety harness for each flight crew seat. 2.
6. The safety harness for each pilot seat shall incorporate a device which automatically restrains the occupant’s torso in the event of rapid deceleration.
7. The safety harness for each pilot seat shall incorporate a 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

1. An aeroplane shall be equipped with means of ensuring that the following information and instructions are conveyed to passengers:
2. when seat belts are to be fastened;
3. when and how oxygen equipment is to be used where carriage of oxygen is required;
4. restrictions on smoking;
5. location and use of life jackets or equivalent individual flotation devices where their carriage is required; and
6. location and method of opening emergency exits;

## Spare electrical fuses

1. An aeroplane shall be equipped with spare electrical fuses of appropriate ratings for replacement of those accessible in flight.

## Lavatory fire extinguisher

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:
2. meet the applicable minimum performance requirements of the State of Registry; and
3. not be of a type that depletes the Ozone layer.

## Operations manual, flight manual and charts

1. An aeroplane shall carry:
2. the operations manual prescribed in the Civil Aviation (Air Operator Certification and Administration) Regulations, or those parts of it that pertain to flight operations;
3. the flight manual for the aeroplane, or other documents containing performance data required for the application of aeroplane performance operating limitations in accordance with the Civil Aviation (Operation of Aircraft - Commercial Air Transport Aeroplanes) 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
4. 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

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 where necessary they shall be outlined in white to contrastPER 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.

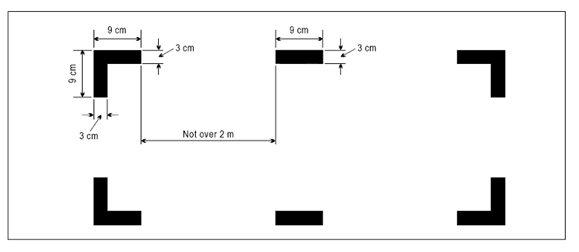


Figure 1: Marking of break-in Points

## Flight recorders

1. Crash-protected flight recorders comprise one or more of the following:
2. a flight data recorder or FDR;
3. a cockpit voice recorder or CVR;
4. an airborne image recorder or AIR; or
5. a data link recorder or DLR.
6. As per the Third Schedule of these Regulations, image and data link information may be recorded on either the CVR or the FDR.
7. Lightweight flight recorders comprise one or more of the following:
8. an aircraft data recording system or ADRS;
9. a cockpit audio recording system or CARS;
10. an airborne image recording system or AIRS; or
11. a data link recording system or DLRS.
12. As per the Third Schedule of these Regulations, image and data link information may be recorded on either the CARS or the ADRS.
13. The parameters to be recorded are listed in the Third Schedule to these Regulations.

## Flight data recorders or FDR, and aircraft data recording systems – applicability

1. All turbine-engined aeroplane 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:
2. an FDR which shall record at least the first 16 parameters listed in table A8-1 in the Third Schedule to these Regulations; or
3. a class C AIR or AIRS which shall record at least the flight path and speed parameters displayed to the pilot or pilots as defined in the Third Schedule to these Regulations; or
4. an ADRS which shall record at least the first 7 parameters listed in table A8-3 in the Third Schedule to these Regulations.
5. 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:
6. an FDR which shall record at least the first 16 parameters listed in table A8-1 in the Third Schedule to these Regulations; or
7. a class C AIR or AIRS which shall record at least the flight path and speed parameters displayed to the pilot or pilots; as defined in the Third Schedule to these Regulations; or
8. an ADRS which shall record at least the first 7 parameters listed in table A8-3 in Third Schedule to these Regulations.
9. 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 to these Regulations.
10. 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 to these Regulations.
11. All multi-engined turbine 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 to these Regulations.
12. 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 to the Third Schedule of these Regulations.
13. 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 to these Regulations.
14. 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 to these Regulations.
15. 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 to these Regulations, such additional parameters as are necessary to meet the objectives of determining:
16. the attitude of the aeroplane in achieving its flight path; and
17. the basic forces acting upon the aeroplane resulting in the achieved flight path and the origin of such basic forces.
18. 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 to these Regulations.
19. 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 to these Regulations.
20. 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 to these Regulations.
21. Flight data recording system shall be inspected annually, in accordance with Third Schedule specifications of these Regulations and the inspection report submitted to the Authority.
22. FDR system shall be calibrated as deemed necessary and, in any case, not more than five years in accordance with Third Schedule specifications of these Regulations.

## Recording technology

1. FDRs or ADRS shall not use engraving metal foil, frequency modulation, photographic film or magnetic tape.

## Duration of FDR

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

## Cockpit voice recorders and cockpit audio recording systems – applicability

1. All turbine-engined aeroplanes of a maximum certificated take-off mass of over 2 250 kg, up
2. to and including 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
3. one pilot shall be equipped with either a CVR or a CARS.
4. 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.
5. 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.
6. 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.
7. All aeroplanes that are required to be equipped with CARS, and for which the individual certificate of airworthiness is first issued on or after 1 January 2025, shall be equipped with a CARS which shall retain the information recorded during at least the last two hours of their operation.
8. CVR systems or CARS shall be inspected in accordance with Third Schedule specifications of these Regulations

## CVR-recording technology

1. CVRS and CARS shall not use magnetic tape or wire.

## CVR- duration

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

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.
5. 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

1. All aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which use any of the data link communications applications referred to in paragraph 5.1.2 of the Third Schedule and:
2. are required to carry a CVR; and
3. the data link communications messages on a crash-protected flight recorder.
4. All aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 2016 that are required to carry a CVR and are modified on or 1 January 2016 to use any of the data link communications applications refered to in paragraph 5.1.2 of the Third Schedule to these Regulations shall record the data limk communications messages on a crash-protected flight recorder unless the installed data link communications equipment is compliant with a type certificate issued or aircraft modification first approved prior to 1 January 2016.
5. All aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in 5.1.2 of the Third Schedule to these Regulations should record the data link communications messages on a crash-protected flight recorder.
6. 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 DLR systems. Recording inspections shall be carried out in accordance with Third Schedule specifications of these Regulations.

## Data link recorders - duration

1. The minimum recording duration shall be equal to the duration of the CVR.

## Data link recorders - correlation

1. Data link recording shall be capable of being correlated with the recorded cockpit audio.

## Flight crew-machine interface recordings

1. All aeroplanes of a maximum 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 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. 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.
3. The minimum flight crew-machine interface recording duration shall be at least for the last 2 hours and capable of being correlated to the recorded cockpit audio.

## Flight recorders — general

1. ***Construction and installation:***
2. flight recorders shall be constructed, located and installed so as to provide maximum practical protection for the recordings so that the recorded information may be preserved, recovered and transcribed; and
3. flight recorders shall meet the prescribed crashworthiness and fire protection specifications.
4. ***Operation:***
5. flight recorders shall not be switched off during flight time;
6. flight recorders shall be deactivated upon completion of flight time following an accident or incident to preserve flight recorder records;
7. the flight recorders shall not be reactivated before their disposition as determined in accordance with the Civil Aviation (Aircraft Accident and Incident Investigation) Regulations.
8. ***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 to these Regulations.

1. ***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

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 follows:
3. the read-out of there corded data shall ensure that the recorder operates correctly for the nominal duration of the recording;
4. 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;
5. 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;
6. 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
7. operational checks and evaluations of recordings from the flight recorder systems shall be conducted to ensure the continued serviceability of the recorders.
8. The operator shall give a report of the annual inspection conducted under this Regulation to the Authority.

## Combination recorders

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.
6. 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 or a CVR, may alternatively be equipped with one combination recorder, FDR/CVR.

## Flight recorder data recovery

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:
3. the capabilities of the operator;
4. overall capability of the aeroplane and its systems as certified by the State of Design;
5. the reliability of the means to recover the appropriate CVR channels and appropriate FDR data; and
6. specific mitigation measures.

## All aeroplanes operated as VFR flights

1. All aeroplanes when operated as VFR flights shall be equipped with:
2. a magnetic compass;
3. an accurate timepiece indicating the time in hours, minutes and seconds;
4. a sensitive pressure altimeter;
5. an airspeed indicator; and
6. such additional instruments or equipment as may be prescribed by the Authority.
7. VFR flights which are operated as controlled flights shall be equipped in accordance with instruments flight rules.

## All aeroplanes on flights over water

1. ***Seaplanes:***

All seaplanes for all flights shall be equipped with:

1. 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;
2. equipment for making the sound signals prescribed in the International Regulations for Preventing Collisions at Sea, where applicable; and
3. one sea anchor or drogue.
4. ***Landplanes:***

Landplanes shall carry the following equipment:

1. when flying over water and at a distance of more than 93 km or 50 NM away from the shore, in the case of landplanes operated in accordance with the Civil Aviation (Operation of Aircraft – Commercial Air Transport Aeroplanes) Regulations;
2. when flying en route over water beyond gliding distance from the shore, in the case of all other landplanes; and
3. 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.
4. 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.
5. Life jackets accessible from seats or berths located in crew rest compartments are required only when the seats or berths concerned are certified to be occupied during take-off and landing.

## All aeroplanes on long-range over-water flights

1. (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 or 400 NM, whichever is the lesser, away from land suitable for making an emergency landing in the case of aircraft operated in accordance with the Civil Aviation (Operation of Aircraft – Commercial Air Transport Aeroplanes) Regulations, and 30 minutes or 185 km or 100 NM, whichever is the lesser, for all other aeroplanes:
2. 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;
3. equipment for making the pyrotechnical distress signals described in Civil Aviation (Rules of the Air) Regulations;
4. on all aeroplanes of a maximum certificated take-off mass of over 27 000 kg, a securely attached underwater locating device operating at a frequency of 8.8 kHz; and
5. subject to paragraph (1), automatically activated underwater locating device shall operate for a minimum of thirty days and shall not be installed in wings or empennage.
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, 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

1. 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

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* |

1. 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 the Civil Aviation (Operation of Aircraft – Commercial Air Transport Aeroplanes) Regulations.
2. 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 the Civil Aviation (Operation of Aircraft – Commercial Air Transport Aeroplanes) Regulations.
3. 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.
4. An aeroplane intended to be operated at flight altitudes at which the atmospheric pressure is less than 376 hPa, or which, when operated at flight altitudes at which the atmospheric pressure is more than 376 hPa, cannot descend safely within 4 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 the Civil Aviation (Operation of Aircraft – Commercial Air Transport Aeroplanes) 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.

## All aeroplanes in icing conditions

1. All aeroplanes shall be equipped with suitable de-icing or anti-icing devices when operated in circumstances in which icing conditions are reported to exist or are expected to be encountered.

## All aeroplanes operated in accordance with instrument flight rules

1. (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:
2. a magnetic compass;
3. an accurate timepiece indicating the time in hours, minutes and seconds;
4. two sensitive pressure altimeters with counter drum-pointer; or equivalent presentation;
5. an airspeed indicating system with means of preventing malfunctioning due to either condensation or icing;
6. a turn and slip indicator;
7. an attitude indicator or artificial horizon;
8. a heading indicator or directional gyroscope;
9. a means of indicating whether the power supply to the gyroscopic instrument is adequate;
10. a means of indicating in the flight crew compartment the outside air temperature;
11. a rate-of-climb and descent indicator; and
12. such additional instruments or equipment as may be prescribed by the Authority.
13. The requirements of paragraphs (5), (6) and (7) 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 indicating instruments

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 or artificial horizon, clearly visible to the pilot-in-command.
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 or indicators is or are respectively are being operated by emergency power.
3. The instruments 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.

## All aeroplanes when operated at night

1. All aeroplanes when operated at night shall be equipped with:
2. all equipment specified in Regulation 39;
3. the lights required by the Civil Aviation (Rules of the Air) regulations for aircraft in flight or operating on the movement area of an aerodrome;
4. two landing lights;
5. illumination for all instruments and equipment that are essential for the safe operation of the aeroplane that are used by the flight crew;
6. lights in all passenger compartments; and
7. an independent portable light for each crew member station.
8. Specifications for lights meeting the requirements of the Civil Aviation (Rules of the Air) Regulations for navigation lights are contained in the First Schedule to these Regulations.
9. The general characteristics of lights are specified in the First Schedule to these Regulations.

## Pressurized aeroplanes when carrying passengers — weather radar

1. Pressurized aeroplanes when carrying passengers shall 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 or 49 000 ft — radiation indicator

1. All aeroplanes intended to be operated above 15 000 m or 49 000 ft shall carry equipment to measure and indicate continuously the dose rate of total cosmic radiation received, being 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.

## Mach number indicator

1. 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 or GPWS

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. The operator shall implement database management procedures that ensure the timely distribution and update of current terrain and obstacle data to the ground proximity warning system.
3. 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.
4. 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.
5. 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.
6. A ground proximity warning system shall provide, unless otherwise specified herein, warnings of the following circumstances:
7. excessive descent rate;
8. excessive terrain closure rate;
9. excessive altitude loss after take-off or go-around;
10. unsafe terrain clearance while not in landing configuration:
11. gear not locked down; and
12. flaps not in a landing position.
13. excessive descent below the instrument glide path.

## Aeroplanes carrying passengers — cabin crew seats

1. All 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 comply with the 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 (a) shall be located near floor level and other emergency exits as required by the State of Registry for emergency evacuation.

## Emergency locator transmitter or ELT

1. All aeroplanes shall carry an automatic ELT.
2. Except as provided for in sub-regulation (3), 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. All aeroplanes authorized to carry more than 19 passengers for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with either:
4. at least two ELTs, one of which shall be automatic; or
5. at least one ELT and a capability that meets the requirements of this Regulation.
6. Except as provided for in sub-regulation (5), all aeroplanes authorized to carry 19 passengers or less shall be equipped with at least one ELT of any type.
7. All aeroplanes authorized to carry 19 passengers or less for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least one automatic ELT.
8. ELT equipment carried in accordance with this regulation shall operate in compliance with the Civil Aviation (Aeronautical Telecommunication – Communication Systems Procedures) Regulations.

## Location of aeroplane in distress

1. 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 2023, 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 the Regulations applicable to location of aircraft in distress.
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, shall autonomously transmit information from which a position can be determined at least once every minute, when in distress, in accordance in accordance with the Regulations applicable to location of aircraft in distress.
3. The operator shall make position information of a flight in distress available to the appropriate organizations, as established by the Authority in the applicable technical guidance material.

## Aeroplanes required to be equipped with airborne collision avoidance system or ACAS II

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 or ACAS II.
2. All aeroplanes shall be equipped with an airborne collision avoidance system or ACAS II.
3. An airborne collision avoidance system shall operate in accordance with the relevant provisions of the applicable Civil Aviation (Aeronautical Telecommunications – Surveillance and Collision Avoidance Systems) Regulations

## Requirements for pressure-altitude reporting transponders

1. All aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of the applicable Civil Aviation (Aeronautical Telecommunications – Surveillance and Collision Avoidance Systems) Regulations.
2. All aeroplanes shall be equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m or 25 ft, or better.
3. The Mode S transponder shall be provided with the airborne or on-the-ground status if the aeroplane is equipped with an automatic means of detecting such status.

## Microphones

1. All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones below the transition level or altitude.

## Turbo-jet aeroplanes — forward-looking wind shear warning system

1. All turbo-jet aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than 9 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 when 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 IFR or at night

1. For approval in accordance with the applicable 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:
2. a serviceable autopilot that has at least altitude hold and heading select modes;
3. a headset with a boom microphone or equivalent; and
4. means of displaying charts that enables them to be readable in all ambient light conditions.

## Aeroplanes equipped with automatic landing systems, a head-up display or HUD or equivalent displays, enhanced vision systems or EVS, synthetic vision systems or SVS or combined vision systems or CVS

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:
3. the equipment meets the appropriate airworthiness certification requirements;
4. 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
5. 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- equipment

1. 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

1. Where EFBs are used on board an aeroplane the operator shall:
2. assess the safety risks associated with each EFB function;
3. establish and document the procedures for the use of, and training requirements for, the device and each EFB function; and
4. 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.
5. The Authority shall issue a specific approval for the operational use of EFB functions to be used for the safe operation of aeroplanes.

## EFB specific approval

1. When issuing a specific approval for the use of EFBs, the State of the Operator shall ensure that:
2. the EFB equipment and its associated installation hardware, including interaction with aeroplane systems where applicable, meet the appropriate airworthiness certification requirements;
3. the operator has assessed the safety risks associated with the operations supported by the EFB functions;
4. the operator has established requirements for redundancy of the information where appropriate as contained in and displayed by the EFB functions;
5. the operator has established and documented procedures for the management of the EFB functions including any database it may use; and
6. the operator has established and documented the procedures for the use of, and training requirements for, the EFB and the EFB function.

# AEROPLANE COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT

## Communication equipment

1. An aeroplane shall be provided with radio communication equipment capable of:
2. conducting two-way communication for aerodrome control purposes;
3. receiving meteorological information at any time during flight; and
4. 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 or [State] Communication Commission or Authority).
5. 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.
6. The radio communication equipment required in accordance with sub-regulation (1) shall provide for communications on the aeronautical emergency frequency 121.5 MHz.
7. For operations where communication equipment is required to meet required communication performance or RCP specification for performance-based communication or PBC, an aeroplane shall, in addition to the requirements specified in sub-regulation (1):
8. be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP specifications;
9. 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
10. have information relevant to the aeroplane RCP specification capabilities included in the MEL.
11. 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:
12. normal and abnormal procedures, including contingency procedures;
13. flight crew qualification and proficiency requirements, in accordance with appropriate RCP specifications;
14. a training programme for relevant personnel consistent with the intended operations; and
15. appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.
16. The State of the Operator shall ensure that, in respect of those aeroplanes mentioned in sub-regulation (4), adequate provisions exist for:
17. receiving the reports of observed communication performance issued by monitoring programmes established in accordance with the applicable Civil Aviation (Air Traffic Services) Regulations, and
18. taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RCP specifications.

## Navigation equipment

1. An aeroplane shall be provided with navigation equipment which will enable it to proceed:
2. in accordance with its operational flight plan;
3. in accordance with the requirements of air traffic services;
4. except when, if not so precluded by the appropriate Authority, navigation for flights under VFR is accomplished by visual reference to landmarks.
5. 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.

## Performance-based navigation or PBN

1. For operations where a navigation specification for PBN has been prescribed, an aeroplane shall, in addition to the requirements specified in sub-regulation (2):
2. be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specifications;
3. 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
4. have information relevant to the aeroplane navigation specification capabilities included in the MEL.
5. The Authority shall, for operations where a navigation specification for PBN has been prescribed, ensure that the operator has established and documented:
6. normal and abnormal procedures including contingency procedures;
7. flight crew qualification and proficiency requirements in accordance with the appropriate navigation specifications;
8. a training programme for relevant personnel consistent with the intended operations; and
9. appropriate maintenance procedures to ensure continued airworthiness in accordance with the appropriate navigation specifications.
10. The Authority shall issue a specific approval for operations based on PBN authorization required or AR navigation specifications.

## Minimum navigation performance specifications or MNPS

1. For flights in defined portions of airspace where, based on regional air navigation agreement, MNPS are prescribed, an aeroplane shall be provided with navigation equipment which:
2. 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
3. has been authorized by the Authority for the MNPS operations concerned.

## Reduced vertical separation minimum or RVSM

1. For flights in defined portions of airspace where, based on regional air navigation agreement, an RVSM of 300 m or 1 000 ft is applied between FL 290 and FL 410 inclusive:
2. the aeroplane shall be provided with equipment which is capable of:
3. indicating to the flight crew the flight level being flown;
4. automatically maintaining a selected flight level;
5. 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 or 300 ft; and
6. automatically reporting pressure-altitude; and
7. the State of the Operator shall issue a specific approval for RVSM operations.
8. Prior to granting the RVSM specific approval required in accordance with sub-regulation (a) the Authority shall be satisfied that:
9. the vertical navigation performance capability of the aeroplane satisfies the requirements specified in Second Schedule of these Regulations;
10. the operator has instituted appropriate procedures in respect of continued airworthiness for maintenance and repair practices and programmes; and
11. the operator has instituted appropriate flight crew procedures for operations in RVSM airspace.
12. An RVSM specific approval is valid globally on the understanding that any operating procedures specific to a given region shalll be stated in the operations manual or appropriate crew guidance.
13. The State of the Operator, in consultation with the State of Registry where appropriate, shall ensure that, in respect of those aeroplanes mentioned in sub-regulation (1), adequate provisions exist for:
14. receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with the applicable Civil Aviation (Air Traffic Services) Regulations; and
15. 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.
16. The Authority that has issued an RVSM specific approval to an operator shall establish a requirement which ensures that a minimum of two aeroplanes of each aircraft type grouping of the 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.
17. Subject to sub-regulation (1), if the operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.
18. Monitoring data from any regional monitoring programme established in accordance with the applicable Civil Aviation (Air Traffic Services) Regulations, may be used to satisfy the requirement.
19. All States that are responsible for airspace where RVSM has been implemented, or that have issued RVSM specific approvals to operators within their State, shall establish provisions and procedures which ensure that appropriate action will be taken in respect of aircraft and operators found to be operating in RVSM airspace without a valid RVSM approval.

## Instrument meteorological conditions or IMC

1. On flights in which it is intended to land in IMC, 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. Subject to sub-regulation (a), 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

1. An aeroplane 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), an aeroplane shall, in addition to the requirements specified in sub-regulation (a):
3. be provided with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specifications;
4. have information relevant to the aeroplane required surveillance performance or RSP specification capabilities listed in the flight manual or other aeroplane documentation approved by the State of Design or State of Registry; and
5. have information relevant to the aeroplane RSP specification capabilities included in the MEL.
6. The Authority shall, for operations where an RSP specification for PBS has been prescribed, ensure that the operator has established and documented:
7. normal and abnormal procedures, including contingency procedures;
8. flight crew qualification and proficiency requirements, in accordance with appropriate RSP specifications;
9. a training programme for relevant personnel consistent with the intended operations; and
10. appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RSP specifications.
11. The Authority shall ensure that, in respect of those aeroplanes mentioned in sub-regulation (b), adequate provisions exist for:
12. receiving the reports of observed surveillance performance issued by monitoring programmes established in accordance with the applicable Civil Aviation (Air Traffic Services) Regulations; and
13. taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RSP specifications.

## Installation

1. The equipment installation shall be such that the failure of any single unit required for communication, navigation or surveillance purposes or any combination thereof shall not result in the failure of another unit required for communication, navigation or surveillance purposes.

## Electronic navigation data management

1. An 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 aircraft as appropriate.

# PART IV

# GENERAL AVIATION — AEROPLANES (GENERAL AVIATION OPERATIONS)

# AEROPLANE INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS

## General

1. In addition to the minimum equipment necessary for the issuance of a certificate of airworthiness, an aeroplane shall not fly unless the instruments, equipment and flight documents prescribed in these Regulations are installed or carried, as appropriate, in aeroplanes according to the aeroplane used and to the circumstances under which the flight is to be conducted.
2. The prescribed instruments and equipment, including their installation, shall be acceptable to the Authority.

## Aeroplanes on all flights

1. 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.
2. An aeroplane shall be equipped with or carry on board:
3. an accessible first-aid kit;
4. portable fire extinguishers of a type which, when discharged, shall not cause dangerous contamination of the air within the aeroplane and at least one shall be located in:
5. the pilot's compartment; and
6. each passenger compartment that is separate from the pilot's compartment and that is not readily accessible to the flight crew.
7. Seat and seatbelt for:
8. each person over 2 years of age; and
9. each seat and restraining belts.
10. the following manuals, charts and information:
11. 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 the applicable Civil Aviation (Operation of Aircraft General Aviation- Aeroplane) Regulations.
12. any specific approval issued by the Authority, where applicable, for the operations to be conducted;
13. 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;
14. Procedures in accordance with the applicable Civil Aviation (Rules of the Air) Regulations, for pilots-in-command of intercepted aircraft;
15. visual signals for use by intercepting and intercepted aircraft in accordance with the applicable Civil Aviation (Rules of the Air) Regulations; and
16. the journey log book for the aeroplane.
17. where the aeroplane is fitted with fuses that are accessible in flight, spare electrical fuses of appropriate ratings for replacement of those fuses.
18. 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:
19. meet the applicable minimum performance requirements of the State of Registry; and
20. not be of a type listed in the 1987 *Montreal Protocol on Substances that Deplete the Ozone Layer* as it appears in the Eighth Edition of the *Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer, Annex A, Group II.*
21. Aeroplanes on all flights shall be equipped with the ground air signal codes for search and rescue purposes.
22. All aeroplanes on all flights shall be equipped with a safety harness for each flight crew member seat.

## Marking of break-in points

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 Figure 2 below.
2. The colour of the markings shall be red or yellow, and where necessary 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.

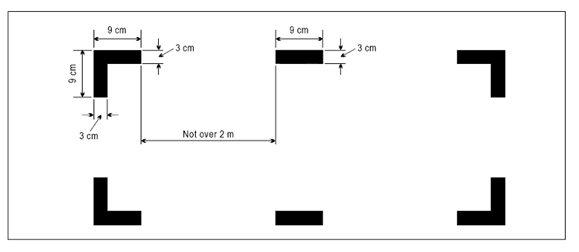


Figure 2. Marking of break-in Points

## VFR operations

1. All aeroplanes when operated as VFR flights shall be:
2. equipped with a means of measuring and displaying:
3. magnetic heading;
4. barometric altitude; and
5. indicated airspeed.
6. equipped with, or shall carry, a means of measuring and displaying time in hours, minutes and seconds; and
7. equipped with such additional equipment as may be prescribed by the Authority.
8. VFR flights which are operated as controlled flights shall be equipped in accordance with Instrument Flight rules or IFR.

## Aeroplanes on flights over water - seaplanes

1. Seaplanes for all flights shall be equipped with:
2. one life jacket, or equivalent individual floatation device, for each person on board, stowed in a position readily accessible from the seat or berth;
3. equipment for making the sound signals prescribed in the International Regulations for Preventing Collisions at Sea, where applicable;
4. one anchor; and
5. one sea anchor (drogue), when necessary to assist in manoeuvring.
6. For purposes of sub regulation (1) above, the term "seaplanes” includes amphibians operated as seaplanes.

## Landplanes

1. All single-engined landplanes includes amphibians operated as landplanes:
2. when flying en route over water beyond gliding distance from the shore; or
3. 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; shall carry 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.

## Aeroplanes on extended flightsover water

1. All aeroplanes operated on extended flights over water shall be 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:
4. sea state and sea and air temperatures;
5. the distance from land suitable for making an emergency landing; and (c) the availability of search and rescue facilities.
6. 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:
7. 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
8. equipment for making the distress signals described in the applicable Civil Aviation (Rules of the Air) Regulations.

## Aeroplanes on flights over designated land areas

1. 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 signalling devices and life-saving equipment, including means of sustaining life as may be appropriate to the area overflown.

## Aeroplanes on high altitude flights

1. Aeroplanes intended to be operated at high altitudes shall be equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in the applicable 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 IFR

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:
2. equipped with a means of measuring and displaying:
3. magnetic heading or standby compass;
4. barometric altitude;
5. indicated airspeed, with a means of preventing malfunctioning due to either condensation or icing;
6. turn and slip;
7. aircraft attitude;
8. stabilized aircraft heading;
9. whether the supply of power to the gyroscopic instruments
10. is adequate;
11. the outside air temperature; and
12. rate-of-climb and descent;
13. equipped with, or shall carry, a means of measuring and displaying time in hours, minutes and seconds; and
14. equipped with such additional instruments or equipment as may be prescribed by the Authority.
15. The requirements above 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.
16. The instrument combination, or integration into a flight director system mentioned in sub-regulation (b) above, refers to turn and slip, aircraft attitude and stabilized aircraft heading instruments.

## Aeroplanes when operated at night

1. Aeroplanes, when operated at night, shall be equipped with
2. the equipment specified in the Regulation 77, and: the lights required by the applicable Civil Aviation (Rules of the Air) Regulations and the First Schedule to these Regulations, for aircraft in flight or operating on the movement area of an aerodrome; and the general characteristics of which are specified in First Schedule of these Regulations;
3. a landing light;
4. illumination for all flight instruments and equipment that are essential for the safe operation of the aeroplane that are used by the flight crew;
5. lights in all passenger compartments; and
6. an independent portable light for each crew member station.

## Mach number indicator

1. Aeroplanes with speed limitations expressed in terms of Mach number shall be equipped with a means of displaying Mach number

## Aeroplanes required to be equipped with ground proximity warning system or GPWS

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 in excess of 5 700 kg 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 are 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:
6. excessive descent rate;
7. excessive terrain closure rate;
8. excessive altitude loss after take-off or go-around;
9. unsafe terrain clearance while not in landing configuration;
10. gear not locked down;
11. flaps not in a landing position; and
12. excessive descent below the instrument glide path.
13. 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 is first issued after 1 January 2011 shall provide, as a minimum, warnings of at least the following circumstances:
14. excessive descent rate;
15. excessive terrain closure rate;
16. excessive altitude loss after take-off or go-around;
17. unsafe terrain clearance while not in landing configuration;
18. gear not locked down;
19. flaps not in a landing position; and
20. excessive descent below the instrument glide path.

## Emergency Locator Transmitter or ELT

1. All Aeroplanes shall carry an automatic ELT.
2. Except as provided for in sub-regulation (c) and (d), all aeroplanes shall be equipped with at least one ELT of any type.
3. All aeroplanes for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least one automatic ELT.
4. ELT equipment carried to satisfy the requirements of this regulation shall operate in accordance with the applicable Civil Aviation (Aeronautical Telecommunication - Communication Systems) Regulations.

## Aeroplanes required to be equipped with pressure altitude reporting transponder

1. Aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of the applicable Civil Aviation (Aeronautical Telecommunication – Surveillance Radar and Collision Avoidance Systems) Regulations.
2. Unless exempted by Authorities, aeroplanes operating as VFR flights shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provision of the applicable Civil Aviation (Aeronautical Telecommunication – Surveillance Radar and Collision Avoidance Systems) Regulations.

## Microphones

1. When operating under IFR, all fight crew members required to be on flight deck duty shall communicate through boom or throat microphones below the transition level or altitude.

## Aeroplanes equipped with automatic landing systems, HUD or equivalent displays, EVS, SVS or CVS.

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 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 Authority shall ensure that:
3. the equipment meets the appropriate airworthiness certification requirements;
4. the operator or 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;
5. the operator or 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

1. Crash-protected flight recorders comprise one or more of the following:
2. a flight data recorder;
3. a cockpit voice recorder;
4. an airborne image recorder or AIR; and
5. a data link recorder.
6. As per the Sixth Schedule of these Regulations, image and data link information shall be recorded on either the CVR or the FDR.
7. Lightweight flight recorders comprise one or more of the following:
8. an aircraft data recording system;
9. a cockpit audio recording system;
10. an airborne image recording system or AIRS; and
11. a data link recording system.
12. As per the Six Schedule of these Regulations, image and data link information may be recorded on either the CARS or the ADRS.
13. Detailed requirements on flight recorders and parameters to be recorded are provided in the Sixth Schedule to these regulations.

## FDR and ADRS – applicability

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 shall be equipped with:
2. an FDR which shall record at least the first 16 parameters in table A2.3-1 of the Sixth Schedule to these Regulations; or
3. a class C AIR or AIRS which shall record at least the flight path and speed parameters displayed to the pilots or pilots; as defined in 2.2.2 of Sixth Schedule to these Regulations; or
4. an ADRS which shall record at least the first 7 parameters listed in table A2-3.3 in the Sixth Schedule to these Regulations.
5. 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 the Sixth Schedule to these Regulations.
6. 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 shall be equipped with an FDR capable of recording at least the 82 parameters listed in table A2.3-1 of the Sixth Schedule to these Regulations.
7. Flight data recording system shall be inspected annually, in accordance with Sixth Schedule specifications of these Regulations and the inspection report submitted to the Authority.
8. FDR system shall be calibrated as deemed necessary and, in any case, not more than five years every five years in accordance with Sixth Schedule specifications of these Regulations.

## FDR and ADRS – recording technology

1. FDRs, ADRS, AIRs or AIRS shall not use engraving metal foil frequency modulation or FM, photographic film or magnetic tape.

## FDR and ADRS -duration

1. All FDRs shall retain the information recorded during at least the last 25 hours of their operation.

## CVR and CARS–applicability

1. All turbine-engined aeroplanes with a seating configuration of more than 5 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.
2. CVR systems or CARS shall be inspected in accordance with Sixth Schedule specifications of these Regulations.

## CVR and CARS –recording technology

1. CVRs and CARS shall not use magnetic tape or wire.

## CVR and CARS -duration

1. All CVRs shall retain the information recorded during at least the last 2 hours of their operation.
2. All aeroplanes that are required to be equipped with CARS, and for which the individual certificate of airworthiness is first issued on or after 1 January 2025, shall be equipped with a CARS which shall retain the information recorded during at least the last two hours of their operation.

## Data link recorders – applicability

1. All aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which use any of the data link communications applications refered to in paragraph 5.1.2 of the Sixth Schedule to these Regulations and are required to carry a CVR, shall record the data link communications messages on a crash-protected flight recorder.
2. All aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to install and use any of the data link communications applications referred to in paragraph 5.1.2 of the Sixth Schedule to these Regulations shall record the data link communications messages on a crash-protected flight recorder unless the installed data link communications equipment is compliant with the type certificate issued or aircraft modification first approved prior to 1 January 2016.
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.
4. All aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in 5.1.2 of the Sixth Schedule to these Regulations shall record the data link communications messages on a crash-protected flight recorder.
5. 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 DLR systems. Recording inspections shall be carried out in accordance with Third Schedule specifications of these Regulations.

## Data link recorders – duration

1. The minimum recording duration shall be equal to the duration of the CVR.

## Data link recorders – correlation

1. Data link recording shall allow correlation with the recorded cockpit audio.

## Flight recorders — general

1. ***Construction and installation:***
2. Flight recorders shall be constructed, located and installed to provide maximum practical protection for the recordings in order that the recorded information may be preserved, recovered and transcribed.
3. Flight recorders shall meet the prescribed crashworthiness and fire protection specifications.
4. ***Operation:***
5. flight recorders shall not be switched off during flight time;
6. to preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident;
7. the flight recorders shall not be reactivated before their disposition as determined in accordance with the Civil Aviation (Aircraft Accident and Incident Investigation) Regulations;
8. the need for removal of the flight recorder records from the aircraft shall be determined by the investigation authority in [state] conducting the investigation with due regard to the seriousness of an occurrence and the circumstances, including the impact on the operation; and
9. the pilot-in-command’s responsibilities regarding the retention of flight recorder records are contained in Regulation 97.

## Flight recorder records

1. The pilot-in-command, or the owner or the operator, shall ensure that in the event the aeroplane becomes involved in an accident or incident, all related flight recorder records, and where necessary the associated flight recorders are preserved and retained in safe custody pending their disposition in accordance with the Civil Aviation (Aircraft Accident and Incident Investigation) Regulations.

## Continued serviceability

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 the Sixth Schedule to these Regulations.
2. Procedures for the inspections of the flight recorder systems shall be in accordance with Sixth Schedule to these Regulations.

## Flight recorder electronic documentation

1. The documentation requirement concerning FDR and ADRS parameters provided by operators to accident investigation authorities shall be in electronic format and meet industry specifications.

## EFBs – equipment

1. Where portable EFBs are used on board an aeroplane, the pilot-in-command or the operator or the owner shall ensure that they do not affect the performance of the aeroplane systems, equipment or the ability to operate the aeroplane.

## EFBs – functions

1. Where EFBs are used on board an aeroplane the pilot-in-command or the owner or the operator shall:
2. assess the safety risks associated with each EFB function;
3. establish the procedures for the use of, and training requirements for, the device and each EFB function; and
4. 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.
5. The Authority shall a issue a specific approval for the operational use of EFB functions used for the safe operation of aeroplanes.

## EFB specific approval

1. When issuing a specific approval for the use of EFBs, the Authority shall ensure that:
2. the EFB equipment and its associated installation hardware, including interaction with aeroplane systems where applicable, meet the appropriate airworthiness certification requirements;
3. the operator or owner has assessed the risks associated with the operations supported by the EFB functions;
4. the operator or owner has established requirements for redundancy of the information where applicable contained in and displayed by the EFB functions;
5. the operator or owner has established and documented procedures for the management of the EFB functions including any databases it may use; and
6. the operator or owner has established and documented the procedures for the use of, and training requirements for, the EFB functions.

## Aeroplane operated under an Article 83 bis agreement

1. An aeroplane, when operating under an Article 83 bis agreement entered into between the State of Registry and the State of the principal location of a general aviation operator, shall carry a certified true copy of the agreement summary, in either an electronic or hard copy format.
2. When the agreement summary specified in sub-regulation (a) is issued in a language other than English, an English translation shall be included.
3. The agreement summary of the Article 83 bis agreement shall be accessible to a civil aviation safety inspector to determine which functions and duties are transferred under the agreement by the State of Registry to the State of the Operator, when conducting surveillance activities such as ramp checks.
4. The agreement summary shall be transmitted to ICAO together with the Article 83 bis Agreement for registration with the ICAO Council by the State of Registry or the State of the Operator.
5. The agreement summary shall contain the information for the specific aircraft and shall follow the layout provided in the Ninth Schedule of these Regulations.

# AEROPLANE COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT

## Communication equipment

1. An aeroplane operated in accordance with the instrument flight rules or at night shall be 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 or [state] Communication Commission or authority.
3. The requirements of sub-regulation (1) and (2) are fulfilled when 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 aeroplane to be operated in accordance with VFR, but as a controlled flight, shall, unless exempted by the 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 Authority in the applicable [state] aeronautical information publications.
6. An aeroplane to be operated on a flight to which the provisions of Regulations 73 or 74 shall apply, unless exempted by the 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 Authority in the applicable [state] aeronautical information publications.
7. The radio communication equipment required in accordance with these Regulations 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 PBC, an aeroplane shall, in addition to the requirements specified in this regulation:
9. be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP specifications;
10. 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
11. where the aeroplane is operated in accordance with a MEL, have information relevant to the aeroplane RCP specification capabilities included in the MEL.
12. The Authority shall establish criteria for operations where an RCP specification for PBC has been prescribed.
13. In establishing criteria for operations where an RCP specification for PBC has been prescribed, the State of Registry shall require that the operator or owner establish:
14. normal and abnormal procedures, including contingency procedures;
15. flight crew qualification and proficiency requirements, in accordance with the appropriate RCP specifications;
16. a training programme for relevant personnel consistent with the intended operations; and
17. appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.
18. The Authority shall ensure that, in respect of sub-regulation (8), adequate provisions exist for:
19. receiving the reports of observed communication performance issued by monitoring programmes established in accordance with the Civil Aviation (Air Traffic Services) Regulations; and
20. taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RCP specifications.

## Navigation equipment

1. An aeroplane shall be provided with navigation equipment which will enable it to proceed in accordance with:
2. its flight plan; and
3. 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.

1. 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 these Regulations.

## Performance-based navigation

1. For operations where a navigation specification for PBN has been prescribed, an aeroplane shall, in addition to the requirements specified in Regulation 104:
2. be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specifications;
3. 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
4. where the aeroplane is operated in accordance with a MEL, have information relevant to the aeroplane navigation specification capabilities included in the MEL.
5. The Authority shall establish criteria for operations where a navigation specification for PBN has been prescribed.
6. In establishing criteria for operations where a navigation specification for PBN has been prescribed, the Authority shall require that the operator or owner establish:
7. normal and abnormal procedures including contingency procedures;
8. flight crew qualification and proficiency requirements, in accordance with the appropriate navigation specifications;
9. training for relevant personnel consistent with the intended operations; and
10. appropriate maintenance procedures to ensure continued airworthiness, in accordance with the appropriate navigation specifications.
11. The Authority shall issue a specific approval for operations based on PBN authorization required or AR navigation specifications.

## Minimum navigation performance specifications

1. For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, MNPS are prescribed, an aeroplane shall be provided with navigation equipment which:
2. 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
3. has been authorized by the State of Registry for the MNPS operations concerned.

## Reduced vertical separation minimum

1. For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, an RVSM of 300 m or 1 000 ft is applied between FL 290 and FL 410 inclusive:
2. the aeroplane shall be provided with equipment which is capable of:
3. indicating to the flight crew the flight level being flown;
4. automatically maintaining a selected flight level;
5. 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 or 300 ft; and
6. automatically reporting pressure altitude.
7. the State of Registry shall issue a specific approval for RVSM operation;
8. Prior to granting the RVSM specific approval required in accordance with sub-regulation (a) (2) the Authority shall be satisfied that:
9. the vertical navigation performance capability of the aeroplane satisfies the legal requirements;
10. the owner or operator has instituted appropriate procedures in respect of continued airworthiness for maintenance and repair practices, reliability monitoring and aircraft maintenance programmes approved by the Authority; and
11. the owner or operator has instituted appropriate flight crew procedures for operations in RVSM airspace.
12. An RVSM specific approval is valid globally on the understanding that any operating procedures specific to a given region shall be stated in the approved operations manual or appropriate crew guidance.
13. The State of Registry shall ensure that, in respect of those aeroplanes mentioned in sub-regulation (a), adequate provisions exist for:
14. receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with Civil Aviation (Air Traffic Services) Regulations; and
15. 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.
16. For the Authority to issue an RVSM specific approval, the owner or operator shall ensure 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.
17. Where an owner or operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.
18. The Authority shall take appropriate action in respect of aircraft and owners or operators found to be operating in RVSM airspace without a valid RVSM specific approval in accordance with these Regulations and the procedures specified in the applicable technical guidance materials.

## Instrument meteorological conditions

1. On flights in which it is intended to land in IMC, 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 IMC and for any designated alternate aerodromes.

## Surveillance equipment

1. An aeroplane shall be provided with surveillance equipment which shall 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, an aeroplane shall, in addition to the requirements specified in sub-regulation (a):
3. be provided with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specifications;
4. 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
5. where the aeroplane is operated in accordance with a MEL, have information relevant to the aeroplane RSP specification capabilities included in the MEL.
6. The Authority shall establish criteria for operations where an RSP specification for PBS has been prescribed.
7. In establishing criteria for operations where an RSP specification for PBS has been prescribed, the Authority shall require that the operator or owner establish:
8. normal and abnormal procedures, including contingency procedures;
9. flight crew qualification and proficiency requirements, in accordance with appropriate RSP specifications;
10. a training programme for relevant personnel consistent with the intended operations; and
11. appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RSP specifications.
12. The Authority shall ensure that, in respect of those aeroplanes mentioned in sub-regulation (b), adequate provisions exist for:
13. receiving the reports of observed surveillance performance issued by monitoring programmes established in accordance with Civil Aviation (Air Traffic Services) Regulations; and
14. taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RSP specifications.

# PART V

# GENERAL AVIATION — AEROPLANES (LARGE AND TURBOJET AEROPLANES)

# AEROPLANE INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS

## General

1. Where a master minimum equipment list is established for the aircraft type, the operator shall include in the operations manual a minimum equipment list 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.
2. 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.
3. The operating manual shall be consistent with the aircraft flight manual and checklists to be used and its design of the manual shall observe human factors principles.

## Aeroplanes on all flights

1. In addition to the requirements contained in Regulation 68 (2), an aeroplane shall be equipped with:
2. accessible and adequate medical supplies appropriate to the number of passengers the aeroplane is authorized to carry;
3. medical supplies shall comprise one or more first-aid kits;
4. a safety harness for each flight crew seat incorporating a device which shall automatically restrain the occupant’s torso in the event of rapid deceleration;
5. The safety harness for each pilot seat shall incorporate a device to prevent a suddenly incapacitated pilot from interfering with the flight controls;
6. means of ensuring that the following information and instructions are conveyed to passengers:
7. when seat belts are to be fastened;
8. when and how oxygen equipment is to be used where the carriage of oxygen is required;
9. restrictions on smoking;
10. location and use of life jackets or equivalent individual flotation devices where their carriage is required;
11. location of emergency equipment; and
12. location and method of opening emergency exits.
13. An aeroplane shall carry:
14. the operations manual prescribed in the Civil Aviation (Operation of Aircraft – General Aviation) Regulations, or those parts of it that pertain to flight operations;
15. the flight manual for the aeroplane, or other documents containing performance data required for the application of Aeroplane Performance Operating Limitations as per the Civil Aviation (Operations of Aircraft – General Aviation) 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
16. the checklists required by the Civil Aviation (Operation of Aircraft – General Aviation) Regulations.

## Flight recorders – FDR

1. ***Applicability:***
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 2005 shall be equipped with an FDR which shall record at least 78 parameters listed in table A2.3-1 of the sixthsSchedule to 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 an FDR which shall record at least 32 parameters listed in table A2.3-1 of the Sixth Schedule to these Regulations; and
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 FDRwhich shall record at least 16 parameters listed in table A2.3-1 of the Sixth Schedule to these Regulations.
5. The maintenance requirements established in sub-regulations 86 (d) & 86 (e) will apply.

## Cockpit voice recorders

1. ***Applicability:***
2. 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;
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 1987 shall be equipped with a CVR;
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 1987, shall be equipped with a CVR.
5. The maintenance requirements established in sub-regulation 89 (b) will apply.
6. ***Duration:***

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

1. 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

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, 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.
3. subject to sub-regulation (b), 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:
4. 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
5. equipment for making the distress signals described in the Civil Aviation (Rules of the Air) Regulations.
6. 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

1. Pressurized aeroplanes 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 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 the Civil Aviation (Operation of Aircraft – General Aviation) Regulations.
3. An aeroplane 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 the Civil Aviation (Operation of Aircraft – General Aviation) Regulations.

## Aeroplanes in icing conditions

1. Aeroplanes shall be equipped with suitable de-icing or anti-icing devices when operated in circumstances in which icing conditions are reported to exist or are expected to be encountered.

## Aeroplanes operated in accordance with the instrument flight rules

1. In addition to the requirements contained in the Civil Aviation (Operation of 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

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 or 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 indicators are 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

1. 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 or 49 000 ft — radiation indicator

1. Aeroplanes intended to be primarily operated above 15 000 m or 49 000 ft shall carry equipment to measure and indicate continuously the dose rate of total cosmic radiation being received, 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

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 in compliance with the Civil Aviation (Operation of 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 or ACAS

1. 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 ACAS II.
2. 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 ACAS II.

## Aeroplanes required to be equipped with pressure-altitude reporting transponder

1. Aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the Civil Aviation (Aeronautical Telecommunication - Surveillance Radar and Collision Avoidance Systems) Regulations.

## Microphones

1. All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones below the transition level or altitude.

# AEROPLANE COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT

## Communication equipment

1. In addition to the requirements of the Civil Aviation (Operation of Aircraft – General Aviation Aeroplanes) Regulations, an aeroplane shall be provided with radio communication equipment capable of:
2. conducting two-way communication for aerodrome control purposes;
3. receiving meteorological information at any time during flight; and
4. 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 or [state] Communication Commission or authority.

## Installation

1. The equipment installation shall be such that the failure of any single unit required for communications, navigation or surveillance purposes or any combination thereof shall not result in the failure of another unit required for communications, navigation or surveillance purposes.

## Electronic navigation data management

1. An 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 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 aeroplanes.

# PART VI

# HELICOPTER OPERATIONS – COMMERCIAL AIR TRANSPORT

# HELICOPTER INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS

## General

1. 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 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

1. A helicopter shall carry a certified true copy of the air operator certificate specified in the 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

1. The operator shall include in the operations manual a minimum equipment list, 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

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.

## Helicopter operated under an Article 83 bis agreement

1. A helicopter, when operating under an Article 83 bis agreement entered into between the State of Registry and the State of the Operator, shall carry a certified true copy of the agreement summary, in either an electronic or hard copy format.
2. Where the agreement summary specified in sub-regulation (1) is issued in a language other than English, an English translation shall be included.
3. The agreement summary of an Article 83 bis agreement shall be accessible to a civil aviation safety inspector in determining which functions and duties are transferred by the State of Registry to the State of the Operator under the agreement, when conducting surveillance activities such as ramp checks.
4. The agreement summary shall be transmitted to ICAO together with the Article 83 bis Agreement for registration with the ICAO Council by the State of Registry or the State of the Operator.
5. The agreement summary shall contain the information for the specific aircraft and the layout specified in the Tenth Schedule to these Regulations.

## All helicopters on all flights

1. 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

1. A helicopter shall be equipped with accessible and adequate medical supplies which shall include:
2. a first-aid kit; and
3. 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

1. 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:
2. the pilot’s compartment; and
3. 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 or safety harness

1. A helicopter shall be equipped with:
2. a seat or berth for each person over two years of age and above;
3. a seat belt for each seat and restraining belts for each berth;
4. a safety harness for each flight crew seat; and
5. a safety harness for each pilot seat incorporating a device which shall automatically restrain the occupant’s torso in the event of rapid deceleration.
6. 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

1. A helicopter shall be equipped with means of ensuring that the following information and instructions are conveyed to passengers:
2. when seat belts or harnesses are to be fastened;
3. when and how oxygen equipment is to be used where the carriage of oxygen is required;
4. restrictions on smoking;
5. location and use of life jackets or equivalent individual flotation devices where their carriage is required; and
6. location and method of opening emergency exits.

## Spare electrical fuses

1. Where fuses are used, a helicopter shall have spare electrical fuses of appropriate ratings for replacement of those accessible in flight.

## Lavatory fire extinguisher

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:
2. meet the applicable minimum performance requirements of the State of Registry; and
3. not be of a type listed in the 1987 *Montreal Protocol on Substances that Deplete the Ozone Layer* as it appears in the Eighth Edition of the *Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer*, Annex A, Group II.

## Operations manual, flight manual and charts.

1. A helicopter shall carry:
2. the operations manual prescribed in the Civil Aviation (Helicopter Operations) Regulations, or those parts of it that pertain to flight operations;
3. the helicopter flight manual for the helicopter, or other documents containing performance data required for the application of the 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
4. 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

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 in figure 3 below.

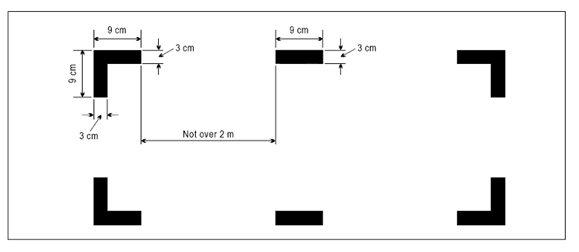


Figure 3. Marking of break-in points

1. The colour of the markings shall be red or yellow, and where necessary, they shall be outlined in white to contrast with the background.
2. 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.

## Flight recorders

1. Crash- protected flight recorders comprise one or more of the following:
2. a flight data recorder;
3. a cockpit voice recorder;
4. an airborne image recorder; and
5. a data link recorder.
6. As per the Seventh Schedule to these Regulations, image and data link information may be recorded on either the CVR or the FDR.
7. Combination recorders, FDR/CVR shall be used to meet the flight recorder equipage requirements in these Regulations.
8. Detailed requirements on flight recorders are contained in Seventh Schedule to these Regulations.
9. Lightweight flight recorders comprise one or more of the following:
10. an aircraft data recording system or ADRS;
11. a cockpit audio recording system or CARS;
12. an airborne image recording system or AIRS; or
13. a data link recording system or DLRS.
14. As per the Seventh Schedule to these Regulations, image and data link information may be recorded on either the CARS or the ADRS.

## FDR and ADRS

1. Parameters to be recorded shall be those listed in the Seventh Schedule to these Regulations.

## FDR and ADRS – applicability

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 to these Regulations.
2. All helicopters of a maximum certificated take-off mass of over 7 000 kg, or having a passenger seating configuration of more than 19 passengers, 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 Seventh Schedule to these Regulations.
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 FDRwhich shall record at least the first 15 parameters listed in table A4-1 of Seventh Schedule to these Regulations.
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:
5. an FDR which shall record at least the first 48 parameters listed in table A4-1 of Seventh Schedule to these Regulations; or
6. 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 reulations to these Regulations; or
7. an ADRS which shall record the 7 parameters listed in table A4-3 of Seventh Schedule of these Regulations.
8. 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:
9. an FDRwhich shall record at least the first 48 parameters listed in table A4-1 of Seventh Schedule of these regulations; or
10. a class C AIR or AIRS which shall record at least flight path and speed parameters displayed to the pilots, as defined in table A4-3 of Seventh Schedule of these reulations; or
11. an ADRS which shall record the 7 parameters listed in table A4-3 of Seventh Schedule of these Regulations.
12. 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.
13. 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.
14. Flight data recording system shall be inspected annually, in accordance with Seventh Schedule specifications of these Regulations and the inspection report submitted to the Authority.
15. FDR system shall be calibrated as deemed necessary and, in any case, not more than five years every five years in accordance with Seventh Schedule specifications of these Regulations

## FDR and ADRS–recording technology

1. FDRs, ADRS, AIRs or AIRS shall not use engraving metal foil, frequency modulation, photographic film or magnetic tape.

## FDR and ADRS – duration

1. All FDRs shall retain the information recorded during at least the last 10 hours of their operation.

## CVR and cockpit audio recording systems – applicability

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 FDR, at least main rotor speed shall be recorded on the CVR.
3. CVR systems or CARS shall be inspected in accordance with Seventh Schedule specifications of these Regulations.

## CVRs and CARS shall not use magnetic tape or wire.

1. CVRs and CARS shall not use magnetic tape or wire.

## CVR- duration

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

1. All helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which use any of the data link communications applications referred to in paragraph 5.1.2 in the Seventh Schedule of these Regulations and are required to carry a CVR, shall record the data link communications messages on a crash-protected flight recorder.
2. All helicopters for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in paragraph 5.1.2 of the Seventh Schedule to these Regulations shall record the data link communications messages on a crash-protected flight recorder unless the installed data link communications equipment is compliant with a type design or aircraft modification first approved prior to 1 January 2016.
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.
4. All helicopters for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in 5.1.2 of the Seventh Schedule to these Regulations shall record the data link communications messages on a crash-protected flight recorder.
5. 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 DLR systems. Recording inspections shall be carried out in accordance with Seventh Schedule specifications of these Regulations.

## Data link recorders – duration

10. The minimum recording duration shall be equal to the duration of the CVR.

## Data link recorders – correlation

1. Data link recording shall allow correlation with the recorded cockpit audio.

## Flight recorders — general, construction and installation

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

## Flight recorders — operation

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 the Civil Aviation (Aircraft Accident and Incident Investigation) Regulations.
4. The need for removal of the flight recorder records from the aircraft shall be determined by the investigation authority in the sate conducting the investigation with due regard to the seriousness of an occurrence and the circumstances, including the impact on the operation.

## Continued serviceability

1. 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

1. The documentation requirement concerning FDR parameters provided by operators to accident investigation authorities shall be in electronic format and meet industry specifications.

## Instruments and equipment for flights operated under VFR and IFR

1. The flight instrument requirements in these Regulation may be met by combinations of instruments or by electronic displays.

## VFR by day

1. All helicopters when operating in accordance with VFR by day shall be equipped with:
2. a magnetic compass;
3. an accurate timepiece indicating the time in hours, minutes and seconds;
4. a sensitive pressure altimeter;
5. an attitude indicator or artificial horizon for each required pilot and one additional attitude indicator;
6. a heading indicator or directional gyroscope;
7. an airspeed indicator; and
8. such additional instruments or equipment as may be prescribed by the Authority.

## VFR by night

1. All helicopters when operating in accordance with VFR at night shall be equipped with:
2. the equipment specified in Regulation 159;
3. an attitude indicator or artificial horizon for each required pilot and one additional attitude indicator;
4. a slip indicator;
5. a heading indicator or directional gyroscope;
6. a rate of climb and descent indicator;
7. such additional instruments or equipment as may be prescribed by the Authority and the following lights:
8. the lights required by the Civil Aviation (Rules of the Air) Regulations for aircraft in flight or operating on the movement area of a heliport;
9. two landing lights;
10. illumination for all instruments and equipment that are essential for the safe operation of the helicopter that are used by the flight crew;
11. lights in all passenger compartments; and
12. a flashlight for each crew member station.
13. One of the landing lights shall be trainable, at least in the vertical plane.

## IFR

1. 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:
2. a magnetic compass;
3. an accurate time piece indicating the time in hours, minutes and seconds;
4. two sensitive pressure altimeters;
5. an airspeed indicating system with means of preventing malfunctioning due to either condensation or icing;
6. a slip indicator;
7. an attitude indicator or artificial horizon for each required pilot and one additional attitude indicator;
8. a heading indicator or directional gyroscope;
9. a means of indicating whether the power supply to the gyroscope instrument is adequate;
10. a means of indicating on the flight deck the outside air temperature;
11. a rate of climb and descent indicator;
12. 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;
13. such additional instruments or equipment as may be prescribed by the Authority; and
14. where operated at night, the lights specified in Regulation 159.
15. 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 or artificial horizon, clearly visible to the pilot-in-command.
16. 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 indicators is being operated by emergency power.

## Ground proximity warning system

1. 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 passengers shall be equipped with a ground proximity warning system - forward-looking terrain avoidance function.

## All helicopters on flights over water – means of flotation

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:
2. engaged in offshore operations, or other overwater operations as prescribed by the Authority; or
3. 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
4. flying over water in a non-hostile environment at a distance from land specified by the Authority of the responsible State when operating in performance class 1; or
5. flying over water beyond autorotational or safe forced landing distance from land when operating in performance class 3.

## Emergency equipment

1. A helicopter operating in performance Class 1 or 2 and operating in accordance with the provisions of this Regulation 162 shall be equipped with:
2. 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. 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;
4. life-saving rafts in sufficient numbers to carry all persons on board, stowed 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;
5. when two life rafts are fitted, each shall be capable to carry all occupants in the overload state; and
6. equipment for making the pyrotechnical distress signals described in the applicable Civil Aviation (Rules of the Air) Regulations.
7. A helicopter 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.
8. When determining the distance from land referred to in sub-regulation (b), consideration shall be given to environmental conditions and the availability of search and rescue facilities.
9. 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.
10. A helicopter operating in performance class 3 when operating beyond the distance specified in sub-regulation (2) shall be equipped as in sub-regulation (a).
11. In the case of a helicopter operating in performance Class 2 or 3, when taking off or landing at a heliport where, 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.
12. 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.
13. 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 All helicopters on flights over designated land areas with the provisions of this Regulation shall be deployable by remote control.
14. 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.
15. On any helicopter for which the individual certificate of airworthiness was first issued before 1 January 1991, the provisions of sub-regulation (7) and (8) shall be complied with.

## All helicopters on flights over designated sea areas

1. A helicopter 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 crew from this recommendation.
4. When establishing rescue time, the sea state and the ambient light conditions shall be taken into consideration.

## All helicopters on flights over designated land areas

1. A helicopter, 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.

## Emergency locator transmitter or ELT

1. From 1 July 2008, all helicopters operating in performance Class 1, 2 and 3 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in Regulation 162 with at least one automatic ELT and one ELT in a raft or life jacket.
2. ELT equipment carried to satisfy the requirements of sub-regulation (1) shall operate in accordance with the relevant provisions of the applicable Civil Aviation (Aeronautical Telecommunication – Communication Systems) Regulations.

## All helicopters on high altitude flights

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* |

1. A helicopter 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 the applicable Civil Aviation (Helicopter Operations) Regulations.
2. A helicopter 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 the applicable Civil Aviation (Helicopter Operations) Regulations.
3. A helicopter 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 4 minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa, shall be provided with automatically deployable oxygen equipment to comply with the requirements of Civil Aviation (Helicopter Operations) Regulations.
4. The total number of oxygen dispensing units shall exceed the number of passenger and cabin crew seats by at least 10 per cent.

## All helicopters in icing conditions

1. All helicopters shall be equipped with suitable anti-icing or de-icing devices when operated in circumstances in which icing conditions are reported to exist or are expected to be encountered.

## Helicopters when carrying passengers —significant-weather detection

1. A helicopter when carrying passengers shall be equipped with operative weather radar or other significant-weather detection equipment whenever such helicopters is 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.

## Helicopters carrying passengers — cabin crew seats

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 comply with the applicable Civil Aviation (Helicopter Operation) Regulation, in respect of emergency evacuation.
2. Subject to Regulation 134, 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

1. Except otherwise authorized by the Authority, all helicopters shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the requirements of the Civil Aviation (Aeronautical Telecommunication - Surveillance Radar and Collision Avoidance Systems) Regulations.

## Microphones

1. All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones.

## Vibration health monitoring system

1. A helicopter with 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, HUD or equivalent displays, EVS, SVS or CVS

1. Where a helicopter is 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 orCVS, the State of the Operator shall ensure that:
3. the equipment meets the appropriate airworthiness certification requirements;
4. 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
5. 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 – eQuipment

1. 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

1. Where EFBs are used on board a helicopter the operator shall:
2. assess the safety risks associated with each EFB function;
3. establish and document the procedures for the use of and training requirements for, the device and each EFB function; and
4. 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.
5. The State of the Operator shall issue a specific approval for the operational use of EFB functions to be used for the safe operation of helicopters.

## EFB specific approval

1. When issuing a specific approval for the operational use of EFBs, the State of the Operator shall ensure that:
2. the EFB equipment and its associated installation hardware, including interaction with helicopter systems where applicable, meet the appropriate airworthiness certification requirements;
3. the operator has assessed the safety risks associated with the operations supported by the EFB functions;
4. the operator has established requirements for redundancy of the information where appropriate contained and displayed by the EFB function(s);
5. the operator has established and documented procedures for the management of the EFB functions including any databases it may use; and
6. the operator has established and documented the procedures for the use of, and training requirements for the EFB functions.

# HELICOPTER COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT

## Communication equipment

1. A helicopter shall be provided with radio communication equipment capable of:
2. conducting two-way communication for heliport control purposes;
3. receiving meteorological information at any time during flight; and
4. 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 or State Communication Commission or Authority.
5. The requirements of sub-regulation (a) are considered fulfilled where the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.
6. The radio communication equipment required in accordance with sub-regulation (a) shall provide for communications on the aeronautical emergency frequency 121.5 MHz.
7. For operations where communication equipment is required to meet an RCP specification for PBC, a helicopter shall, in addition to the requirements specified in Sub-regulation (a):
8. be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP specifications;
9. 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
10. have information relevant to the helicopter RCP specification capabilities included in the MEL.
11. The Authority shall, for operations where an RCP specification for PBC has been prescribed, ensure that the operator has established and documented:
12. normal and abnormal procedures, including contingency procedures;
13. flight crew qualification and proficiency requirements, in accordance with appropriate RCP specifications;
14. a training programme for relevant personnel consistent with the intended operations; and
15. appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.
16. The Authority shall ensure that, in respect of those helicopters mentioned in sub-regulation (d), adequate provisions exist for:
17. receiving the reports of observed communication performance issued by monitoring programmes established in accordance with Civil Aviation (Air Traffic Services) Regulations.
18. taking immediate corrective action for individual helicopters, helicopter types or operators, identified in such reports as not complying with the RCP specifications.

## Navigation equipment

1. A helicopter shall be provided with navigation equipment which will enable it to proceed in accordance with:
2. its operational flight plan; and
3. the requirements of air traffic services;

except when authorized by the appropriate authority, navigation for flights under VFR is accomplished by visual reference to landmarks.

1. For operations where a navigation specification for PBN has been prescribed, a helicopter shall, in addition to the requirements specified in sub-regulation (a):
2. be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specifications; and
3. 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
4. have information relevant to the helicopter navigation specification capabilities included in the MEL.
5. The Authority shall, for operations where a navigation specification for PBN has been prescribed, ensure that the operator has established and documented:
6. normal and abnormal procedures, including contingency procedures;
7. flight crew qualification and proficiency requirements, in accordance with the appropriate navigation specifications;
8. a training programme for relevant personnel consistent with the intended operations; and
9. appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate navigation specifications.
10. The Authority shall issue a specific approval for operations based on PBN authorization required or AR navigation specifications.
11. 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 these Regulations.
12. 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.
13. 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

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, a helicopter shall, in addition to the requirements specified in Sub-regulation (a):
3. be provided with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specifications;
4. 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
5. have information relevant to the helicopter RSP specification capabilities included in the MEL.
6. The Authority shall, for operations where an RSP specification for PBS has been prescribed, ensure that the operator has established and documented:
7. normal and abnormal procedures, including contingency procedures;
8. flight crew qualification and proficiency requirements, in accordance with appropriate RSP specifications;
9. a training programme for relevant personnel consistent with the intended operations; and
10. appropriate maintenance procedures to ensure continued airworthiness in accordance with appropriate RSP specifications
11. The Authority shall ensure that, in respect of those helicopters mentioned in sub-regulation (b), adequate provisions exist for:
12. receiving the reports of observed surveillance performance issued by monitoring programmes established in accordance with the Civil Aviation (Air Traffic Services) Regulations, and
13. taking immediate corrective action for individual helicopter, helicopter types or operators, identified in such reports as not complying with the RSP specifications.

## Installation

1. 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

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 aircraft.

# PART VII

# HELICOPTER OPERATIONS - GENERAL AVIATION

# HELICOPTER INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS

# ALL HELICOPTERS ON ALL FLIGHTS

## General

1. In addition to the minimum equipment required for the issuance of a certificate of airworthiness, the instruments, equipment and flight documents prescribed in the following paragraphs 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. Subject to sub-regulation (a) the instruments and equipment, including their installation, shall be approved or accepted by the State of Registry.

## Instruments

1. A helicopter shall be equipped with instruments which shall 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

1. A helicopter shall be equipped with or carry on board an accessible first-aid kit.

## Portable fire extinguishers

1. A helicopter shall be equipped with or carry on board: 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:
2. the pilot’s compartment; and
3. 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 or safety harness

1. A helicopter shall be equipped with:
2. a seat or berth for each person 2 years of age and above; and
3. a seat belt for each seat and restraining belts for each berth.

## Operations mannual, flight manual and charts

1. A helicopter shall carry:
2. 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 compliance with the applicable Civil Aviation (Helicopter Operations) Regulations;
3. any specific approval issued by the State of Registry, where applicable, for the operations to be conducted;
4. current and suitable charts for the route of the proposed flight and all routes along which the flight may be diverted;
5. procedures, as prescribed in the applicable Civil Aviation (Rules of the Air) Regulations, for pilots-in-command of intercepted aircraft;
6. a list of visual signals for use by intercepting and intercepted aircraft, as contained in the applicable Civil aviation (Rules of the Air) Regulations; and
7. the journey log book for the helicopter.

## Spare electrical fuses

1. Where fuses are used, a helicopter shall have spare electrical fuses of appropriate ratings for replacement of those accessible in flight.

## Lavatory fire extinguisher

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:
2. meet the applicable minimum performance requirements of the State of Registry; and
3. not be of a type listed in the 1987 *Montreal Protocol on Substances that Deplete the Ozone Layer* as it appears in the Eighth Edition of the *Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer,* Annex A, Group II.
4. All helicopters on all flights shall be equipped with the ground-air signal codes for search and rescue purposes.
5. All helicopters on all flights shall be equipped with a safety harness for each flight crew member seat.

## Marking of break-in points

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 in figure 4 below.
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. 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.

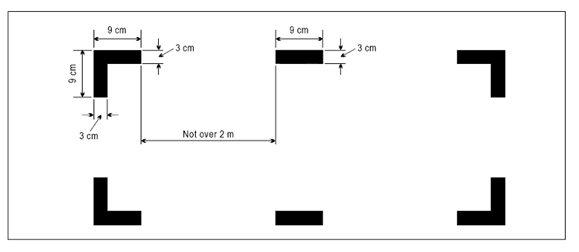


Figure 4. Marking of break-in points

## Instruments and equipment for flights operated under VFR and IFR

1. The flight instrument requirements in this Regulation may be met by combinations of instruments or by electronic displays.

## VFR by day

1. All helicopters when operating in accordance with VFR by day shall:
2. be equipped with:
3. a magnetic compass;
4. a sensitive pressure altimeter;
5. an attitude indicator or artificial horizon for each required pilot and one additional attitude indicator;
6. a heading indicator or directional gyroscope
7. an airspeed indicator; and
8. such additional instruments or equipment as may be prescribed by the Authority; and
9. equipped with, or shall carry, a means of measuring and displaying the timing in hours, minutes and seconds.

## VFR by night

1. All helicopters when operating in accordance with VFR at night shall be equipped with:
2. the equipment specified in Regulation 191;
3. an attitude indicator or artificial horizon for each required pilot and one additional attitude indicator;
4. a slip indicator;
5. a heading indicator or directional gyroscope;
6. a rate of climb and descent indicator;
7. such additional instruments or equipment as may be prescribed by the Authority; and the following lights:
8. the lights required by the applicable Civil Aviation (Rules of the Air) Regulations for aircraft in flight or operating on the movement area of a heliport;
9. landing lights;
10. illumination for all instruments and equipment that are essential for the safe operation of the helicopter that are used by the flight crew;
11. lights in all passenger compartments; and
12. a flashlight for each crew member station.
13. One of the landing lights shall be trainable, at least in the vertical plane.

## IFR

1. 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:
2. a magnetic compass;
3. two sensitive pressure altimeters;
4. an airspeed indicating system with means of preventing malfunctioning due to either condensation or icing;
5. a slip indicator;
6. an attitude indicator or artificial horizon for each required pilot and one additional attitude indicator;
7. a heading indicator or directional gyroscope;
8. a means of indicating whether the power supply to the gyroscope instrument is adequate;
9. a means of indicating on the flight deck the outside air temperature;
10. a rate of climb and descent indicator;
11. such additional instruments or equipment as may be prescribed by the Authority;
12. where operated at night, the lights specified in Regulation 192 paragraphs (f); and
13. means of measuring and displaying the time in hours, minutes and seconds.

## All helicopters on flights over water – means of flotation

1. All helicopters 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:
2. engaged in offshore operations, or other over water operations as prescribed by the State of Registry; or
3. flying at a distance from land specified by the appropriate state authority.
4. 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

1. (1) A helicopter operating in accordance with the provisions of Regulation 194 shall be equipped with:
2. 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 not precluded by consideration related to the type of helicopter used:
4. life-saving rafts in sufficient numbers to carry all persons on board;
5. stowed to facilitate their ready use in emergency;
6. provided with such life-saving equipment including means of sustaining life as appropriate to the flight to be undertaken; and
7. equipment for making the pyrotechnical distress signals described in the applicable Civil Aviation (Rules of the Air) Regulations.
8. When taking off or landing at a heliport where 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.
9. 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.
10. A 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 these Regulations shall be deployable by remote control.
11. 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.
12. A helicopter for which the individual certificate of airworthiness was first issued before 1 January 1991, the provisions of sub-regulation (d) and (e) shall be complied with.

## All helicopters on flights over designated land areas

1. All 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

1. ***Unpressurized helicopters*** operated at high altitudes shall carry equipment for storing and dispensing the oxygen supplies required in the applicable Civil Aviation (Helicopter Operations) Regulations.
2. ***Pressurized helicopters*** operated at high altitudes shall carry emergency oxygen storage and dispensing equipment capable of storing and dispensing the oxygen supplies required in the applicable Civil Aviation (Helicopter Operations) Regulations.

## Flight Recorders

1. Crash-protected flight recorders comprise one or more of the following:
2. a flight data recorder;
3. a cockpit voice recorder;
4. an airborne image recorder; or
5. a data link recorder.
6. As per the Seventh Schedule to these Regulations, image and data link information may be recorded on either the CVR or the FDR.
7. Combination recorders, FDR/CVR may be used to meet the flight recorder equipage requirements in these Regulations and Seventh Schedule to these Regulations.
8. Detailed requirements on flight recorders are contained in Seventh Schedule to these.
9. Light weight flight recorders comprise one or more of the following:
10. an aircraft data recording system;
11. a cockpit audio recording system;
12. an airborne image recording system; and
13. a data link recording system.
14. As per the Seventh Schedule to these Regulations, image and data link information may be recorded on either the CARS or the ADRS.

## FDR and ADRS

1. Parameters to be recorded shall be those listed in the Seventh Schedule.

## FDR and ADRS–applicability

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 Seventh Schedule to these Regulations.
2. All helicopters of a maximum certificated take-off mass of over 7 000 kg, or having a passenger seating configuration of more than 19 passengers, 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 48 parameters listed in table A4-1 of Seventh Schedule to these Regulations.
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 a type V FDR.
4. The maintenance requirements established in sub-regulations 145 (8) & 145 (9) will apply.

## FDR and ADRS–recording technology

1. FDRs shall not use engraving metal foil, frequency modulation, photographic film or magnetic tape.

## FDR and ADRS - duration

1. All FDRs shall retain the information recorded during at least the last 10 hours of their operation.

## CVR – Cockpit audio recording systems or CARS – applicability

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.
4. The maintenance requirements established in sub-regulations 148 (c) will apply.

## CVR- recording technology

1. CVRs shall not use magnetic tape or wire.

## CVR- duration

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

1. All helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which use any of the data link communications applications referred to in paragraph 5.1.2 of the Seventh Schedule to these Regulations and are required to carry a CVR, shall record the data link communications messages on a crash-protected flight recorder.
2. All helicopters for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to install and use any of the data link communications applications referred to in paragraph 5.1.2 of the Seventh Schedule to these Regulations shall record the data link communications messages on a crash-protected flight recorder unless the data link communications equipment is compliant with a type design or aircraft modification first approved prior to 1 January 2016.
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.
4. All helicopters for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in paragraph 5.1.2 of the Seventh Schedule to these Regulations shall record the data link communications messages on a crash-protected flight recorder.
5. The maintenance requirements established in sub-regulations 151 (5) will apply

## Data link recorders- duration

1. The minimum recording duration shall be equal to the duration of the CVR.

## Data link recorders- correlation

1. Data link recording shall allow correlation with the recorded cockpit audio.

## Flight recorders — general, construction and installation

1. Flight recorders shall be constructed, located and installed 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

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 required by the Civil Aviation (Aircraft Accident and Incident Investigation) Regulations.
4. 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.

## Continued serviceability

1. 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

1. The documentation requirement concerning FDR parameters provided by operators to accident investigation authorities shall be in electronic format and meet industry specifications.

## Emergency Locator Transmitter

1. From 1 July 2008, all helicopters operating in performance Class 1, 2 and 3 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in regulation 194 with at least one automatic ELT and one ELT in a raft or life jacket.
2. ELT equipment carried to satisfy the requirements of sub-regulation (1) shall operate in accordance with the requirements of the applicable Civil Aviation (Aeronautical Telecommunication – Communication Systems).

## Helicopters required to be equipped with pressure-altitude reporting transponder

1. All helicopters shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the requirements of the applicable Civil Aviation (Aeronautical Telecommunication - Surveillance Radar and Collision Avoidance Systems) Regulations.

## Microphones

1. 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 HUD or equivalent displays, EVS, SVS or CVS

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:
3. the equipment meets the appropriate airworthiness certification requirements;
4. 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
5. 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 – equipment

1. 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

1. Where EFBs are used on board a helicopter the pilot-in-command or the owner shall:
2. assess the safety risks associated with each EFB function;
3. establish and document the procedures for the use of and training requirements for the device and each EFB function; and
4. 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.
5. The Authority shall a issue a specific approval the operational use of EFB functions for the safe operation of helicopters.

## EFB specific approval

1. When issuing a specific approval for the operational use of EFBs, the Authority shall ensure that:
2. the EFB equipment and its associated installation hardware, including interaction with helicopter systems where applicable, meet the appropriate airworthiness certification requirements;
3. the owner has assessed the safety risks associated with the operations supported by the EFB functions;
4. the owner has established requirements for redundancy of the information where appropriate, contained and displayed by the EFB functions;
5. the owner has established and documented procedures for the management of the EFB functions including any databases it may use; and
6. the owner has established and documented the procedures for the use of, and training requirements for the EFB functions.

## Helicopter operated under an Article 83 bis agreement

1. A helicopter, when operating under an Article 83 bis agreement entered into between the State of Registry and the State of the principal location of a general aviation operator, shall carry a certified true copy of the agreement summary, in either an electronic or hard copy format.
2. When the agreement summary specified in sub-regulation (1) is issued in a language other than English, an English translation shall be included.
3. The agreement summary of an Article 83 bis agreement shall be accessible to a civil aviation safety inspector to determine which functions and duties are transferred by the State of Registry to the State of the principal location of a general aviation operator under the agreement, when conducting surveillance activities such as ramp checks.
4. The agreement summary shall be transmitted to ICAO together with the Article 83 bis Agreement for registration with the ICAO Council by the State of Registry or the State of the principal location of a general aviation operator.
5. The agreement summary shall contain the information for the specific aircraft and follow the layout specified in the Tenth Schedule to these Regulations

# HELICOPTER COMMUNICATION, NAVIGATION AND SURVEILLANCE EQUIPMENT

## Communication equipment

1. A helicopter operated in accordance with IFR or at night shall be provided with radio communication equipment.
2. The equipment in sub-regulation (a) shall be capable of conducting two-way communication with those aeronautical stations and on those frequencies prescribed by the appropriate authority or [state] Communication Commission or authority.
3. The requirements of sub-regulation (a) shall 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 (a) 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 or [state] Communication Commission or authority.
6. A helicopter to be operated on a flight to which the provisions of regulations 194 or 196 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 or [state] Communication Commission or 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, a helicopter shall, in addition to the requirements specified in these Regulation:
9. be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP specifications;
10. 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
11. have information relevant to the helicopter RCP specification capabilities included in the MEL.
12. The State of Registry shall establish criteria for operations where RCP specification for PBC has been prescribed.
13. In establishing criteria for operations where RCP specification for PBC has been prescribed, the State of Registry shall require that the operator or owner establish:
14. normal and abnormal procedures, including contingency procedures;
15. flight crew qualification and proficiency requirements, in accordance with appropriate RCP specifications;
16. a training programme for relevant personnel consistent with the intended operations; and
17. appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.
18. The Authority shall ensure that, in respect of those helicopters mentioned in sub-regulation (h), adequate provisions exist for:
19. receiving the reports of observed communication performance issued by monitoring programmes established in accordance with the applicable Civil Aviation (Air Traffic Services) Regulations.
20. taking immediate corrective action for individual helicopters, helicopter types or operators, identified in such reports as not complying with the RCP specifications.

## Navigation equipment

1. A helicopter shall be provided with navigation equipment which shall enable it to proceed in accordance with:
2. (a) its operational flight plan; and
3. (b) the requirements of air traffic services;

except when authorised by the appropriate authority, navigation for flights under VFR is accomplished by visual reference to landmarks.

1. For international general aviation, landmarks shall be located at least every 110 km or 60 NM.
2. For operations where a navigation specification for performance-based navigation has been prescribed, a helicopter shall, in addition to the requirements specified in sub-regulation (a):
3. be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification;
4. 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
5. have information relevant to the helicopter navigation specification capabilities included in the MEL.
6. The Authority shall establish criteria for operations where a navigation specification for PBN has been prescribed.
7. In establishing criteria for operations where a navigation specification for PBN has been prescribed, the Authority shall require that the operator or owner establish:
8. normal and abnormal procedures, including contingency procedures;
9. flight crew qualification and proficiency requirements, in accordance with the appropriate navigation specifications;
10. a training programme for relevant personnel consistent with the intended operations; and
11. appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate navigation specifications.
12. The Authority shall issue a specific approval for operations based on PBN authorization required or AR navigation specifications.
13. 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-regulation (a) and (b).
14. For international general aviation, sub-regulation (e) may be met by means other than the duplication of equipment.
15. On flights 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 affected.
16. The equipment in sub-regulation (i) 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

1. A helicopter shall be provided with surveillance equipment which shall 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, a helicopter shall, in addition to the requirements specified in Sub-regulation (a):
3. be provided with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specification;
4. 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
5. have information relevant to the helicopter RSP specification capabilities included in the MEL.
6. The Authority shall establish criteria for operations where an RSP specification for PBS has been prescribed.
7. When establishing criteria for operations where an RSP specification for PBS has been prescribed, the Authority shall require that the operator/owner establish:
8. normal and abnormal procedures, including contingency procedures;
9. flight crew qualification and proficiency requirements, in accordance with appropriate RSP specifications;
10. a training programme for relevant personnel consistent with the intended operations; and
11. appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RSP specifications.
12. The Authority shall ensure that, in respect of those helicopters mentioned in sub-regulation (b), adequate provisions exist for:
13. a) receiving the reports of observed surveillance performance issued by monitoring programmes established in accordance with the applicable Civil Aviation (Air Traffic Services) Regulations, and
14. b) taking immediate corrective action for individual helicopter, helicopter types or operators, identified in such reports as not complying with the RSP specifications.

# PART VIII

# EXEMPTION

## Application for exemptions

1. A person or operator may apply to the Authority for an exemption from any provision of these Regulations.
2. A request for exemption shall be made in accordance with the requirements of these Regulations and an application for such exemption shall be submitted and processed in a manner prescribed in the applicable technical guidance material.
3. A request for an exemption must contain the applicant’s:
4. name;
5. physical address and mailing address;
6. telephone number;
7. fax number where available; and
8. email address where available;
9. The application shall be accompanied by a fee prescribed by the Authority in the applicable aeronautical information circulars for technical evaluation.

## Exemption

1. The Authority may, upon consideration of the circumstances of a particular maintenance organisation, issue an exemption providing relief from specified provisions of these Regulations, provided that:
2. the Authority finds that the circumstances presented warrant the exemption; and
3. a level of safety shall be maintained equal to that provided by the Regulations from which the exemption is sought.
4. The exemption referred to in sub-regulation (a) may be terminated or amended at any time by the Authority.
5. A person or operator who receives an exemption shall have a means of notifying the management and appropriate personnel performing functions subject to the exemption.

# FIRST SCHEDULE

## LIGHTS TO BE DISPLAYED BY AEROPLANE (COMMERCIAL AIR TRANSPORT — AEROPLANES)

(Regulation 41)

* + - 1. **TERMINOLOGY**

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

***Angles of coverage.***

***Angles of coverage.***

1. 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.

1. 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.

1. 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.

1. 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**

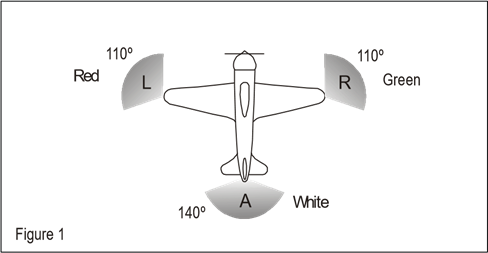
*Note. — The lights specified herein are intended to meet the requirements of the Civil Aviation (Rules of the Air) for navigation lights.*

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

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

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

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



**3. LIGHTS TO BE DISPLAYED ON THE WATER**

**3.1 General**

*Note. — The lights specified herein are intended to meet the requirements of the Civil Aviation (Rules of the Air) 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:

1. when under way;

1. when towing another vessel or aeroplane;

1. when being towed;

1. when not under command and not making way;

1. when making way but not under command;

1. when at anchor;

1. 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:

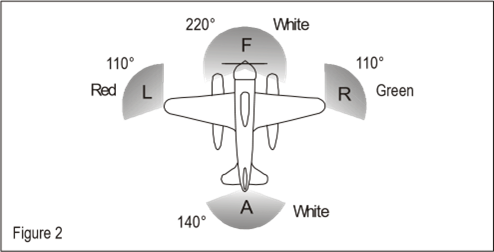
a) a red light projected above and below the horizontal through angle of coverage L;

1. a green light projected above and below the horizontal through angle of coverage R;

1. a white light projected above and below the horizontal through angle of coverage A; and

1. a white light projected through angle of coverage F.

The lights described in 3.2 a), b) and c) shall be visible at a distance of at least 3.7 km (2 NM). The light described in 3.2 d) shall 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.



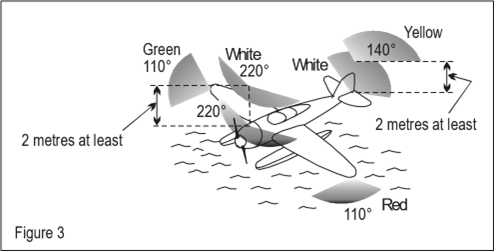
**3.3 When towing another vessel or aeroplane**

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

1. the lights described in 3.2;

1. 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

1. 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.



**3.4 When being towed**

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

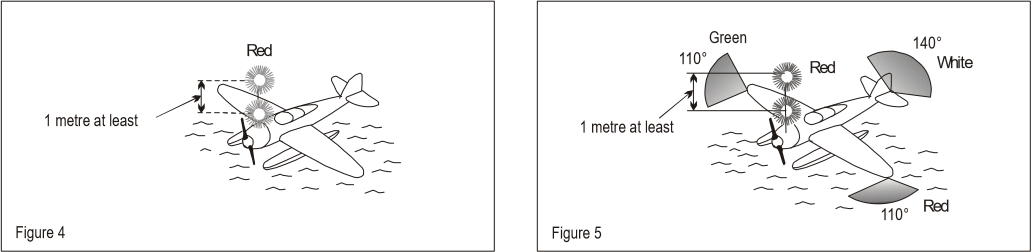
**3.5 When not under command and not making way**

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*



**3.7 When at anchor**

1. 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).

1. 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).

1. 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).



|  |  |  |
| --- | --- | --- |
| 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.

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# Second Schedule

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

*(Regulation 62)*

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 – 0.013z2 for 0 ≤ z ≤ 25 when z is the magnitude of the mean TVE in metres, or 92 – 0.004z2 for 0 ≤ z ≤ 80 where z is in feet. In addition, the components of TVE shall have the following characteristics:

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

1. 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

1. 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:

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

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.

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# THIRD SCHEDULE

## FLIGHT RECORDERS (COMMERCIAL AIR TRANSPORT — AEROPLANES)

*(Regulation 17 and 29)*

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:

* a flight data recorder (FDR),
* a cockpit voice recorder (CVR),
* an airborne image recorder (AIR),
* a data link recorder (DLR).

When image or data link information is required to be recorded on a crash-protected flight recorder, it is permissible to record it on either the CVR or the FDR.

Lightweight flight recorders comprise one or more of the following:

* an aircraft data recording system (ADRS),
* a cockpit audio recording system (CARS),
* an airborne image recording system (AIRS),
* a data link recording system (DLRS).

When image or data link information is required to be recorded on a lightweight flight recorder, it is permissible to record it on either the CARS or the ADRS

1. **GENERAL REQUIREMENTS**

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

* 1. Non-deployable crash-protected flight recorder containers shall:

1. carry reflective material to facilitate their location; and

1. 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:

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

1. carry reflective material to facilitate their location; and

1. have an integrated automatically activated ELT.

1.4 The flight recorder systems shall be installed so that:

1. the probability of damage to the recordings is minimized;

1. there is an aural or visual means for pre-flight checking that the flight recorder systems are operating properly; and

1. 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

1. 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. The crash-protected flight recorders shall be installed so that they receive electrical power from a bus that provides the maximum reliability for operation of the flight recorders without jeopardizing service to essential or emergency loads.
  2. The lightweight flight recorders shall be connected to a power source having the characteristics which ensure proper and reliable recording in the operational environment.

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

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

1. manufacturer’s operating instructions, equipment limitations and installation procedures;

1. parameter origin or source and equations which relate counts to units of measurement; and

1. 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***

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

1. 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;

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

* 1. warnings and alerts; and

* 1. the identity of displayed pages for emergency procedures and checklists; and

1. 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 the first 7 parameters listed in Table A8-3.

2.2.5 Where further ADRS recording capacity is available, the recording of any parameters from 8 onwards defined in Table A8-3 shall be considered.

**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.

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

* 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.

* 1. **Signals to be recorded**

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

1. voice communication transmitted from or received in the aeroplane by radio;

1. aural environment on the flight deck;

1. voice communication of flight crew members on the flight deck using the aeroplane’s interphone system, when installed;

1. voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and

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

3.2.2 The preferred CVR audio allocation shall be as follows:

1. pilot-in-command audio panel;

1. co-pilot audio panel;

1. additional flight crew positions and time reference; and

1. cockpit area microphone.

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

1. voice communication transmitted from or received in the aeroplane by radio;

1. aural environment on the flight deck; and

1. 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 shall be as follows:

1. voice communication; and

1. 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.— where 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 Chapter 6, 6.18.*

***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 Where 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:

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

1. 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;

1. 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;

1. 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;

1. 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

1. 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.
2. an examination of the recorded messages on the DLR or DLRS shall be carried out by replay of the DLR or DLRS recording.

* 1. 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.

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

* 1. Calibration of the FDR system:

1. 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

1. 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 24 hours 4 ±0.125%/h 1 s available, otherwise relative time count or GNSS time sync)
2. Pressure-altitude –300 m (–1 000 ft) to 1 ±30 m to ±200 1.5 m (5 ft) maximum certificated m

altitude of aircraft (±100 ft to

+1 500 m (+5 000 ft) ±700 ft)

1. Indicated airspeed or 95 km/h (50 kt) to max 1 ±5% 1 kt (0.5 kt

calibrated airspeed VSo *(Note 1)* recommended)

VSo to 1.2 VD *(Note 2)* ±3%

1. Heading (primary 360° 1 ±2° 0.5° flight crew reference)
2. Normal acceleration Application for type certification is –3 g to +6 g 0.125 ±1% of 0.004 g

(*Note 8*) submitted to a Contracting State before maximum

1 January 2016 range

excluding

datum error of

±5%

Application for type certification is –3 g to +6 g 0.0625 ±1% of 0.004 g submitted to a Contracting State on or maximum

after 1 January 2016 range

excluding

datum error of

±5%

1. Pitch attitude ±75° or usable range 0.25 ±2° 0.5° whichever is greater
2. Roll attitude ±180° 0.25 ±2° 0.5°
3. Radio transmission On-off (one discrete) 1 keying
4. Power on each Full range 1 (per ±2% 0.2% of full engine engine) range or the

*(Note 3)* resolution

required to operate the aircraft

10\* Trailing edge flap Full range or each 2 ±5% or as 0.5% of full and cockpit discrete position pilot’s range or the control selection indicator resolution

required to operate the aircraft

11\* Leading edge flap Full range or each 2 ±5% or as 0.5% of full and cockpit discrete position pilot’s range or the control selection indicator resolution

required to operate the

aircraft

12\* Thrust reverser Stowed, in transit, 1 (per position and reverse engine)

13\* Ground spoiler/speed Full range or each 1 ±2% unless 0.2% of full brake discrete position higher range selection (selection accuracy and position) uniquely

required

14 Outside air Sensor range 2 ±2°C 0.3°C

temperature

15\* Autopilot/auto A suitable 1 throttle/AFCS combination mode and of discretes engagement status

1. Longitudinal Application for type certification ±1 g 0.25 ±0.015 g 0.004 g acceleration submitted to a Contracting State before excluding a

(*Note 8*) 1 January 2016 datum error of

±0.05 g

Application for type certification ±1 g 0.0625 ±0.015 g 0.004 g submitted to a Contracting State on or excluding a

after 1 January 2016 datum error of

±0.05 g

1. Lateral acceleration Application for type certification ±1 g 0.25 ±0.015 g 0.004 g

(*Note 8*) submitted to a Contracting State before excluding a

1 January 2016 datum error of

±0.05 g

Application for type certification ±1 g 0.0625 ±0.015 g 0.004 g submitted to a Contracting State on or excluding a

after 1 January 2016 datum error of

±0.05 g

1. Pilot input and/or Application for type certification Full range 0.25 ±2° unless 0.2% of full

control submitted to a Contracting State before higher range or as surface position- 1 January 2016 accuracy installed

primary uniquely controls (pitch, roll, required yaw)

*(Notes 4 and 8)*

Application for type certification Full range 0.125 ±2° unless 0.2% of full

submitted to a Contracting State on or higher range or as

after 1 January 2016 accuracy installed

uniquely

required

19 Pitch trim position Full range 1 ±3% unless 0.3% of full

higher range or as

accuracy installed uniquely

required

20\* Radio altitude –6 m to 750 m 1 ±0.6 m (±2 ft) 0.3 m (1 ft)

(–20 ft to 2 500 ft) or ±3% below 150 m

whichever is (500 ft) 0.3 m

greater below (1 ft) + 0.5% of

150 m full range above

(500 ft) and 150 m (500 ft)

±5% above

150 m

(500 ft)

21\* Vertical beam Signal range 1 ±3% 0.3% of full deviation range

(ILS/GNSS/GLS glide path, MLS elevation,

IRNAV/IAN vertical deviation)

22\* Horizontal beam Signal range 1 ±3% 0.3% of full deviation range

(ILS/GNSS/GLS localizer, MLS azimuth,

IRNAV/IAN lateral deviation)

1. Marker beacon Discrete 1 passage
2. Master warning Discrete 1
3. Each NAV receiver Full range 4 As installed frequency selection *(Note 5)*

26\* DME 1 and 2 0 – 370 km 4 1 852 m (1 NM) distance (includes (0 – 200 NM)

Distance to runway threshold (GLS) and Distance to missed approach point (IRNAV/IAN))

*(Notes 5 and 6)*

27 Air/ground status Discrete 1

28\* GPWS/TAWS/GCA Discrete 1

S 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)

29\* Angle of attack Full range 0.5 As installed 0.3 % of full

range

30\* Hydraulics, each Discrete 2 0.5% of full system range

(low pressure)

31\* Navigation data As installed 1 As installed

(latitude/longitude, ground speed and drift angle) *(Note 7)*

32\* Landing gear and Discrete 4 As installed gear selector position

33\* Groundspeed As installed 1 Data shall be 1 kt

obtained from the most accurate

system

34 Brakes (left and right (Maximum metered 1 ±5% 2% of full brake pressure, left brake range, discretes range and right brake pedal or full range) position)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 35\* | Additional engine Engine fuel metering valve position: parameters (EPR, N1, Application for type certification is | | As installed | Each engine each second |  | 2% of full range |
| indicated vibration level, N2, EGT, fuel flow, fuel cut-off lever position, N3, engine fuel metering valve position) | submitted to a Contracting State on or after 1 January 2023 |
| 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, copilot) |  | 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\* | Multifunction/engine/alert s 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 | |  | |  | |
| 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 | |
| Serial  number | | Parameter | Applicability | | | Measurement range | | Maximum  sampling and recording interval  (seconds) | | Accuracy limits (sensor input  compared to FDR readout) | | Recording resolution | |
| 67\* | | Roll trim surface position |  | | | Full range | | 2 | | ±3% unless higher  accuracy uniquely required | | 0.3% of full range | |
| 68\* | | Yaw or sideslip angle |  | | | Full range | | 1 | | ±5% | | 0.5° | |
| 69\* | | De-icing and/or antiicing 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. VSo stalling speed or minimum steady flight speed in the landing configuration is in Section “Abbreviations and Symbols”.

1. VD design diving speed.

1. Record sufficient inputs to determine power.

1. 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.

1. Where signal available in digital form.

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

1. When signals readily available.

1. 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***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Parameter name | Minimum  recording range | Maximum recording  interval in seconds | Minimum recording accuracy | Minimum recording resolution | Remarks |

1. Heading
   * + - 1. Heading (Magnetic ±180º 1 ±2° 0.5° Heading is preferred, if not or True) available, yaw rate shall be

recorded

* + - * 1. Yaw rate ±300º/s 0.25 ±1% + drift 2°/s of 360°/h

1. Pitch
   * + - 1. Pitch attitude ±90º 0.25 ±2º 0.5° Pitch attitude is preferred, if

not available, pitch rate shall be recorded

* + - * 1. Pitch rate ±300º/s 0.25 ±1% + drift 2°/s of 360°/h

1. Roll
   * + - 1. Roll attitude ±180º 0.25 ±2º 0.5° Roll attitude is preferred, if

not available, roll rate shall be recorded

* + - * 1. Roll rate ±300º/s 0.25 ±1% + drift 2°/s of 360°/h

1. Positioning system:
   * + - 1. Time 24 hours 1 ±0.5 s 0.1 s UTC time preferred where

available.

* + - * 1. Latitude/longitude Latitude:±90° 2 As installed 0.00005°

Longitude:±180° (1 if available) (0.00015°

recommended)

* + - * 1. Altitude –300 m (–1 000 ft) to 2 As installed 1.5 m (5 ft)

maximum certificated (1 if available) (±15 m (±50 ft) altitude of aeroplane recommended)

+1 500 m (5 000 ft)

* + - * 1. Ground speed 0–1 000 kt 2 As installed 1 kt

(1 if available) (±5 kt recommended)

e) Track 0–360º 2 As installed 0.5°

(1 if available) (± 2º recommended)

f) Estimated error Available range 2 As installed As installed Shall be recorded if readily

(1 if available) available

1. Normal acceleration –3 g to + 6 g (\*) 0.25 (0.125 if As installed (± 0.09 g 0.004 g

available) excluding a datum error of ±0.45 g recommended)

1. Longitudinal ±1 g (\*) 0.25 (0.125 if As installed (±0.015 g 0.004 g acceleration available) excluding a datum error

of ±0.05 g recommended)

1. Lateral acceleration ±1 g (\*) 0.25 (0.125 if

available)

1. External static pressure 34.4 mb (3.44 in-Hg) to 1

(or pressure altitude) 310.2 mb (31.02 in-Hg)

or available sensor range

1. Outside air –50° to +90°C or 2 temperature (or total available sensor range air temperature)
2. Indicated air speed As the installed pilot 1

display measuring

system or available

sensor range

1. Engine RPM Full range including Each engine overspeed condition each second
2. Engine oil pressure Full range Each engine each second
3. Engine oil temperature Full range Each engine each second
4. Fuel flow or pressure Full range Each engine each second
5. Manifold pressure Full range Each engine each second
6. Engine Full range Each engine thrust/power/torque each second

parameters required to determine propulsive thrust/power\*

1. Engine gas generator 0-150% Each engine speed (Ng) each second
2. Free power turbine 0-150% Each engine speed (Nf) each second
3. Coolant temperature Full range 1
4. Main voltage Full range Each engine

each second

1. Cylinder head Full range Each cylinder temperature each second
2. Flaps position Full range or each 2

discrete position

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Parameter name | Minimum  recording range | Maximum recording  interval in seconds | Minimum recording accuracy | Minimum recording resolution | Remarks |

As installed (±0.015 g 0.004 g

|  |  |  |
| --- | --- | --- |
| 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) | |
| As installed  (±2°C recommended) | 1°C | |
| As installed  (±3 % recommended) | 1 kt (0.5 kt recommended) | |
| As installed | 0.2% of full range |  |
| As installed  (5% of full range recommended) | 2% of full range |  |
| As installed  (5% of full range recommended) | 2% of full range |  |
| As installed | 2% of full range |  |
| As installed | 0.2% of full range |  |
| 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 shall be provided. |
| As installed | 0.2% of full range |  |
| As installed | 0.2% of full range |  |
| As installed  (±5°C recommended) | 1° C |  |
| As installed | 1 Volt |  |
| As installed | 2% of full range |  |
| As installed | 0.5° |  |

excluding a datum error of ±0.05 g recommended)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Parameter name | Minimum  recording range | Maximum recording  interval in seconds | Minimum recording accuracy | Minimum recording resolution | Remarks |
| 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 downand-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 77)*

***1. TERMINOLOGY***

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

***Angles of coverage.***

1. 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.

1. 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.

1. 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.

1. 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***

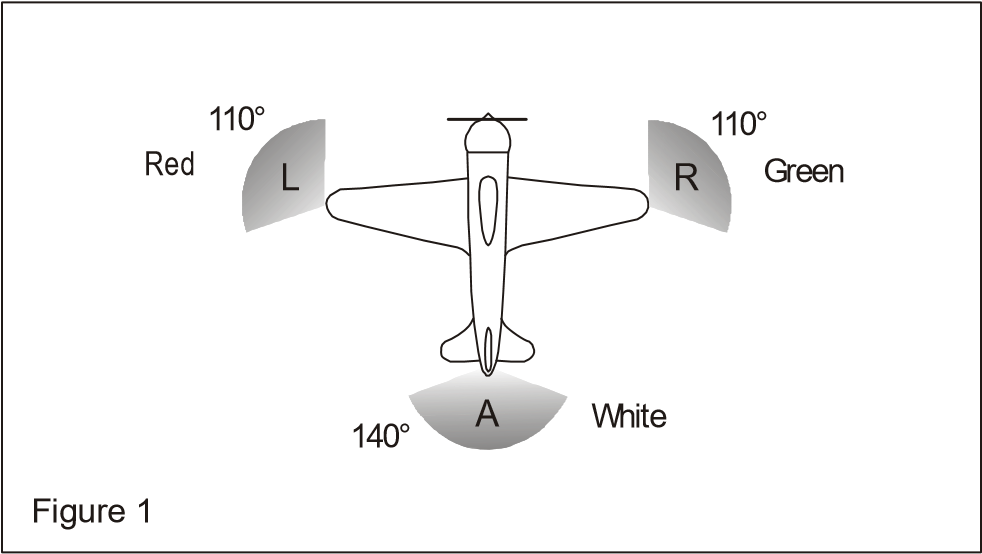
*Note.— The lights specified herein are intended to meet the requirements of Civil Aviation (Rules of the Air) Regulations for navigation lights.*

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

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

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

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



***3. LIGHTS TO BE DISPLAYED ON THE WATER***

**3.1 General**

*Note.— The lights specified herein are intended to meet the requirements of the applicable Civil Aviation (Rules of the Air) Regulations 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:

1. when under way;

1. when towing another vessel or aeroplane;

1. when being towed;

1. when not under command and not making way;

1. when making way but not under command;

1. when at anchor;

1. 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:

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

1. a green light projected above and below the horizontal through angle of coverage R;

1. a white light projected above and below the horizontal through angle of coverage A; and

1. a white light projected through angle of coverage F.

The lights described in a), b) and c) shall be visible at a distance of at least 3.7 km (2 NM). The light described in d) shall 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.

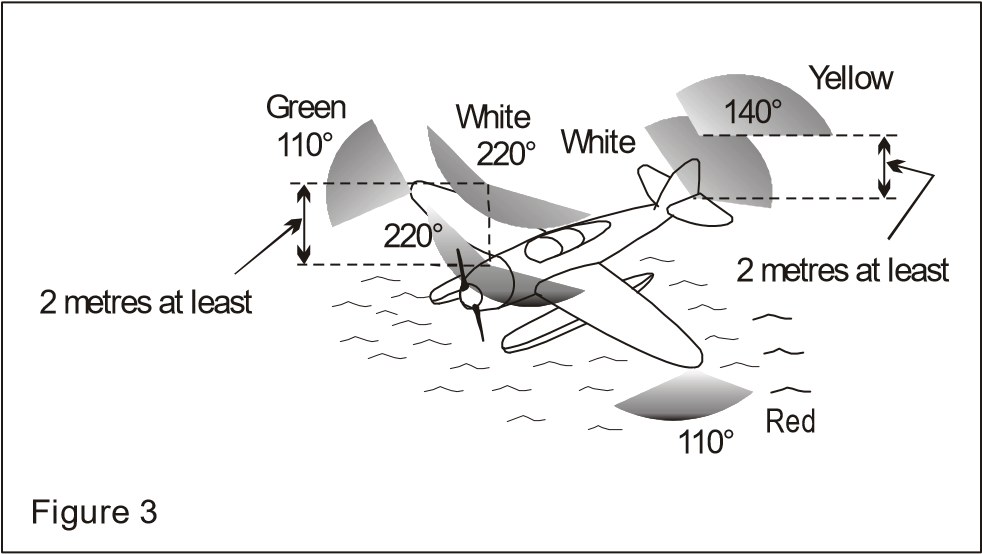
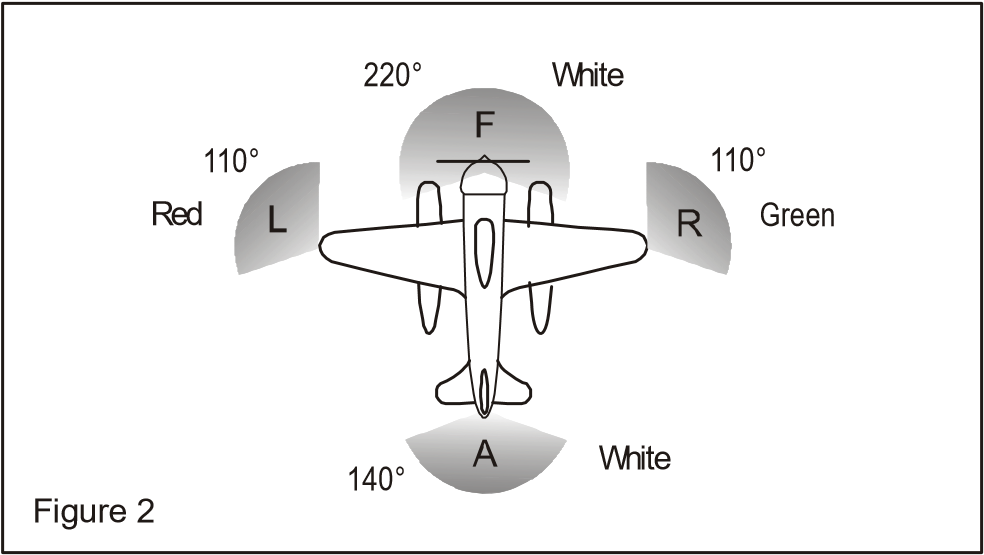
3.3 When towing another vessel or aeroplane

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

1. the lights described in 3.2;

1. 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

1. 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.



**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).

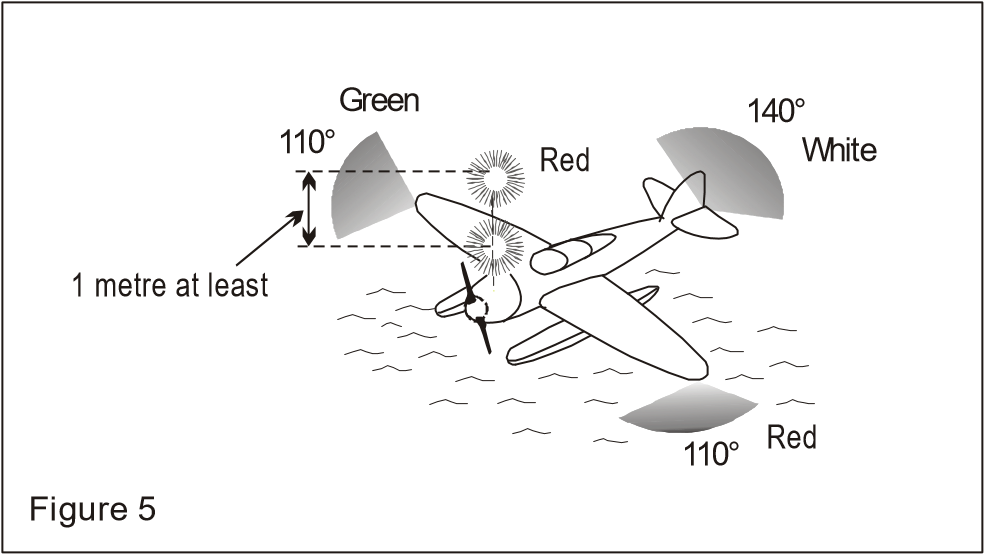
*Note. — The display of lights prescribed in 3.5 and 3.6 is to be taken by other aircraft as signals that the aeroplane showing them is not under command and cannot therefore get out of the way. They are not signals of aeroplanes in distress and requiring assistance.*

Red

1

metre at least

Figure 4



3.7 When at anchor

1. 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).

1. 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).

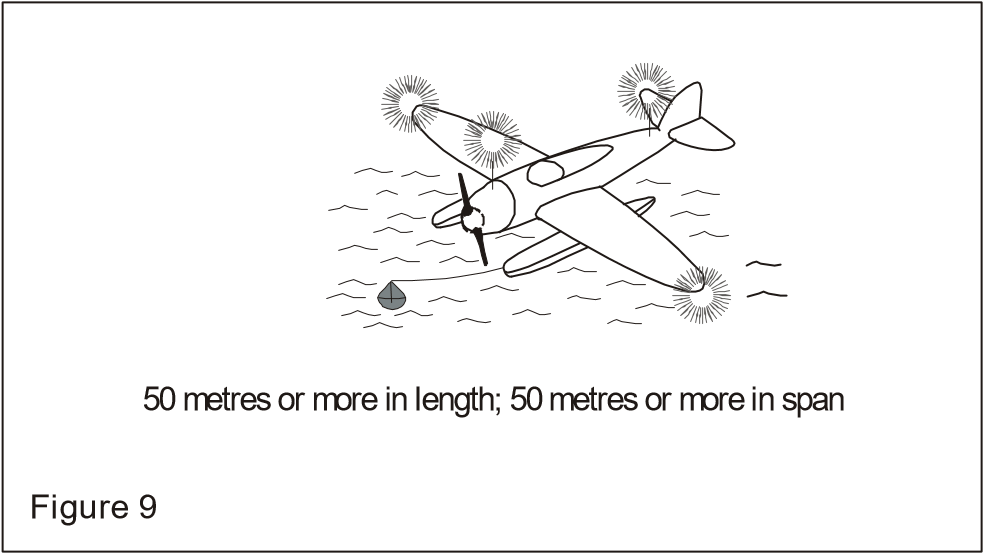
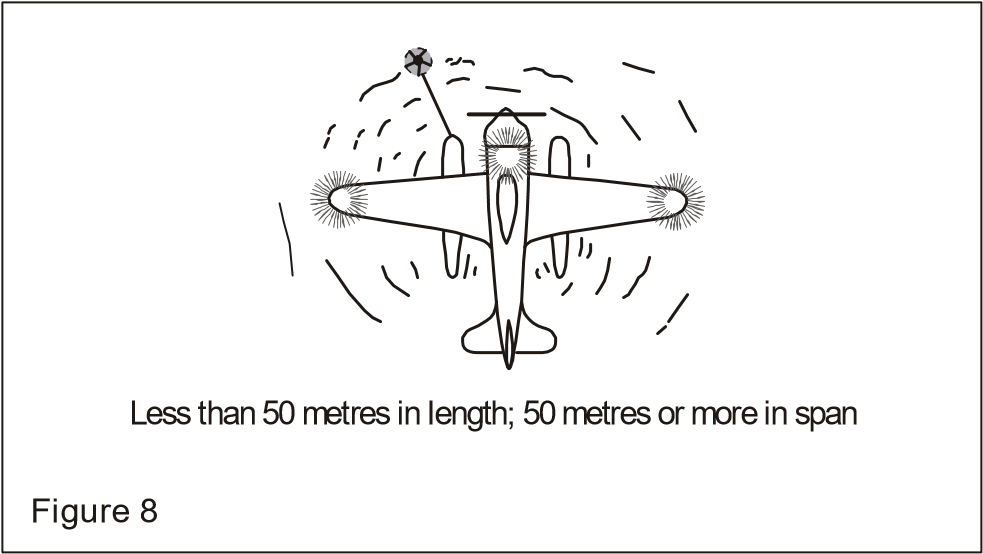
Figure 6

Figure 7

1. 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.



# FIFTH SCHEDULE

## ALTIMETRY SYSTEM PERFORMANCE REQUIREMENTS FOR OPERATIONS IN RVSM AIRSPACE (GENERAL AVIATION — AEROPLANES)

*(Regulation 105)*

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 – 0.013z2 for 0 ≤ z ≤ 25 when z is the magnitude of the mean TVE in metres, or 92 – 0.004z2 for 0 ≤ z ≤ 80 where z is in feet. In addition, the components of TVE shall have the following characteristics:

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

1. 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

1. 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:

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

1. 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)

*(Regulation 110)*

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:

* a flight data recorder (FDR),
* a cockpit voice recorder (CVR),
* an airborne image recorder (AIR),
* a data link recorder (DLR).

When image or data link information is required to be recorded on a crash-protected flight recorder, it is permissible to record it on either the CVR or the FDR.

Lightweight flight recorders comprise one or more of the following:

* an aircraft data recording system (ADRS),
* a cockpit audio recording system (CARS),
* an airborne image recording system (AIRS),
* a data link recording system (DLRS).

When image or data link information is required to be recorded on a lightweight flight recorder, it is permissible to record it on either the CARS or the ADRS.

***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:

1. carry reflective material to facilitate their location; and

1. 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:

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

1. carry reflective material to facilitate their location; and

1. have an integrated automatically activated ELT.

1.4 The flight recorder systems shall be installed so that:

1. the probability of damage to the recordings is minimized;

1. there is an aural or visual means for pre-flight checking that the flight recorder systems are operating properly; and

1. 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

1. 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. The crash-protected flight recorder shall be installed so that they receive electrical power from a bus that provides the maximum reliability for operation of the flight recorder without jeopardizing service to essential or emergency loads.
  2. The lightweight flight recorders shall be connected to a power source having the characteristics which ensure proper and reliable recording in the operational environment.

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

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

1. manufacturer’s operating instructions, equipment limitations and installation procedures;

1. parameter origin or source and equations which relate counts to units of measurement; and

1. 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**

2.2.1 The parameters that satisfy the requirements for FDRs are the first 7 parameters 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 shall be considered:

1. 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;

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

* 1. warnings and alerts; and

* 1. the identity of displayed pages for emergency procedures and checklists;

1. 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.

2.2.5 Where further ADRS recording capacity is available, the recording of any parameters from 8

onwards defined in Table A2.3-3 shall be considered.

**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:

1. voice communication transmitted from or received in the aeroplane by radio;

1. aural environment on the flight deck;

1. voice communication of flight crew members on the flight deck using the aeroplane’s interphone system, if installed;

1. voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and

1. digital communications with ATS, unless recorded by the FDR.

3.2.2 The preferred CVR audio allocation shall be as follows:

1. pilot-in-command audio panel;

1. co-pilot audio panel;

1. additional flight crew positions and time reference; and

1. cockpit area microphone.

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

1. voice communication transmitted from or received in the aeroplane by radio;

1. aural environment on the flight deck; and

1. 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 shall be as follows:

1. voice communication; and

1. 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:

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

1. 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;

1. 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;

1. 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;

1. 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

1. 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.
2. an examination of the recorded messages on the DLR or DLRS shall be carried out by replay of the DLR or DLRS recording.

* 1. 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.

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

* 1. Calibration of the FDR system:

1. 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

1. 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  4  5  6  7  8  9  10\* | Indicated airspeed or calibrated airspeed  Heading (primary flight crew reference)  Normal acceleration  Pitch attitude  Roll attitude  Radio transmission keying  Power on each engine (Note 3)  Trailing edge flap and cockpit control selection |  | 95 km/h (50 kt) to max Vso  (Note 1)  V to 1.2 Vso D (Note 2)  360°  –3 g to +6 g  ±75° or usable range whichever is greater  ±180°  On-off (one discrete)  Full range  Full range or each discrete position | 1  1  0.125  0.25  0.25  1  1 (per engine)  2 | ±5%    ±3%  ±2°  ±1% of maximum  range excluding  datum error of  ±5%  ±2°  ±2°    ±2%  ±5% or as pilot’s indicator | 1 kt (0.5 kt  recommended)  0.5°  0.004 g  0.5°  0.5°    0.2% of full range or the resolution  required to  operate the aircraft  0.5% of full range or the resolution  required to  operate the aircraft |

15\* Autopilot/auto A suitable combination 1 throttle/AFCS mode of discretes and engagement status

1. Longitudinal ±1 g 0.25 ±0.015 g acceleration excluding a

datum error of

±0.05 g

1. Lateral acceleration ±1 g 0.25 ±0.015 g

(Note 3) excluding a

datum error of

±0.05 g

1. Pilot input and/or Application for type Full range 0.25 ±2° unless control surface certification submitted to a higher accuracy position-primary Contracting State before uniquely controls (pitch, roll, 1 January 2016 required yaw) (Notes 4 and 8)

Application for type Full range 0.125 ±2° unless certification submitted to a higher accuracy

Contracting State on or uniquely after 1 January 2016 required

1. Pitch trim position Full range 1 ±3% unless

higher accuracy uniquely

required

20\* Radio altitude –6 m to 750 m 1 ±0.6 m (±2 ft) (–20 ft to 2 500 ft) or ±3%

whichever is

greater below

150 m

(500 ft) and ±5% 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 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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 |

0.004 g

0.004 g

0.2% of full range or

as installed

0.2% of full range or as installed

0.3% of full range or

as installed

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 shall be obtained from the most  accurate system | 1 kt |
| 34 | Brakes (left and right brake pressure, left and right brake pedal position) |  | (Maximum metered  brake range, discretes or full range) | 1 | ±5% | 2% of full range |
| 35\* | Additional engine parameters (EPR, N1, indicated vibration level, N2, EGT, fuel flow, fuel cut-off lever position, N3 engine fuel metering valve position) | Engine fuel metering valve position: Application for type certification is submitted to a Contracting  State on or after 1 January  2023 | As installed | Each engine each second | As installed | 2% of full range |
| 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. Vso *stalling speed or minimum steady flight speed in the landing configuration is in Section “Abbreviations and Symbols”.*

1. *VD design diving speed.*

1. *Record sufficient inputs to determine power.*

1. *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.*

1. *If signal available in digital form.*

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

1. *If signals readily available.*

1. *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:

1. a) Heading (Magnetic or ±180° 1 ±2° 0.5° \* Heading is

True) preferred, if not

available, yaw rate shall be recorded

b) Yaw rate ±300°/s 0.25 ±1% + drift of 2°/s

360°/h

1. Pitch:
   1. Pitch attitude ±90° 0.25 ±2° 0.5° \* Pitch altitude

is preferred, if not available, pitch rate shall be recorded

* 1. Pitch rate 300°/s 0.25 ±1% + drift of 2°/s

360°/h

1. Roll:
   1. Roll attitude ±180° 0.25 ±2° 0.5° \* If not

available, roll rate shall be recorded

* 1. Roll rate 300°/s 0.25 ±1% + drift of 2°/s

360°/h

1. Positioning system:
   1. Time 24 hours 1 ±0.5 s 0.1 s UTC time

preferred where available

* 1. Latitude/longitude Latitude: ±90° 2 As installed 0.00005°

Longitude: ±180° (1 if available) (0.00015°

recommended)

* 1. Altitude –300 m (–1 000 ft) 2 As installed 1.5 m (5 ft)

to maximum (1 if available) (±15 m (±50 ft) certificated altitude recommended) of aircraft + 1 500 m (5 000 ft)

* 1. Ground speed 0–1 000 kt 2 As installed 1 kt

(1 if available) (±5 kt

recommended)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 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/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 shall 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-andlocked position |
| 29 | Novel/unique aircraft features | As required | As required | | | As required | | As required |  |

# SEVENTH SCHEDULE

## FLIGHT RECORDERS- HELICOPTER OPERATIONS)

*(Regulation 143 and 198)*

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:

— a flight data recorder (FDR),

— a cockpit voice recorder (CVR), — an airborne image recorder (AIR),

— a data link recorder (DLR).

When image or data link information is required to be recorded on a crash-protected flight recorder, it is permissible to record it on either the CVR or the FDR.

Lightweight flight recorders comprise one or more of the following:

— an aircraft data recording system (ADRS),

— a cockpit audio recording system (CARS),

— an airborne image recording system (AIRS),

— a data link recording system (DLRS).

When image or data link information is required to be recorded on a crash-protected flight recorder, it is permissible to record it on either the CARS or the ADRS.

***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:

1. carry reflective material to facilitate their location; and

1. 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:

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

1. carry reflective material to facilitate their location; and

1. have an integrated automatically activated ELT.

1.4 The flight recorder systems shall be installed so that:

1. the probability of damage to the recordings is minimized;

1. there is an aural or visual means for preflight checking that the flight recorder systems are operating properly; and

1. 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

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

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

* 1. The manufacturer usually provides the appropriate certificating authority with the following information in respect of the flight recorder systems:

1. ) manufacturer’s operating instructions, equipment limitations and installation procedures;

1. ) 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**

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:

1. 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

1. additional engine parameters (EPR, N1, fuel flow, etc.).

2.2.4 The parameters that satisfy the requirements for ADRS are the first 7 parameters listed in Table A4-3.

2.2.5 Where further ADRS recording capacity is available, the recording of any parameters from 8 onwards defined in Table A4-3 shall be considered.

**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:

1. voice communication transmitted from or received in the aircraft by radio;

1. aural environment on the flight deck;

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

1. voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and

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

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

1. *pilot-in-command audio panel;*

1. *co-pilot audio panel;*

1. *additional flight crew positions and time reference; and*

1. *cockpit area microphone.*

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

1. voice communication transmitted from or received in the helicopter by radio;

1. aural environment on the flight deck; and

1. 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 shall be as follows:*

1. *voice communication; and*

1. *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:

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

1. 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;

1. 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;

1. 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;

1. 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

1. 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.
2. an examination of the recorded messages on the DLR or DLRS shall be carried out by replay of the DLR or DLRS recording.

* 1. 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.

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

* 1. Calibration of the FDR system:

1. 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

1. 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 Parameter Applicability Measurement range Maximum Accuracy limits Recording number sampling and (sensor input resolution

recording compared to FDR

interval readout)

(seconds)

l Time (UTC 24 hours 4 ±0.125% /h 1 s when available, otherwise relative time count or GNSS time sync)

1. Pressure altitude –300 m (–1 000 ft) to 1 ±30 m to ±200 m 1.5 m (5 ft) maximum certificated (±100 ft to ±700 ft) altitude of aircraft

+1 500 m (+5 000 ft)

1. Indicated airspeed As the installed pilot 1 ±3% 1 kt

display measuring system

1. Heading 360° 1 ±2° 0.5°
2. Normal acceleration –3 g to +6 g 0.125 ±0.09 g excluding a 0.004 g

datum error of ±0.045 g

1. Pitch attitude ±75° or 100% of 0.5 ±2° 0.5°

useable range

whichever is greater

1. Roll attitude ±180° 0.5 ±2° 0.5°
2. Radio On-off (one discrete) 1 — — transmission keying
3. Power on each Full range 1 (per engine) ±2% 0.1% of full range

engine

1. Main rotor:

Main rotor speed 50–130% 0.51 ±2% 0.3% of full range

—

Rotor brake Discrete —

1. Pilot input and/or Full range 0.5 ±2% unless higher 0.5% of operating range control surface (0.25 accuracy uniquely

position recommended) required

— primary controls

(collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal)

1. Hydraulics, each Discrete 1 — — system (low pressure and selection)
2. Outside air Sensor range 2 ±2°C 0.3°C temperature

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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/m2 (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) |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 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  (T4) |  | As installed | 1 | As installed |  |  |
| 32\* | Turbine inlet temperature (TIT/ITT) |  | As installed | 1 | As installed |  |  |
| 33\* | Fuel contents |  | As installed | 4 | As installed |  |  |
| 34\* | Altitude rate |  | As installed | 1 | As installed |  |  |
| 35\* | Ice detection |  | As installed | 4 | As installed |  |  |
| 36\* | Helicopter health and usage monitor system |  | As installed | — | As installed |  | — |
| 37 | Engine control modes |  | Discrete | 1 | — |  | — |
| 38\* | Selected barometric setting (pilot and co-pilot) |  | As installed | 64  (4 recommended) | As installed |  | 0.1 mb  (0.01 in Hg) |
| 39\* | Selected altitude (all pilot selectable modes of operation) |  | As installed | 1 | As installed | Sufficient to determine crew selection | |
| 40\* | Selected speed  (all pilot selectable modes of operation) |  | As installed | 1 | As installed | Sufficient to determine crew selection | |
| 41\* | Selected Mach  (all pilot selectable modes of operation) |  | As installed | 1 | As installed | Sufficient to determine crew selection | |
| 42\* | Selected vertical speed (all pilot selectable modes of operation) |  | As installed | 1 | As installed | Sufficient to determine crew selection | |
| 43\* | Selected heading  (all pilot selectable  modes of operation) |  | As installed | 1 | As installed | Sufficient to determine crew selection | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 44\* | Selected flight path (all pilot selectable modes of operation) | As installed | 1 | As installed | Sufficient to determine crew selection |
| 45\* | Selected decision  height | As installed | 4 | As installed | Sufficient to determine crew selection |
| 46\* | EFIS display format  (pilot and co-pilot) | Discrete(s) | 4 | — | — |
| 47\* | Multi-  function/ engine/alerts display format | Discrete(s) | 4 | — | — |
| 48\* | Event marker | Discrete | 1 | — | — |
| 49\* | GPWS/TAWS/GCAS Application for  status (selection of type terrain display mode certification is including pop-up submitted to a display status) and Contracting (terrain alerts, both State on or  cautions and warnings, after 1 January  and advisories) and 2023 (on/off switch position)  and (operational status) | Discrete(s) | 1 | As installed |  |
| 50\* | TCAS/ACAS (traffic Application for alert and collision type avoidance system) and certification is (operational status) submitted to a Contracting State on or after 1 January  2023 | Discrete(s) | 1 | As installed |  |
| 51\* | Primary flight controls Application for – pilot input forces 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 |

**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**

Maximum

recording Minimum Minimum Minimum interval in recording recording

N° Parameter name recording range seconds accuracy 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 |

Maximum

recording Minimum Minimum Minimum interval in recording recording

N° Parameter name recording range seconds accuracy resolution Remarks

1. Normal acceleration –3 g to + 6 g 0.25 As installed 0.004 g (0.125 if (±0.09 g available) excluding a

datum error of

±0.05 g recommended)

1. Longitudinal acceleration ±1 g 0.25 As installed 0.004 g

(0.125 if (±0.015 g available) excluding a

datum error of

±0.05 g recommended)

1. Lateral acceleration ±1 g 0.25 As installed 0.004 g

(0.125 if (±0.015 g available) excluding a

datum error of

±0.05 g recommended)

1. External static pressure 34.4 hPa (1.02 in-Hg) 1 As installed 0.1 hPa

(or pressure altitude) to 310.2 hPa (±1 hPa (0.03 in-Hg) or (9.16 in-Hg) or (0.3 in-Hg) or 1.5 m (5 ft) available sensor ±30 m (±100 ft) range to ±210 m

(±700 ft) recommended)

1. Outside air temperature –50° to +90°C or 2 As installed 1°C (or total air temperature) available sensor (±2°C

range recommended)

1. Indicated air speed As the installed pilot 1 As installed 1 kt (0.5 kt

display measuring (±3% recommended) system or available recommended) sensor range

1. Main rotor speed (Nr) 50% to 130% or 0.5 As installed 0.3% of full

available sensor range range

1. Engine RPM (\*) Full range including Each engine each As installed 0.2% of full \*For piston-

overspeed condition second range engined

helicopters

1. Engine oil pressure Full range Each engine each As installed 2% of full range

second (5% of full range

recommended)

1. Engine oil temperature Full range Each engine each As installed 2% of full range

second (5% of full range

recommended)

1. Fuel flow or pressure Full range Each engine each As installed 2% of full range

second

1. Manifold pressure (\*) Full range Each engine each As installed 0.2% of full \*For piston-

second range engined

helicopters

Maximum

recording Minimum Minimum Minimum interval in recording recording

N° Parameter name recording range seconds accuracy resolution Remarks

1. Engine thrust/power/ Full range Each engine each As installed 0.1% of full \*Sufficient

torque parameters second range parameters e.g.

required to determine EPR/N1 or propulsive thrust/power\* torque/Np as

appropriate to the particular engine shall be recorded to determine power. A margin for possible overspeed shall be provided. Only for turbineengined helicopters.

1. Engine gas generator 0–150% Each engine each As installed 0.2% of full \*Only for

speed (Ng) (\*) second range turbine-engined

helicopters

1. Free power turbine speed 0–150% Each engine each As installed 0.2% of full \*Only for

(Nf) (\*) second range turbine-engined

helicopters

1. Collective pitch Full range 0.5 As installed 0.1% of full

range

1. Coolant temperature (\*) Full range 1 As installed 1° C \*Only for piston-

(±5°C engined

recommended) helicopters

1. Main voltage Full range Each engine each As installed 1 Volt

second

1. Cylinder head Full range Each cylinder As installed 2% of full range \*Only for pistontemperature (\*) each second engined

helicopters

1. Fuel quantity Full range 4 As installed 1% of full range
2. Exhaust gas temperature Full range Each engine each As installed 2% of full range second
3. Emergency voltage Full range Each engine each As installed 1 Volt second
4. Trim surface position Full range or each 1 As installed 0.3% of full

discrete position range

1. Landing gear position Each discrete Each gear every As installed \*Where available,

position\* two seconds record up-and-

locked and downand-locked position

1. Novel/unique aircraft As required As required As required As required

features

# EIGHTH SCHEDULE

## ARTICLE 83 bis AGREEMENT SUMMARY

**Commercial Air Transport- Aeroplanes**

*(Regulation 8)*

*Note.— A certified true copy of the agreement summary to be carried on board.*

1. **Purpose and scope**

*The Article 83*bis*agreement summary shall contain the information in the**template at paragraph 2, in a standardized format.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **2. Article 83 *bis* agreement summary** | | | | |  |  |
|  |  |  |  |  |  | |  |
|  | **ARTICLE 83 *bis* AGREEMENT SUMMARY** | | | | | | |
|  |  |  |  |  |  |  |  |
| Title of the Agreement: |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| State of Registry: |  |  |  |  |  | Focal point: | |
|  |  |  |  |  |  |  |  |
| State of the Operator: |  |  |  |  |  | Focal point: | |
|  |  |  |  |  |  |  |  |
| Date of signature: |  | By State of Registry1: |  |  |  |  |  |
|  |  | By State of the Operator1: |  |  |  |  |  |
| Duration: |  | Start Date1: |  |  | End Date (if applicable)2: | | |
|  |  |  |  |  |  |  |  |
| Languages of the Agreement | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| ICAO Registration No.: |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Umbrella Agreement (if any) with | |  |  |  |  |  |  |
| ICAO Registration number: | |  |  |  |  |  |  |
|  |  | |  | |  | |  |
| **Chicago** | **ICAO Annexes affected by the transfer to the State of the Operator of** | | | | | | |
| **Convention** | **responsibility in respect of certain functions and duties** | | | | | | |
| Article 12: | Annex 2, all chapters | | Yes | ☐ | |  |  |
| Rules of the Air |  |  | No | ☐ | |  |  |
| Article 30 a): Aircraft | Radio Station Licence | | Yes | ☐ | |  |  |
|  |  |
| radio equipment |  |  | No | ☐ | |  |  |
|  | Annex 1, Chapters 1, 2, 3 and 6 | | Yes | ☐ | | | Annex 6: [Specify Part and |
| Articles 30 b) | and Annex 6 Part I, Radio Operator or | |  |  |  |  | paragraph]3 |
| No | ☐ | |  |
| and 32 a): | Part III, section II, Composition of the | |  |  |  |  |  |
|  |  |  |  |  |
| Personnel Licensing | flight crew (radio operator) and/or Part | |  |  |  |  |  |
|  | II, Qualifications and/or Flight crew | |  |  |  |  |  |
|  | member licensing | |  |  |  |  |  |
|  | or Part III, Section III, Qualifications | |  |  |  |  |  |
|  |  | Annex 6 | Yes | ☐ | |  | [Specify Part and chapters]3 |
| Article 31: Certificates | Part I or Part III, Section II | | No | ☐ | |  |  |
| of Airworthiness |  | Annex 6 | Yes | ☐ | |  | [Specify Part and chapters]3 |
|  | Part II or Part III, Section III | | No | ☐ | |  |  |
|  |  | Annex 8 | Yes | ☐ | |  | [Specify chapters]3 |
|  | Part II, Chapters 3 and 4 | |  |  | |  |  |
|  | No | ☐ | |  |  |

**Aircraft affected by the transfer of responsibilities to the State of the Operator**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Aircraft make, | Nationality and | Serial No | AOC # | Dates of transfer of responsibilities | |
| model, series | Registration marks |  | (Commercial air | From1 | To (if applicable)2 |
|  |  |  | transport) |  |  |
|  |  |  |  |  |  |

*Notes.—*

1. *dd/mm/yyyy.*
2. *dd/mm/yyyy or N/A if not applicable.*
3. *Square brackets indicate information that needs to be provided.*

# NINTH SCHEDULE

## ARTICLE 83 bis AGREEMENT SUMMARY

**General Aviation Operations- Aeroplanes**

*(Regulation 102)*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Title of the Agreement: | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| State of Registry: | |  |  |  |  | Focal point: | |
|  |  | |  |  |  |  |  |
| State of the principal location of a general aviation operator: | | |  |  |  | Focal point: | |
|  |  |  |  |  |
|  |  |  |  |  |
| Date of signature: | |  | By State of Registry1: |  |  |  |  |
|  |  |  | By State of the principal location  of a general aviation operator1: | | | | |
|  |  |  |
| Duration: | |  | Start Date1: |  |  | End Date (if applicable)2: | |
|  |  | |  |  |  |  |  |
| Languages of the Agreement | | |  |  |  |  |  |
|  |  | |  |  |  |  |  |
| ICAO Registration No.: | | |  |  |  |  |  |
|  |  | |  |  |  |  |  |
| Umbrella Agreement (if any) with | | |  |  |  |  |  |
| ICAO Registration number: | | |  |  |  |  |  |
|  |  |  | |  | |  |  |
| **Chicago** |  | **ICAO Annexes affected by the transfer to the State of the principal location**  **of a general aviation operator of responsibility in respect of certain**  **functions and duties** | | | | | |
| **Convention** |  |
|  |  |
| Article 12: |  | Annex 2, all chapters | | Yes | ☐ | |  |
| Rules of the Air |  |  |  | No | ☐ | |  |
| Article 30 a): Aircraft |  | Radio Station Licence | | Yes | ☐ | |  |
| radio equipment |  |  |  | No | ☐ | |  |
| Articles 30 b)  and 32 a):  Personnel Licensing |  | Annex 1, Chapters 1, 2, 3 and 6  and Annex 6 Part I, Radio Operator or  Part III, section II, Composition of the  flight crew (radio operator) and/or Part  II, Qualifications and/or Flight crew  member licensing  or Part III, Section III, Qualifications | | Yes | ☐ | | Annex 6: [Specify Part and |
|  |  |  |  | paragraph]3 |
| No | ☐ | |
|  |  |  |  |  |
|  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Article 31: |  |  | Annex 6 | Yes | ☐ | | [Specify Part and chapters]3 |
|  | Part I or Part III, Section II | | No | ☐ | |  |
| Certificates of | Annex 6  Part II or Part III, Section III | | | Yes | ☐ | | [Specify Part and chapters]3 |
| Airworthiness |  |  | |  |
| No | ☐ | |
|  |  |  | Annex 8 | Yes | ☐ | | [Specify chapters]3 |
|  |  | Part II, Chapters 3 and 4 | |  |  | |  |
|  |  | No | ☐ | |

**Aircraft affected by the transfer of responsibilities to the**

**State of the principal location of a general aviation operator**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Aircraft make, | Nationality and | Serial | AOC # | Dates of transfer of responsibilities | |
| model, series | Registration marks | No | (Commercial air transport) | From1 | To (if applicable)2 |
|  |  |  |  |  |  |

*Notes.—*

1. *dd/mm/yyyy.*
2. *dd/mm/yyyy or N/A if not applicable.*
3. *Square brackets indicate information that needs to be provided.*

**. . .**

# TENTH SCHEDULE

## ARTICLE 83 bis AGREEMENT SUMMARY

**General Aviation Operations- Aeroplanes**

*(Regulation )*

*Note.— A certified true copy of the agreement summary to be carried on board.*

* + - 1. **Purpose and scope**

*The Article 83*bis*agreement summary shall contain the information in the**template at paragraph 2, in a standardized format.*

1. **Article 83 *bis* agreement summary for commercial air transport**

**ARTICLE 83 *bis* AGREEMENT SUMMARY**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Title of the Agreement: | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| State of Registry: | |  |  |  |  | Focal point: | |
|  |  | |  |  |  |  |  |
| State of the Operator/State of the | | |  |  |  | Focal point: | |
| principal location of a general  aviation operator: | | |  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Date of signature: | |  | By State of Registry1: |  |  |  |  |
|  |  |  | By State of the Operator1: |  |  |  |  |
| Duration: | |  | Start Date1: |  |  | End Date (if applicable)2: | |
|  |  | |  |  |  |  |  |
| Languages of the Agreement | | |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| ICAO Registration No.: | |  |  |  |  |  |  |
|  |  | |  |  |  |  |  |
| Umbrella Agreement (if any) with | | |  |  |  |  |  |
| ICAO Registration number: | | |  |  |  |  |  |
|  |  |  | |  | |  |  |
| **Chicago** |  | **ICAO Annexes affected by the transfer to the State of the Operator of** | | | | | |
| **Convention** |  | **responsibility in respect of certain functions and duties** | | | | | |
| Article 12: |  | Annex 2, all chapters | | Yes | ☐ | |  |
| Rules of the Air |  |  |  | No | ☐ | |  |
| Article 30 a): Aircraft |  | Radio Station Licence | | Yes | ☐ | |  |
| radio equipment |  |  |  | No | ☐ | |  |
|  |  | Annex 1, Chapters 1, 2, 3 and 6 | | Yes | ☐ | | Annex 6: [Specify Part and |
| Articles 30 b) |  | and Annex 6 Part I, Radio Operator or | | No | ☐ | | paragraph]3 |
| and 32 a): |  | Part III, section II, Composition of the | |  |  |  |  |
|  |  |  |  |
| Personnel Licensing |  | flight crew (radio operator) and/or Part | |  |  |  |  |
|  |  | II, Qualifications and/or Flight crew | |  |  |  |  |
|  |  | member licensing | |  |  |  |  |
|  |  | or Part III, Section III, Qualifications | |  |  |  |  |
|  |  |  | Annex 6 | Yes | ☐ | | [Specify Part and chapters]3 |
| Article 31: |  | Part I or Part III, Section II | | No | ☐ | |  |
| Certificates of |  |  | Annex 6 | Yes | ☐ | | [Specify Part and chapters]3 |
| Airworthiness |  | Part II or Part III, Section III | | No | ☐ | |  |
|  |  |  | Annex 8 | Yes | ☐ | | [Specify chapters]3 |
|  |  | Part II, Chapters 3 and 4 | | No | ☐ | |  |

**Aircraft affected by the transfer of responsibilities to the State of the Operator**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Aircraft make, | Nationality and | Serial | AOC # | Dates of transfer of responsibilities | |
| model, series | Registration marks | No | (Commercial air transport) | From1 | To (if applicable)2 |
|  |  |  |  |  |  |

*Notes.—*

1. *dd/mm/yyyy.*
2. *dd/mm/yyyy or N/A if not applicable.*
3. *Square brackets indicate information that needs to be provided.*