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SUBPART A – GENERAL

§ 91.1 Applicability.

(a) Except as provided in paragraphs (b), (c) and (g) of this section and General Authority of Civil Aviation (GACA) Regulation (GACAR) §§ 91.471, 91.475, and 91.476, this part prescribes rules governing the operation of aircraft (other than model aircraft, unmanned aircraft systems, moored balloons, kites, unmanned rockets, and unmanned free balloons, which are governed by GACAR Part 101,ultralight vehicles operated in accordance with GACAR Part 103, and small unmanned aircraft which are governed by GACAR Part-107) within the sovereign area and territorial waters of the Kingdom of Saudi Arabia (KSA), including the waters within 3 NM of the KSA coast.

(b) This part applies to each person on board an aircraft being operated under this part, unless otherwise specified.

(c) The requirements for signalmen prescribed in GACAR § 91.29 apply to each person marshaling aircraft.

(d) Reserved.

(e) These rules are applicable to all aircraft operations in KSA territory, whether inside or outside the Jeddah Flight Information Region (FIR), except when specifically stated otherwise.

(f) This part also establishes requirements for operators to take actions to support the continued airworthiness of each aircraft.

(g) Remotely piloted aircraft systems (RPAS) must comply with all applicable requirements in Subparts B, D, E and F of this part.

NOTE: Requirements for the mandatory notification and reporting of aircraft accidents and aircraft incidents are contained in GACAR Part 4.

§ 91.3 Responsibility and Authority of the Pilot in Command.

(a) The pilot in command (PIC) of an aircraft is directly responsible for, and is the final authority as to, the operation, safety and security of that aircraft and the safety of all crew members, passengers and cargo on board.

(b) In an in flight emergency requiring immediate action, the PIC may deviate from any rule of this

part to the extent required to meet that emergency.

(c) Each PIC who deviates from a rule under paragraph (b) of this section must send a written report of that deviation to the President upon his request.

(d) Each PIC is responsible for ensuring that a flight—

(1) Will not be commenced if any flight crew member is incapacitated from performing duties by any cause such as injury, sickness, fatigue, or the effects of any psychoactive substance;

(2) Will not be continued beyond the nearest suitable aerodrome when flight crew members' capacity to perform functions is significantly reduced by impairment of faculties from causes such as fatigue, sickness or lack of oxygen; and

(3) Will not continue toward any aerodrome of intended landing if, in the opinion of the PIC, the flight cannot be completed safely, unless, in the opinion of the PIC, there is no safer procedure. In that event, continuation toward that aerodrome is an emergency situation.

(e) Each PIC is responsible for ensuring that a flight will not be commenced unless it has been determined by every reasonable means available that the ground and/or water facilities, including communication facilities and navigation aids available and directly required for the flight and the safe operation of the aircraft, are adequate for the type of operation under which the flight is to be conducted.

(f) Each PIC is responsible for notifying the nearest appropriate authority by the quickest available means of any accident involving the aircraft resulting in serious injury or death of any person or substantial damage to the aircraft or property.

§ 91.5 PIC of Aircraft Requiring More Than One Pilot.

(a) No person may operate an aircraft that is type certificated for more than one required pilot unless the PIC meets the proficiency requirements of GACAR § 61.17(b).

(b) Each PIC must—

(1) Ensure that each flight crew member holds a valid airman certificate issued under GACAR Part 61, or if issued by another Contracting State to the Convention on International Civil Aviation is acceptable to the President;

(2) Ensure that flight crew members are properly rated for the type of aircraft being flown; and

(3) Ensure that flight crew members have demonstrated competency in accordance with the type of operation being conducted.

(c) Each PIC of an aircraft equipped with an airborne collision avoidance system (ACAS) II must ensure that each flight crew member has been appropriately trained to competency in the use of ACAS II equipment and the avoidance of collision.

§ 91.7 Civil Aircraft Airworthiness.

(a) No person may operate a civil aircraft unless it is in an airworthy condition.

(b) The PIC of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight. The PIC must discontinue the flight when unairworthy mechanical, electrical, or structural conditions occur.

§ 91.8 Flight Logbook.

(a) An owner or operator of an aircraft must maintain a flight logbook for that aircraft.

(b) The flight logbook must contain the following items:

(1) Aircraft registration number,

(2) The date the flight is operated,

(3) Names of crew members,

(4) Duty assignments of crew members,

(5) Place of departure,

(6) Place of arrival,

(7) Time of departure,

(8) Time of arrival,

(9) Duration of flight, and

(10) Signature of the PIC.

§ 91.9 Required Documents.

(a) The PIC must ensure the following documents are carried on board a Saudi Arabian registered aircraft at all times:

(1) An original or a true copy of the aircraft certificate of registration;

(2) An original or a true copy of the airworthiness certificate (to include the noise operating characteristics and certifications of the aircraft that demonstrate compliance with this part and GACAR Part 36);

(3) An original or true copy of the aircraft radio station license;

(4) A list of the names of all passengers carried and their places of origination and destination;

(5) A manifest and detailed declaration of all cargo carried;

(6) The flight logbook;

(7) If the aircraft is the subject of an agreement under Article 83 bis of the Convention on International Civil Aviation, a true copy of that agreement or an approved summary sheet of that agreement; and

(8) The essential information concerning the search and rescue services and procedures in the area over which the aircraft will be operated.

(b) An owner, operator, or lessee, as applicable, of a Saudi Arabian registered aircraft must have a list of the emergency and survival equipment carried on board the aircraft available for immediate communication to rescue coordination centers available at all times. The information must include, as applicable—

(1) The number, color, and type of life rafts and pyrotechnics;

(2) Details of emergency medical supplies and water supplies; and

(3) The type and frequencies of the emergency portable radio equipment.

§ 91.11 Empty Mass and Center of Gravity: Currency Requirement.

(a) No person may operate a Saudi Arabian registered aircraft unless the current empty mass and center of gravity are calculated from values established by actual weighing of the aircraft within the preceding 36 months.

(b) Paragraph (a) of this section does not apply to—

(1) Aircraft issued an original airworthiness certificate within the preceding 36 months,

(2) Aircraft operated under an empty mass and balance control system approved in the operations specifications of the certificate holder;

(3) Unmanned aircraft; and

(4) Light-sport aircraft (LSA).

§ 91.13 Civil Aircraft Flight Manual, Marking, and Placard Requirements.

(a) Except as provided in paragraph (c) of this section, no person may operate a civil aircraft without complying with the operating limitations specified in the approved aircraft flight manual (AFM), markings, and placards, or as otherwise prescribed by the certificating authority of the State of registry.

(b) No person may operate a Saudi Arabian registered aircraft unless the AFM is updated by implementing changes made mandatory under requirements prescribed in GACAR Part 21 or GACAR Part 39.

(c) No person may operate a Saudi Arabian registered civil aircraft unless that aircraft is identified in accordance with GACAR Part 45.

(d) Any person taking off or landing a rotorcraft certificated under GACAR Part 29 at a heliport constructed over water may make such momentary flight as is necessary for takeoff or landing through the prohibited range of the limiting height speed envelope established for the rotorcraft, if that flight through the prohibited range takes place over water on which a safe ditching can be accomplished and if the rotorcraft is amphibious or is equipped with floats or other emergency flotation gear adequate to accomplish a safe emergency ditching on open water.

§ 91.15 Prohibition on Interference With Crew Members.

(a) No person may assault, threaten, intimidate, or interfere with a crew member in the performance of the crew member’s duties aboard an aircraft being operated.

(b) During any act of unlawful interference, the PIC must—

(1) Notify the appropriate Air Traffic Service of the interference, any significant circumstances, and any deviation from the current flight plan necessitated by the circumstances and

(2) Land as soon as practicable at the nearest suitable aerodrome or at an aerodrome assigned by air traffic control (ATC).

(c) The requirements of paragraph (b)(1) and (2) do not apply when the PIC determines compliance would adversely affect the safety of the flight.

(d) Following any act of unlawful interference, the PIC must submit a report of such an act to the President within 24 hours.

§ 91.17 Careless or Reckless Operation.

(a) *Aircraft operations for the purpose of air navigation.* No person may operate an aircraft in a careless or reckless manner so as to endanger the life or property of another.

(b) *Aircraft operations other than for the purpose of air navigation.* No person may operate an aircraft, other than for the purpose of air navigation, on any part of the surface of an aerodrome used by aircraft (including areas used by those aircraft for receiving or discharging persons or cargo), in a careless or reckless manner so as to endanger the life or property of another.

§ 91.19 Dropping Objects.

No PIC of a civil aircraft may allow any object to be dropped from that aircraft in flight that creates a hazard to persons or property. However, this section does not prohibit the dropping of any object if reasonable precautions are taken to avoid injury or damage to persons or property.

§ 91.21 Psychoactive Substances.

(a) No person may act or attempt to act as a crew member of a civil aircraft while under the influence of any psychoactive substance, by reason of which human performance is impaired. No such person will engage in any kind of problematic use of psychoactive substances.

(b) Except in an emergency, no pilot of a civil aircraft may allow a person who appears to be or who demonstrates by manner or physical indications that the individual is under the influence of psychoactive substances (except a medical patient under proper care) to be carried in that aircraft.

(c) A crew member must do the following:

(1) On request of a law enforcement officer, submit to a test to indicate the presence of any psychoactive substances in the body, when—

(i) The law enforcement officer is authorized to conduct the test or to have the test conducted.

(ii) The law enforcement officer is requesting submission to the test to investigate a suspected violation of the law governing the same or substantially similar conduct prohibited by paragraph (a) of this section.

(2) Whenever the President has a reasonable basis to believe that a person may have violated paragraph (a) of this section, on request of the President, that person must furnish to the President the results, or authorize any clinic, hospital, or doctor, or other person to release to the President, the results of each test taken within 4 hours after acting or attempting to act as a crew member that indicate the presence of any psychoactive substances in the body.

(d) Any test information obtained by the President under paragraph (c) of this section may be evaluated in determining a person's qualifications for any airman certificate or possible violations, and may be used as evidence in any legal proceeding under the Civil Aviation Law.

§ 91.23 Carriage, Selling and Offering of Psychoactive Substances.

(a) Except as provided in paragraph (b) of this section, no person may operate a civil aircraft within the Kingdom of Saudi Arabia with knowledge that psychoactive substances or other banned substances are carried in the aircraft.

(b) Paragraph (a) of this section does not apply to any carriage of psychoactive substances authorized by the President or any Government agency.

(c) No owner or operator of an aircraft registered in the Kingdom of Saudi Arabia may offer or sell psychoactive substances aboard the aircraft.

(d) The air operator and PIC must notify passengers entering the Kingdom of Saudi Arabia that possession of psychoactive substances is illegal unless authorized by a Government agency.

§ 91.25 Portable Electronic Devices.

(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator

or PIC of an aircraft allow the operation of, any portable electronic device on any of the following Saudi Arabian registered civil aircraft:

(1) Aircraft operated by a holder of an air operator certificate (AOC) or an operator certificate (OC) issued in accordance with GACAR Part 119 or

(2) Any other aircraft while it is operated under instrument flight rules (IFR).

(b) Paragraph (a) of this section does not apply to—

(1) Portable voice recorders,

(2) Hearing aids,

(3) Heart pacemakers,

(4) Electric shavers, or

(5) Any other portable electronic device that the operator of the aircraft has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.

(c) In the case of an aircraft operated by a holder of an AOC or an OC, the determination required by paragraph (b)(5) of this section must be made by the operator of that aircraft on which the particular device is to be used. In the case of other aircraft, the determination may be made by the PIC or operator of the aircraft.

§ 91.27 Transport of Dangerous Goods.

(a) The transport of dangerous goods by air must be conducted in accordance with the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Technical Instructions)(as amended) which is published by decision of the Council of the International Civil Aviation Organization (ICAO) (ICAO Doc. 9284).

(b) Dangerous goods must only be transported in accordance with an authorization issued under GACAR Part 109, except when they are—

(1) Not subject to the ICAO Technical Instructions in accordance with Part 1 of those instructions,

(2) Required on board the aircraft in accordance with airworthiness and operational requirements,

(3) Required on board the aircraft for specialized purposes, or

(4) Carried by passengers or crew members in accordance with Part 8 of the ICAO Technical Instructions.

(c) All reasonable measures must be taken to prevent dangerous goods from being carried on board inadvertently.

§ 91.29 Marshaling Signals.

(a) Upon observing any of the signals given in Appendix F to this part by a signalman, a person operating an aircraft must respond appropriately to the signal as provided for in that appendix.

(b) No person will use a signalman to guide an aircraft unless he is trained, qualified, and authorized to act as a signalman.

(c) A signalman must—

(1) Provide marshaling signals to aircraft as provided for in Appendix F to this part.

(2) Ensure the area within which an aircraft is to be guided is clear of objects which the aircraft might strike.

(3) Wear a distinctive fluorescent identification vest to allow the person operating the aircraft to identify that signalman is the person responsible for marshaling that aircraft.

(4) For all signaling—

(i) During daylight hours, use daylight fluorescent wands, or other signal equipment or hands, as appropriate and

(ii) At night or in low visibility, use illuminated wands.

§ 91.33 Aircraft Taxi on Aerodrome Movement Areas.

No person may taxi an aircraft on the movement area of an aerodrome unless the person at the aircraft's controls holds an appropriate current and valid pilot certificate or—

(a) Has been authorized by the owner, the lessee, or a designated agent, as applicable;

(b) Is trained, qualified, and authorized to taxi the aircraft;

(c) Is trained, qualified, and authorized to use the aircraft radio if radio communications are required; and

(d) Has received instruction on the aerodrome's layout, and appropriate information on—

(1) Routes, signs, markings, lights, ATC signals and

(2) Taxiing instructions, phraseology, and procedures.

§ 91.35 Rotor Engagement.

(a) No person may turn a rotor under power, for the purpose of flight, unless the person at the rotorcraft's controls holds an appropriate current and valid pilot certificate.

(b) An operator must provide appropriate specific training and procedures to be followed for any person other than an appropriately certificated pilot who turns a rotor under power for purposes other than flight.

§ 91.37 Use of Electronic Flight Bags.

(a) Except as provided in paragraph (b) of this section, no person may use, nor may any operator or PIC of an aircraft allow the use of, any electronic flight bag (EFB) for the safe operation of any of the following Saudi Arabian registered civil aircraft:

(1) Aircraft operated by a holder of an air operator certificate (AOC) or an operator certificate (OC) issued in accordance with GACAR Part 119; or

(2) Any other aircraft while it is operated under GACAR Part 133.

(b) An EFB may be used on board an aircraft if authorized by the President in the certificate holder's operations specifications issued under GACAR Part 119 or GACAR Part 133. The President may authorize the use of an EFB if:

(1) The EFB does not adversely affect the performance of the aircraft's systems, equipment or the ability to operate the aircraft safely;

(2) The EFB and its associated installation hardware and software, including interaction with the aircraft systems if applicable, meet the appropriate airworthiness requirements under Chapter C;

(3) The operator has established for redundancy of information contained in, and displayed by, the EFB function(s) in the event of an EFB failure;

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

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

SUBPART B – FLIGHT RULES

<< GENERAL >>

§ 91.41 Applicability.

This subpart prescribes flight rules pertaining to the operation of aircraft within the sovereign area and territorial waters of the Kingdom of Saudi Arabia.

§ 91.43 Preflight Action.

(a) Before beginning a flight, each PIC must become familiar with all available information concerning that flight, and ensure dissemination of information to appropriate flight crew members. This information must include—

(1) The AFM for that aircraft, if one is required, and with placards, listings, instrument markings, or any combination thereof, containing each operating limitation prescribed for that aircraft;

(2) The emergency equipment installed on the aircraft and the procedures to be followed for the use of that equipment in an emergency situation;

(3) For a flight operated under IFR or a flight not in the vicinity of an aerodrome, weather reports and forecasts, fuel requirements, alternatives available if the planned flight cannot be completed, and any known traffic delays of which the PIC has been advised by ATC;

(4) Runway lengths at aerodromes of intended use, and the following takeoff and landing distance information:

(i) The takeoff and landing distance data in an approved AFM, if required for the aircraft and

(ii) Other information appropriate to the aircraft, relating to aircraft performance under expected values of aerodrome elevation and runway slope, aircraft gross mass, and wind and temperature.

(5) Any necessary overflight and/or landing approval for KSA airspace and, if an approval is required, the PIC must carry a copy of the approval aboard the aircraft and submit the registration number on the approval with the flight plan information; and

(6) The laws, regulations and procedures, pertinent to the performance of his duties, prescribed

for the areas to be traversed, the aerodromes to be used and the related air navigation facilities.

(b) A flight must not commence until the PIC is satisfied that—

(1) The aircraft is airworthy, registered under GACAR Part 45, and that the appropriate certificates are aboard the aircraft;

(2) The instruments and equipment installed in the aircraft are appropriate, taking into account the expected flight conditions and kinds of operation;

(3) Any necessary maintenance has been performed in accordance with the GACAR;

(4) The mass of the aircraft and center of gravity location are such that the flight can be conducted safely, taking into account the flight conditions expected;

(5) Any load carried is properly distributed and safely secured;

(6) The aircraft operating limitations, contained in the AFM, or its equivalent, will not be exceeded; and

(7) The aircraft has adequate oil to complete the flight safely.

§ 91.45 Passenger Briefing.

(a) Before each takeoff the PIC of an aircraft carrying passengers must ensure that all passengers have been orally briefed on—

(1) *Smoking*. Each passenger must be briefed on when, where, and under what conditions smoking is prohibited;

(2) *Use of safety belts and shoulder harnesses*. Each passenger must be briefed on when, where, and under what conditions it is necessary to have his safety belt and, if installed, his shoulder harness fastened about himself;

(3) The placement of seat backs in an upright and locked position for takeoff and landing;

(4) Location of fire extinguishers;

(5) Location and means for opening the passenger entry door and emergency exits;

(6) Location of survival equipment;

(7) Ditching procedures and the use of flotation equipment for a flight over water; and

(8) The normal and emergency use of oxygen equipment installed on the aircraft.

(b) The oral briefing required by paragraph (a) of this section must be given by the PIC or a crew member, but is not required when the PIC determines that the passengers are familiar with the contents of the briefing. Unless the person giving the briefing has established that the use of a single language for the briefing will be understood by all passengers, the oral briefing must be made in both the Arabic and English languages. It may be supplemented by printed cards for the use of each passenger containing—

(1) A diagram of, and methods of operating, the emergency exits and

(2) Other instructions necessary for use of emergency equipment.

(c) Each card used under paragraph (b) must be carried on the aircraft and be easily accessible for the use of each passenger, and must contain information pertinent only to the type and model aircraft on which it is used.

(d) In an emergency, the PIC must ensure that passengers are instructed on emergency actions which may be appropriate to the circumstances.

§ 91.47 Flight Crew Members at Stations.

(a) During takeoff and landing, each required flight crew member must occupy his assigned duty station and keep his safety belt and shoulder harness fastened. The shoulder harness is not required to be worn if—

(1) The seat at the flight crew member’s station is not equipped with a shoulder harness or

(2) A flight crew member occupying a duty station other than a pilot’s seat would be unable to perform required duties with the shoulder harness fastened.

(b) While en route, each required flight crew member must—

(1) Be at his assigned crew member station unless his absence is necessary to perform duties in connection with the operation of the aircraft or in connection with physiological needs and

(2) Keep his safety belt fastened while at the crew member station.

§ 91.49 Use of Safety Belts, Shoulder Harnesses, and Child Restraint Systems.

(a) Unless otherwise authorized by the President, each person on board an aircraft (except a manned balloon that incorporates a basket or gondola) must occupy an approved seat or berth with a safety belt and, if installed, shoulder harness, properly secured about himself during movement on the surface, takeoff, and landing and at any other time when directed by the PIC.

(b) For seaplane and float equipped rotorcraft operations during movement on the surface, the person pushing off the seaplane or rotorcraft from the dock and the person mooring the seaplane or rotorcraft at the dock are excepted from the preceding seating and safety belt requirements.

(c) Notwithstanding the preceding requirements of this section, a person may—

(1) Be held by an adult who is occupying an approved seat or berth, provided the person being held has not reached his second birthday and does not occupy or use any restraining device;

(2) Use the floor of the aircraft as a seat, provided the person is on board for the purpose of engaging in parachuting; or

(3) Occupy a child restraint system (CRS) meeting the requirements prescribed in Section IV of Appendix C to this part provided that the child is accompanied by a parent, guardian, or attendant designated by the child's parent or guardian to attend to the safety of the child during the flight.

§ 91.51 Carry On Baggage.

No PIC may permit a passenger to stow baggage aboard an aircraft except—

(a) In a suitable baggage or cargo storage compartment, or as provided in GACAR § 91.53.

(b) Under a passenger seat in such a way that baggage will not slide forward under crash impacts severe enough to induce the ultimate inertia forces specified in GACAR § 25.561(b)(3), or the requirements of the regulations under which the aircraft was type certificated. Restraining devices must also limit sideward motion of under seat baggage and be designed to withstand crash impacts severe enough to induce sideward forces specified in GACAR § 25.561(b)(3) or the requirements of the regulations under which the aircraft was type certificated.

§ 91.53 Carriage of Cargo.

(a) No person may permit cargo, including carry on baggage, to be carried in an aircraft unless—

(1) It is carried in an approved cargo rack, bin, or compartment installed in the aircraft;

(2) It is secured by means approved by the President; or

(3) It is carried in accordance with each of the following:

(i) For cargo, it is properly secured by a safety belt or other tie down having enough strength to eliminate the possibility of shifting under all normally anticipated flight and ground conditions or for carry on baggage, it is restrained to prevent its movement during air turbulence.

(ii) It is packaged or covered to avoid possible injury to passengers.

(iii) It does not impose any load on seats or on the floor structure that exceeds the load limitation for those components.

(iv) It is not located in a position that restricts the access to or use of any required emergency or regular exit, or the use of the aisle between the crew and the passenger compartment or is located in a position that obscures any passenger's view of the "seat belt" sign, "no smoking" sign or placard, or any required exit sign, unless an auxiliary sign or other approved means for proper notification of the passengers is provided.

(v) It is not carried directly above seated passengers.

(4) It is stowed in compliance with this section for takeoff and landing.

(b) When cargo is carried in cargo compartments designed to require the physical entry of a crew member to extinguish any fire that may occur during flight, the cargo must be loaded to allow a crew member to effectively reach all parts of the compartment with the contents of a hand fire extinguisher.

§ 91.55 Stowage of Food, Beverage, and Passenger Service Equipment During Aircraft Movement on the Surface, Takeoff, and Landing.

(a) No person may take off, or land when any food, beverage, or tableware furnished by the operator is located at any passenger seat.

(b) No person may move an aircraft on the surface, take off, or land unless each food and beverage tray and seat back tray table is secured in its stowed position.

(c) No person may permit an aircraft to move on the surface, take off, or land unless each passenger serving cart is secured in its stowed position.

(d) No person may permit an aircraft to move on the surface, take off, or land unless each movie screen that extends into an aisle is stowed.

(e) Each passenger must comply with instructions given by a crew member with regard to compliance with this section.

§ 91.57 Flight Instruction: Simulated Instrument Flight and Certain Flight Tests.

(a) No person may operate an aircraft (except a manned free balloon) that is being used for flight instruction unless the aircraft has fully functioning dual controls. However, instrument flight instruction may be given in an airplane that is equipped with a single, functioning throw over control wheel that controls of the elevator and ailerons, in place of fixed dual controls, when—

(1) The instructor has determined the flight can be conducted safely; and

(2) The person manipulating the controls has at least a private pilot certificate with applicable category and class ratings.

(b) An airplane equipped with a single, functioning throw-over control wheel that controls the elevator and ailerons, in place of fixed, dual controls may be used for flight instruction to conduct a flight review required by GACAR § 61.21, or to obtain recent flight experience or an instrument proficiency check required by GACAR § 61.17 when—

(1) The airplane is equipped with operable rudder pedals at both pilot stations;

(2) The pilot manipulating the controls is qualified to serve and serves as pilot in command during the entire flight;

(3) The instructor is current and qualified to serve as PIC of the airplane, meets the requirements of GACAR § 61.199(b), and has logged at least 25 hours of PIC flight time in the make and model of airplane; and

(4) The PIC and the instructor have determined the flight can be conducted safely.

(c) No person may operate a civil aircraft in simulated instrument flight unless—

(1) The other control seat is occupied by a safety pilot who possesses at least a private pilot certificate with category and class ratings appropriate to the aircraft being flown.

(2) The safety pilot has adequate vision forward and to each side of the aircraft, or a competent observer in the aircraft adequately supplements the vision of the safety pilot; and

(3) Except in the case of lighter-than-air aircraft, that aircraft is equipped with fully functioning dual controls. However, simulated instrument flight may be conducted in a single-engine airplane, equipped with a single, functioning, throw over control wheel, in place of fixed, dual controls of the elevator and ailerons, when:

(i) The safety pilot has determined that the flight can be conducted safely; and

(ii) The person manipulating the controls has at least a private pilot certificate with appropriate category and class ratings.

(d) No person may operate an aircraft being used for a flight test for an airline transport pilot certificate or a class or type rating on that certificate, or for a GACAR Part 121 proficiency flight test, unless the pilot seated at the controls, other than the pilot being checked, is fully qualified to act as PIC of the aircraft.

§ 91.59 Operating Near Other Aircraft.

(a) No person may operate an aircraft so close to another aircraft as to create a collision hazard.

(b) No person may operate an aircraft in formation flight except by arrangement with the PIC of each aircraft in the formation and, for formation flight in controlled airspace, in accordance with the conditions prescribed by the appropriate Air Traffic Service authorities and the following:

(1) The formation must operate as a single aircraft with regard to navigation and position reporting;

(2) The flight leader and the PIC of the other aircraft in the flight are responsible for separation between aircraft in the flight including periods of transition when aircraft are maneuvering to attain their own separation within the formation and during join up and breakaway; and

(3) Each aircraft must maintain a distance not exceeding 0.5 NM (1 km) laterally and

longitudinally and 100 ft (30 m) vertically from the flight leader.

(c) No person may operate an aircraft carrying passengers for hire in formation flight.

§ 91.61 Right of Way Rules: Except Water Operations.

(a) *Inapplicability.* This section does not apply to the operation of an aircraft on water.

(b) *General.* When weather conditions permit, regardless of whether an operation is conducted under IFR or visual flight rules (VFR), vigilance must be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right of way, the PIC must give way to that aircraft and may not pass over, under, or ahead of it unless well clear, and take into account the effect of wake turbulence.

(c) *In distress.* An aircraft in distress has the right of way over all other air traffic.

(d) *Converging.* When aircraft of the same category are converging at approximately the same altitude (except head on, or nearly so), the aircraft to the other's right has the right of way. If the aircraft are of different categories—

(1) A balloon has the right of way over any other category of aircraft.

(2) A glider has the right of way over an airship, powered parachute, weight shift control aircraft, airplane, or rotorcraft.

(3) An airship has the right of way over a powered parachute, weight shift control aircraft, airplane, or rotorcraft.

However, an aircraft towing or refueling other aircraft has the right of way over all other engine driven aircraft.

(e) *Approaching head-on.* When aircraft are approaching each other head on, or nearly so, each PIC of each aircraft must alter course to the right.

(f) *Overtaking.* Each aircraft being overtaken has the right of way and each PIC of an overtaking aircraft must alter course to the right to pass well clear.

(g) *Landing.* Aircraft, while on final approach to land or while landing, have the right of way over other aircraft in flight or operating on the surface, except they must not take advantage of this rule to

force off the runway surface, an aircraft which has already landed and is attempting to make way for an aircraft on final approach. When two or more aircraft are approaching an aerodrome to land, the aircraft at the lower altitude has the right of way, but it must not take advantage of this rule to cut in front of another which is on final approach to land or to overtake that aircraft.

(h) *Taking off.* Aircraft taking off or about to take off have the right of way over other aircraft taxiing on the maneuvering area of an aerodrome.

(i) *Surface movement of aircraft.* In case of danger of collision between two aircraft taxiing on the movement area of an aerodrome the following apply:

(1) When two aircraft are approaching head on or approximately so, each must stop or where practicable alter its course to the right to keep well clear.

(2) When two aircraft are on a converging course, the aircraft to the other's right has the right of way.

(3) An aircraft which is being overtaken by another aircraft has the right of way and the overtaking aircraft must keep well clear of the other aircraft.

(4) An aircraft taxiing on the maneuvering area must stop and hold at all runway holding positions unless otherwise authorized by the aerodrome control tower.

(5) An aircraft taxiing on the maneuvering area must stop and hold at all lighted stop bars and may only proceed further when the lights are switched off.

(j) *Heading and speed.* The aircraft that has the right of way must maintain its heading and speed.

§ 91.63 Right of Way Rules: Water Operations.

(a) *General.* Each person operating an aircraft on the water must, to the greatest extent possible, keep clear of all vessels and avoid impeding their navigation, and must give way to any vessel or other aircraft that is given the right of way by any rule of this section.

(b) *Crossing.* When aircraft, or an aircraft and a vessel, are on crossing courses, the aircraft or vessel to the other's right has the right of way.

(c) *Approaching head on.* When aircraft, or an aircraft and a vessel, are approaching head on, or

nearly so, each must alter its course to the right to keep well clear.

(d) *Overtaking*. Each aircraft or vessel being overtaken has the right of way, and the one overtaking must alter course to keep well clear.

(e) *Special circumstances*. When aircraft, or an aircraft and a vessel, approach with the risk of collision, each aircraft or vessel must proceed with careful regard to existing circumstances, including the limitations of the respective craft.

(f) *Landing and taking off*. Aircraft landing on or taking off from the water must, to the greatest extent practicable, keep well clear of all vessels and avoid impeding their navigation.

(g) *Heading and speed*. The aircraft that has the right of way must maintain its heading and speed.

§ 91.65 Aircraft Speed.

(a) Unless otherwise authorized by the President, no person may operate an aircraft below 10 000 ft (3 050 m) mean sea level (MSL) at an indicated airspeed of more than 250 kt (463 km/h).

(b) Unless otherwise authorized or required by ATC, no person may operate an aircraft at or below 2 500 ft (750 m) above ground level (AGL) within 4 NM of the primary aerodrome of a Class C or Class D airspace area at an indicated airspeed of more than 200 kt (370 km/h). This paragraph does not apply to any operations within a Class B airspace area. These operations must comply with paragraph (a) of this section.

(c) No person may operate an aircraft in the airspace underlying a Class B airspace area designated for an aerodrome at an indicated airspeed of more than 200 kt (370 km/h).

(d) No person may operate a turbine engine aircraft in the traffic circuit of an aerodrome at an airspeed greater than 200 kt (370 km/h), or 156 kt (290 km/h) for a reciprocating engine aircraft.

(e) If the minimum safe airspeed for any particular operation is greater than the maximum speed prescribed in this section, the aircraft may be operated at that minimum speed.

§ 91.67 Minimum Safe Altitudes: General.

Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(a) *Anywhere.* An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

(b) *Over congested areas.* Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1 000 ft (300 m) above the highest obstacle within a horizontal radius of 2 000 ft (600 m) of the aircraft.

(c) *Over other than congested areas.* An altitude of 500 ft (150 m) above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 ft (150 m) to any person, vessel, vehicle, or structure.

(d) *Powered parachutes and weight shift control aircraft.* If the operation is conducted without hazard to persons or property on the surface, a powered parachute or weight shift control aircraft may be operated at less than the minimums prescribed in paragraph (c) of this section.

(e) *Rotorcraft.* Rotorcraft may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section if the operation is conducted without hazard to persons or property on the surface. In addition, each person operating a rotorcraft must comply with any routes or altitudes specifically prescribed for rotorcraft by the President.

§ 91.69 Minimum Altitudes for Use of Autopilot in Airplanes.

(a) *Definitions.* For purpose of this section—

(1) Altitudes for takeoff/initial climb and go-around/missed approach are defined as above the aerodrome elevation.

(2) Altitudes for enroute operations are defined as above terrain elevation.

(3) Altitudes for approach are defined as above the touchdown zone elevation (TDZE), unless the altitude is specifically in reference to DA(H) or MDA, in which case the altitude is defined by reference to the DA(H) or MDA itself.

(b) *Takeoff and initial climb.* No person may use an autopilot for takeoff or initial climb below the higher of 500 feet or an altitude that is no lower than twice the altitude loss specified in the Aircraft Flight Manual (AFM), except as follows—

(1) At a minimum engagement altitude specified in the AFM; or

(2) At an altitude specified by the President, whichever is greater.

(c) *Enroute.* No person may use an autopilot enroute, including climb and descent, below the following—

(1) 500 feet;

(2) At an altitude that is no lower than twice the altitude loss specified in the AFM for an autopilot malfunction in cruise conditions; or

(3) At an altitude specified by the President, whichever is greater.

(d) *Approach.* No person may use an autopilot at an altitude lower than 50 feet below the DA(H) or MDA for the instrument procedure being flown, except as follows—

(1) For autopilots with an AFM specified altitude loss for approach operations—

(i) An altitude no lower than twice the specified altitude loss if higher than 50 feet below the MDA or DA(H);

(ii) An altitude no lower than 50 feet higher than the altitude loss specified in the AFM, when the following conditions are met—

(A) Reported weather conditions are less than the basic VFR weather conditions in GACAR § 91.165;

(B) Suitable visual references specified in GACAR § 91.191 have been established on the instrument approach procedure; and

(C) The autopilot is coupled and receiving both lateral and vertical path references;

(iii) An altitude no lower than the higher of the altitude loss specified in the AFM or 50 feet above the TDZE, when the following conditions are met—

(A) Reported weather conditions are equal to or better than the basic VFR weather conditions in GACAR § 91.165; and

(B) The autopilot is coupled and receiving both lateral and vertical path references; or

(iv) A greater altitude specified by the President.

(2) For autopilots with AFM specified approach altitude limitations, the greater of—

(i) The minimum use altitude specified for the coupled approach mode selected;

(ii) 50 feet; or

(iii) An altitude specified by President.

(3) For autopilots with an AFM specified negligible or zero altitude loss for an autopilot approach mode malfunction, the greater of—

(i) 50 feet; or

(ii) An altitude specified by President.

(4) If executing an autopilot coupled go-around or missed approach using a certificated and functioning autopilot in accordance with paragraph (e) in this section.

(e) *Go-Around/Missed Approach.* No person may engage an autopilot during a go-around or missed approach below the minimum engagement altitude specified for takeoff and initial climb in paragraph (b) in this section. An autopilot minimum use altitude does not apply to a go-around/missed approach initiated with an engaged autopilot. Performing a go-around or missed approach with an engaged autopilot must not adversely affect safe obstacle clearance.

(f) *Landing.* Notwithstanding paragraph (d) of this section, autopilot minimum use altitudes do not apply to autopilot operations when an approved automatic landing system mode is being used for landing. Automatic landing systems must be authorized in an operations specification issued to the operator.

(g) This section does not apply to operations conducted in rotorcraft.

§ 91.71 Altimeter Settings.

Each person operating an aircraft must maintain the cruising altitude or flight level of the aircraft, as the case may be, by reference to an altimeter that is set, when operating—

(a) Below 15 000 ft (4 550 m) MSL, to—

(1) The current reported altimeter setting of a station along the route and within 185 km (100 NM) of the aircraft;

(2) If there is no station within the area prescribed in paragraph (a)(1) of this section, the current reported altimeter setting of an appropriate available station; or

(3) In the case of an aircraft not equipped with a radio, the elevation of the departure aerodrome or an appropriate altimeter setting available before departure; or

(b) At or above 15 000 ft (4 550 m) MSL, to 1 013.2 hPa.

§ 91.73 Flight Plans: General.

(a) Each person operating an aircraft must submit a flight plan as prescribed in this section for all aircraft arriving, departing, and overflying the Kingdom of Saudi Arabia.

(b) Each person operating an aircraft must submit either—

(1) A filed flight plan which may be submitted for any type of flight or

(2) A repetitive flight plan, which only may be submitted for frequent, regularly operated IFR flights.

(c) Each person operating an aircraft must complete, submit, and transmit the flight plans prescribed in paragraph (b) of this section in accordance with the KSA Aeronautical Information Publication (AIP) and GACAR §§ 91.163 and 91.185.

(d) Except as provided in paragraph (e) of this section, each person operating an aircraft must submit a flight plan before departure. In flight opening or closing of and minor revisions to previously filed flight plans will be accepted by radiotelephone.

(e) A person may file a flight plan during flight when operating emergency, search and rescue, medical evacuation, and ambulance aircraft.

(f) Each operator submitting a flight plan must follow the preferred routing system as listed in the current KSA AIP supplement and include Jeddah FIR entry and exit points in the filed and stored

flight plans.

(g) All changes to a flight plan submitted for an IFR flight, or a VFR flight operated as a controlled flight, must be reported as soon as practicable to the appropriate Air Traffic Service unit. For other VFR flights, significant changes to a flight plan must be reported as soon as practicable to the appropriate Air Traffic Service unit.

(h) Each person operating an aircraft must make a report of arrival in person, by radiotelephony, or via data link as soon as practicable after landing, to the appropriate Air Traffic Service unit at the arrival aerodrome, by any flight for which a flight plan has been submitted covering the entire flight or the remaining portion of a flight to the destination aerodrome. When no Air Traffic Service unit exists at the arrival aerodrome, the arrival report must be made as soon as practicable after landing and by the quickest means available to the nearest Air Traffic Service unit. When communication facilities at the arrival aerodrome are known to be inadequate and alternate arrangements for the handling of arrival reports on the ground are not available, the report of arrival must be made immediately prior to landing the aircraft.

(i) Arrival reports made by aircraft must contain the following elements of information:

(1) Aircraft identification;

(2) Departure aerodrome;

(3) Destination aerodrome (only in the case of a diversionary landing);

(4) Arrival aerodrome; and

(5) Time of arrival.

§ 91.75 Operation on and in the Vicinity of an Aerodrome.

(a) Except as provided in GACAR §§ 91.121, 91.123, and 91.125, a person operating an aircraft on or in the vicinity of an aerodrome must, whether or not within an aerodrome traffic zone—

(1) Observe other aerodrome traffic for the purpose of avoiding collision.

(2) Conform with or avoid the pattern of traffic formed by other aircraft in operation.

(3) Make all turns to the left, when approaching for a landing and after taking off, unless

otherwise instructed.

(4) Land and take off into the wind unless safety, the runway configuration, or air traffic considerations determine that a different direction is preferable.

(b) A person operating an aircraft into or out of any aerodrome not listed in Part 3 - Aerodromes of the KSA AIP must conduct his flight under VFR and during daylight hours only.

(c) Upon observing any of the signals given in this paragraph, a person operating an aircraft must take such action as may be required by the interpretation of the signal.

(1) *Prohibition of landing.* A horizontal red square panel with yellow diagonals.

Figure 91–1 when displayed in a signal area indicates that landings are prohibited and that the prohibition is liable to be prolonged.

Figure 91–1.

(2) *Need for special precautions while approaching or landing.* A horizontal red square panel with one yellow diagonal, Figure 91–2, when displayed in a signal area indicates that because of the bad state of the maneuvering area, or for any other reason, special precautions must be observed in approaching to land or in landing.

Figure 91–2.

(3) *Use of runways and taxiways.* A horizontal white dumbbell, Figure 91–3, when displayed in a signal area indicates that aircraft are required to land, take off and taxi on runways and taxiways only. The same horizontal white dumbbell but with a black bar placed perpendicular to the shaft across each circular portion of the dumbbell, Figure 91–4, when displayed in a signal area indicates that aircraft are required to land and take off on runways only, but other maneuvers need not be confined to runways and taxiways.

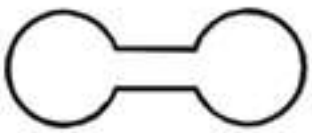


Figure 91–3.

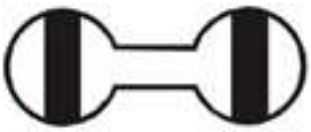


Figure 91–4.

(4) *Closed runways or taxiways.* Crosses of a single contrasting color, yellow or white, Figure 91–5, displayed horizontally on runways and taxiways or parts thereof indicate an area unfit for movement of aircraft.

Figure 91–5.

(5) *Directions for landing or takeoff.* A horizontal white or orange landing T, Figure 91–6, indicates the direction to be used by aircraft for landing and takeoff, which must be in a direction parallel to the shaft of the T towards the cross arm.

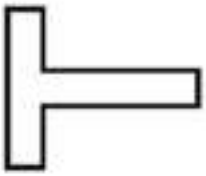


Figure 91–6.

Note.— When used at night, the landing T is either illuminated or outlined in white lights. A set of two digits, Figure 91–7, displayed vertically at or near the aerodrome control tower indicates to aircraft on the maneuvering area the direction for takeoff, expressed in units of 10°to the nearest 10°of the magnetic compass.

Figure 91–7.

(6) *Right-hand traffic.* When displayed in a signal area, or horizontally at the end of the runway or strip in use, a right hand arrow of conspicuous color, Figure 91–8, indicates that turns are to be made to the right before landing and after takeoff.

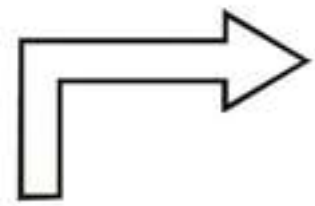


Figure 91–8.

§ 91.77 Mandatory IFR Above Flight Level 150.

Each person operating an aircraft at flight level (FL) 150 or above must operate the aircraft under IFR.

§ 91.79 Notifications Required From Operators.

(a) An operator requiring meteorological service or changes in existing meteorological service must notify the appropriate meteorological authority or aerodrome meteorological office as follows:

(1) For scheduled flights, sufficiently in advance.

(2) For nonscheduled flights, at least 6 hours before the expected time of departure. However, the operator may obtain an oral briefing without prior notice.

(3) When flights are delayed, advanced, or canceled.

(4) When new routes or new types of operations are planned.

(b) An operator notification with respect to needed briefing flight documentation and other meteorological information must contain sufficient details such as aircraft identification, estimated time of departure, route, and flight level.

<< CONTROLLED FLIGHTS: GENERAL >>

§ 91.91 Time.

(a) A person operating an aircraft must obtain a time check using Coordinated Universal Time (UTC) that is expressed in hours and minutes and, when required, seconds of the 24 hour day beginning at midnight prior to operating a controlled flight and at such other times during the flight as may be necessary.

(b) Wherever time is used in the application of data link communications, it must be accurate to within 1 second of UTC.

§ 91.93 Adherence to Flight Plan.

(a) A PIC must adhere to the current flight plan or the applicable portion of the current flight plan submitted for a controlled flight unless—

(1) He obtains an amended clearance from the appropriate ATC facility, or

(2) An emergency situation arises which necessitates immediate action by the PIC under GACAR § 91.3(b).

(b) If a PIC exercises emergency authority under paragraph (a)(2) of this section, he must notify the

appropriate Air Traffic Service unit of the action taken and that the action was taken under emergency authority.

(c) Unless otherwise directed by the appropriate ATC facility, a PIC operating an aircraft under controlled flight must—

(1) When on an established Air Traffic Service route operate along the defined center line of that route; or

(2) When on any other route, operate directly between the navigation facilities or points defining that route.

(d) If a PIC deviates from the requirements of paragraph (c) of this section, the PIC must communicate the deviation to the appropriate Air Traffic Service unit.

(e) *Strategic lateral offset.* If the PIC elects to apply a strategic lateral offset, he—

(1) May apply the strategic lateral offset in airspace—

(i) Where offsets have been authorized by the appropriate Air Traffic Service authority and published in the KSA AIP and

(ii) When the aircraft is equipped with automatic offset tracking capability;

(2) Must establish a course at a distance of 1 NM or 2 NM to the right of the center line relative to the direction of flight; and

(3) Is not required to inform ATC that a strategic lateral offset is being applied.

(f) *Changeover point.* A PIC operating an aircraft along an Air Traffic Service route segment defined by reference to Very High Frequency Omnidirectional Range (VOR) must change primary navigation guidance from the facility behind the aircraft to the facility ahead of it, at or as close as operationally feasible to the changeover point, where established.

(g) *Inadvertent changes.* In the event that a PIC operating an aircraft in controlled flight inadvertently deviates from his current flight plan, the following actions must be taken:

(1) *Deviation from track.* If the aircraft is off track, the PIC must take action without delay to adjust the heading of the aircraft to regain track as soon as practicable.

(2) *Variation in true airspeed.* If the average true airspeed at cruising level between reporting points varies or is expected to vary by plus or minus 5 percent of the true airspeed from that given in the flight plan, the PIC must inform the appropriate Air Traffic Service unit.

(3) *Change in time estimate.* If the time estimate for the next applicable reporting point, FIR boundary, or destination aerodrome, whichever comes first, is found to be in error in excess of 2 minutes from that given to Air Traffic Service, or such other period of time as is prescribed by the Air Traffic Service authority, the PIC must communicate a revised estimated time as soon as possible to the appropriate Air Traffic Service unit.

(4) *Automatic Dependent Surveillance (ADS).* When an ADS agreement is in place, the Air Traffic Service unit must be informed automatically via data link whenever changes occur beyond the threshold values stipulated in the ADS event contract.

(h) *Intended changes.* A PIC must include the following information in a request for a flight plan change:

(1) *Change of cruising level.*

(i) Aircraft identification;

(ii) Requested new cruising level and cruising speed at this level; and

(iii) Revised time estimates (when applicable) at subsequent FIR boundaries.

(2) *Change of route—Destination unchanged*

(i) Aircraft identification;

(ii) Flight rules;

(iii) Description of new route of flight including related flight plan data beginning with the position from which requested change of route is to commence;

(iv) Revised time estimates; and

(v) Any other pertinent information.

(3) *Change of route—Destination changed*

(i) Aircraft identification;

(ii) Flight rules;

(iii) Description of revised route of flight to revised destination aerodrome including related flight plan data, beginning with the position from which requested change of route is to commence;

(iv) Revised time estimates;

(v) Alternate aerodrome(s); and

(vi) Any other pertinent information.

(i) *Weather deterioration below visual meteorological conditions (VMC).* When it becomes evident that flight in VMC in accordance with a current flight plan will not be practicable, the PIC operating the VFR flight as a controlled flight must—

(1) Request an amended clearance enabling the aircraft to continue in VMC to the destination or to an alternative aerodrome, or to leave the airspace within which an ATC clearance is required;

(2) If the PIC cannot obtain an amended clearance in accordance with paragraph (i)(1) of this section, continue to operate in VMC and notify the appropriate ATC facility of the action being taken either to leave the airspace concerned or to land at the nearest suitable aerodrome;

(3) If operated within a control zone, request authorization to operate as a special VFR flight; or

(4) Request clearance from ATC to operate in accordance with IFR.

§ 91.95 Communications.

(a) Each PIC operating an aircraft as a controlled flight must—

(1) Maintain continuous air ground voice communication watch on the appropriate communication frequency and

(2) Establish two way communication as necessary with the appropriate Air Traffic Service unit.

(b) *Communications failure.* If a communications failure occurs that does not allow the PIC to comply with paragraph (a) of this section, the PIC must—

(1) Comply with the voice communication failure procedures in paragraphs (c) through (f) of this section,

(2) Attempt to establish communications with the appropriate ATC facility using all other available means, and

(3) When entering the aerodrome traffic pattern at a controlled aerodrome, look for instructions issued by visual signals as prescribed in GACAR § 91.107.

(c) *Communications failure in VMC.*

(1) If operating as a controlled flight under VFR, the PIC must continue to fly in VMC; land at the nearest suitable aerodrome; and immediately report his arrival to the appropriate Air Traffic Service unit.

(2) If operating under IFR, the PIC must comply with GACAR § 91.209.

(d) When the PIC fails to establish contact with the appropriate Air Traffic Service facility on the designated frequency, he must attempt to establish contact on the previous frequency used and, if not successful, on another frequency appropriate to the route. If those attempts are not successful the PIC must—

(1) Attempt to establish communication using all available means and advise the Air Traffic Service facility reached that contact on the assigned frequency could not be established.

(2) Monitor the appropriate VHF frequency for calls from nearby aircraft.

(e) If the PIC is unable to establish contact in accordance with paragraph (d) of this section, he must transmit his message twice on the designated frequency or frequencies preceded by the phrase “TRANSMITTING BLIND” and, include the name of the ATC facility for which the message is intended.

(f) *Receiver failure.*

(1) When the PIC is unable to establish communication due to receiver failure, he must—

(i) Transmit reports at the scheduled times, or positions, on the frequency in use, beginning with the phrase “TRANSMITTING BLIND DUE TO RECEIVER FAILURE” followed by the intended message.

(ii) Repeat the information in paragraph (f)(1)(i) of this section with each transmission.

(iii) Advise the time of his next intended transmission.

(iv) Select Secondary Surveillance Radar (SSR) transponder code 7600 to indicate radio failure.

(2) If the PIC is provided with ATC or advisory service he must state his intention with respect to the continuation of the flight in addition to complying with the requirements of paragraph (f)(1) of this section.

§ 91.97 Radiotelephony Procedures.

(a) *General.* The PIC must ensure that all communications follow—

(1) The highest standard of discipline at all times,

(2) International Civil Aviation Organization (ICAO) standardized phraseology in all situations for which standard phraseology has been specified in accordance with paragraph (f) of this section, and

(3) Plain language only when the standardized phraseology in paragraph (a)(2) of this section cannot serve an intended transmission.

(b) *Initial communication.* The initial call a PIC makes to any ATC facility must contain the following elements:

(1) Designation of the station being called;

(2) Call sign and, for aircraft in the heavy wake turbulence category, the word “HEAVY”;

(3) Level, including passing and cleared levels if not maintaining the cleared level;

(4) Speed, if assigned by ATC; and

(5) Any additional elements, as required by the Air Traffic Service authority.

(c) *Communications between aircraft.* In communications between aircraft, the duration of communication must be controlled by the aircraft which is receiving the communication.

(d) *Communications between aircraft on Air Traffic Service frequencies.* If communications between aircraft occur on an Air Traffic Service frequency, prior permission of the Air Traffic Service facility must be obtained.

(e) *Air ground communications.* The PIC must ensure all air ground radiotelephony communications are transmitted in the English or Arabic language.

(f) The PIC must ensure all radiotelephony communications are transmitted using ICAO standardized protocols, including word spelling, the transmission of numbers, calling, and exchange of messages.

(g) *Distress and urgency communications.* The PIC must use, at the commencement of the first distress and urgency communication, as applicable the radiotelephony distress signal, “MAYDAY” or the radiotelephony urgency signal, “PAN PAN”. Distress and urgency conditions are defined as follows:

(1) *Distress*: A condition of being threatened by serious and/or imminent danger and of requiring immediate assistance.

(2) *Urgency*: A condition concerning the safety of an aircraft or other vehicle, or of some person on board or within sight, but which does not require immediate assistance.

(h) *Signal testing.* When sending radio signals for testing or adjustment from an aircraft that may interfere with operations at a nearby Air Traffic Service facility, the person performing the testing or adjustment must—

(1) Obtain the consent of the affected Air Traffic Service facility before sending such signals and

(2) Keep such transmissions to a minimum.

§ 91.99 Clearances: General.

(a) An ATC clearance must—

(1) Be obtained prior to operating a controlled flight, or a portion of a flight as a controlled

flight and

(2) Be requested through the submission of a flight plan to an ATC facility.

(b) Whenever a PIC requests a clearance involving priority, he must submit a report explaining the necessity for such priority, if requested by the ATC facility.

(c) If prior to departure the PIC anticipates that depending on fuel supply, he may need to proceed to a revised destination aerodrome, the PIC must insert information concerning the revised route (when known) and the revised destination in the flight plan.

(d) A PIC must read back to the air traffic controller safety related parts of ATC clearances and instructions which are transmitted by voice. The following items always must be read back:

(1) ATC route clearances;

(2) Clearances and instructions to enter, land on, take off from, hold short of, cross, taxi and backtrack on any runway; and

(3) Runway in use, altimeter settings, SSR transponder codes, level instructions, heading and speed instructions and, whether issued by ATC or contained in automatic terminal information service (ATIS) broadcasts, transition levels.

(e) A PIC must read back or acknowledge any ATC clearance or instruction transmitted by voice other than those specified in paragraph (d) of this section, including conditional clearances, in a manner to clearly indicate that he has understood and will comply with them.

(f) A PIC must not taxi an aircraft on a controlled aerodrome maneuvering area without clearance from the aerodrome control tower and must comply with any instructions given by the tower.

(g) When operating a controlled flight, a PIC must, except when landing at a controlled aerodrome, advise the appropriate ATC facility when the aircraft is no longer subject to ATC services.

(h) A PIC must challenge or verify any instruction or clearance he suspects may be false or deceptive with the appropriate ATC facility.

§ 91.101 Compliance With ATC Clearances and Instructions.

(a) No PIC may deviate from an ATC clearance unless—

(1) He receives an amended clearance,

(2) An emergency exists, or

(3) The deviation is in response to an ACAS resolution advisory (RA).

(b) The PIC may cancel an IFR flight plan if the operation is being conducted in VMC, unless the operation is being conducted in Class A airspace.

(c) The PIC must immediately request clarification from ATC when he is uncertain of an ATC clearance.

(d) Except in an emergency, no person may operate an aircraft contrary to an ATC instruction in an area in which ATC authority is exercised.

(e) Each PIC who deviates from an ATC clearance or instruction must notify ATC of the deviation as soon as practicable.

(f) Each PIC who (though not deviating from a rule of this subpart) is given priority by ATC in an emergency, must submit a detailed report of the emergency within 48 hours to the manager of the ATC facility, if requested by ATC.

(g) Unless otherwise authorized by ATC, no PIC operating an aircraft may operate the aircraft according to any clearance or instruction that has been issued to the PIC of another aircraft for radar ATC purposes.

(h) Each PIC operating on a standard instrument departure (SID) must follow the vertical profile of the SID and comply with all published altitude restrictions while climbing to a higher level assigned by ATC unless ATC explicitly cancels the SID altitude restrictions.

(i) Each PIC operating on a standard terminal arrival (STAR) must follow the vertical profile of the STAR and comply with all published altitude restrictions while descending to a lower level assigned by ATC unless ATC explicitly cancels the STAR altitude restrictions.

§ 91.103 Position Reporting.

(a) Unless exempted by the appropriate Air Traffic Service unit, a PIC operating a controlled flight on routes defined by designated waypoints must report to the appropriate Air Traffic Service unit when over, or as soon as possible after passing, each designated compulsory reporting, together with any

other required information.

(b) The PIC must make position reports—

(1) In relation to additional points, when requested by the appropriate Air Traffic Service unit;

(2) In the absence of designated reporting points, at intervals prescribed in GACAR § 91.105 or specified by the appropriate Air Traffic Service unit; and

(3) On routes not defined by designated waypoints, as soon as possible after the first half hour of flight and at hourly intervals thereafter.

(c) The PIC must make the position reports required by paragraphs (a) and (b) of this section to the Air Traffic Service unit serving the airspace in which the aircraft is operated; and for the last position report before passing from one FIR or control area to an adjacent FIR or control area, he must make a position report to the Air Traffic Service unit serving the airspace about to be entered.

(d) *Contents of voice position reports*. The position reports required by paragraphs (a) and (b) of this section must contain the following:

(1) Aircraft identification;

(2) Position;

(3) Time (expressed in four digits, giving both the hour and the minutes);

(4) Flight level or altitude, including passing level and cleared level if not maintaining the cleared level;

(5) Next position and time over;

(6) Ensuing waypoint; and

(7) When assigned a speed to maintain, the PIC must include this speed.

The PIC must also include the assigned speed in the initial call after a change of air ground voice communication frequency, whether or not a full position report is required.

(e) For verbal position reports, the PIC must transmit the spoken word “POSITION” immediately

before or after the aircraft call sign/identification.

(f) If the appropriate Air Traffic Service unit exempts position reporting, the PIC must resume position reporting when—

(1) Instructed by an Air Traffic Service unit;

(2) Advised that Air Traffic Service surveillance service has been terminated; or

(3) Advised that identification is lost.

§ 91.105 Periodic Reporting of Flight Progress.

(a) Each PIC of an aircraft equipped with suitable two way radio communications must report to the appropriate Air Traffic Service unit during the period 20 to 40 minutes following the time of last contact with that facility.

(b) If no routine communication is necessary to meet the requirements of paragraph (a) of this section, the PIC must make a report to the appropriate Air Traffic Service unit to indicate that the flight is progressing according to plan using the words “OPERATIONS NORMAL” or the signal “QRU.”

§ 91.107 ATC Light Signals.

(a) ATC light signals have the meaning as shown in Table 91–3.

Table 91–3.

Color and Type of Signal	Surface Operations	In Flight
Steady Green	Cleared for takeoff.	Cleared for landing.
Flashing Green	Cleared to taxi.	Return to aerodrome (to be followed by steady green at proper time).
Steady Red	Stop.	Give way to other aircraft and continue circling.
Flashing Red	Taxi clear of runway in use.	Aerodrome unsafe – do not land.
Flashing White	Return to starting point on aerodrome.	Not applicable.

Color and Type of Signal	Surface Operations	In Flight
Alternating Red and Green	Exercise extreme caution.	Exercise extreme caution.

(b) *Acknowledgement by an aircraft*. The PIC must acknowledge ATC light signals in the following manner:

(1) When in flight—

(i) *During daylight*: By rocking the aircraft's wings;

(ii) *During darkness*: By flashing the aircraft's landing lights or, if not so equipped, by switching its navigation lights on and off twice.

(2) When on the ground—

(i) *During daylight*: By moving the aircraft's ailerons or rudder;

(ii) *During darkness*: By flashing the aircraft's landing lights twice or, if not so equipped, by switching its navigation lights on and off twice.

§ 91.109 Reporting of Degraded Performance.

(a) If, as a result of failure or degradation of navigation, communications, altimetry, flight control or other systems, aircraft performance is degraded below the level required for the airspace in which the aircraft is operating, the PIC must advise the appropriate Air Traffic Service unit without delay.

(b) If the PIC encounters an irregularity in a ground facility or navigation aid in flight, which the PIC considers essential to the safety of other flights, the PIC must advise the appropriate Air Traffic Service unit without delay.

§ 91.111 Uncertainty of Position on the Maneuvering Area.

(a) Except as provided in paragraph (b) of this section, a PIC in doubt as to the position of the aircraft on the maneuvering area must immediately—

(1) Stop the aircraft and

(2) Simultaneously notify the appropriate Air Traffic Service unit of the circumstances (including the last known position).

(b) In those situations where a PIC is in doubt as to the position of the aircraft on the maneuvering area, but recognizes the aircraft is on a runway, the PIC must immediately—

(1) Notify the appropriate Air Traffic Service unit of the circumstances (including the last known position);

(2) If able to locate a nearby suitable taxiway, vacate the runway as expeditiously as possible, unless otherwise instructed by the Air Traffic Service unit; and then

(3) Stop the aircraft.

<< FLIGHTS IN DESIGNATED AIRSPACE >>

§ 91.121 Operating on or in the Vicinity of an Aerodrome in Class G Airspace.

(a) *General*. Unless otherwise authorized or required, each person operating an aircraft on or in the vicinity of an aerodrome in a Class G airspace area must comply with the requirements of this section.

(b) *Direction of turns*. When approaching to land at an aerodrome without an operating control tower in a Class G airspace area—

(1) Each PIC of an airplane must make all turns of the airplane to the left unless right hand patterns have been established for the aerodrome under GACAR Part 93, in which case the PIC must make all turns to the right and

(2) Each PIC of a rotorcraft or a powered parachute must avoid the flow of fixed–wing aircraft.

(c) *Flap settings*. Except when necessary for training or certification, the PIC of a civil turbojet–powered airplane must use, as a final flap setting, the minimum certificated landing flap setting set forth in the approved performance information in the AFM for the applicable conditions. However, each PIC has the final authority and responsibility for the safe operation of his airplane, and may use a different flap setting for the airplane if he determines it is necessary in the interest of safety.

(d) *Communications*. Each PIC of an aircraft must follow any traffic information broadcasts by aircraft (TIBA) procedures published in the KSA AIP and broadcast relevant collision avoidance

information to other pilots and ground vehicles on the published TIBA frequency.

§ 91.123 Operating on or in the Vicinity of an Aerodrome in Class F Airspace.

(a) *General.* Unless otherwise required by GACAR Part 93 or unless otherwise authorized or required by the ATC facility having jurisdiction over the Class F airspace area, each person operating an aircraft on or in the vicinity of an aerodrome in a Class F airspace area must comply with the requirements of GACAR § 91.121.

(b) *Operations under IFR.* Each PIC of an aircraft must comply with GACAR § 91.95(a) when operating an aircraft on or in the vicinity of an aerodrome in Class F airspace under IFR.

(c) *Departures.* Each PIC of an aircraft must comply with any traffic patterns established for that aerodrome in GACAR Part 93.

§ 91.125 Operating on or in the Vicinity of an Aerodrome in Class E Airspace.

(a) *General.* Unless otherwise required by GACAR Part 93 or unless otherwise authorized or required by the ATC facility having jurisdiction over the Class E airspace area, each person operating an aircraft on or in the vicinity of an aerodrome in a Class E airspace area must comply with the requirements of GACAR § 91.121.

(b) *Departures.* Each PIC of an aircraft must comply with any traffic patterns established for that aerodrome in GACAR Part 93.

§ 91.127 Operations in Class D Airspace.

(a) *General.* Unless otherwise authorized or required by the ATC facility having jurisdiction over the Class D airspace area, each person operating an aircraft in Class D airspace must comply with the applicable provisions of this section. In addition, each person must comply with GACAR §§ 91.121 and 91.125. For the purpose of this section, the primary aerodrome is the aerodrome for which the Class D airspace area is designated. A satellite aerodrome is any other aerodrome within the Class D airspace area.

(b) *Deviations.* A person may deviate from any provision of this section under the provisions of an ATC authorization issued by the ATC facility having jurisdiction over the airspace concerned. ATC may authorize a deviation on a continuing basis or for an individual flight, as appropriate.

(c) *Communications.* Each PIC operating an aircraft in Class D airspace must meet the following two way radio communications requirements:

(1) *Arrival or through flight.* Each PIC must establish two way radio communications with the ATC facility (including foreign ATC in the case of foreign airspace designated in the Kingdom of Saudi Arabia) providing air traffic services prior to entering that airspace and maintain communications while within that airspace.

(2) *Departing flight.* Each PIC—

(i) From the primary aerodrome or satellite aerodrome with an operating control tower must establish and maintain two way radio communications with the control tower, and thereafter as instructed by ATC while operating in the Class D airspace area or

(ii) From a satellite aerodrome without an operating control tower, must establish and maintain two way radio communications with the ATC facility having jurisdiction over the Class D airspace area as soon as practicable after departing.

(d) *Communications failure.* Unless otherwise prescribed in GACAR § 91.95, each PIC who operates an aircraft in a Class D airspace area must maintain two way radio communications with the ATC facility having jurisdiction over that area.

(1) If the aircraft radio fails in flight under IFR, the pilot must comply with GACAR § 91.207.

(2) If the aircraft radio fails in flight under VFR, the PIC may operate the aircraft and land if—

(i) Weather conditions are at or above basic VFR weather minimums,

(ii) Visual contact with the tower is maintained, and

(iii) A clearance to land is received.

(e) *Minimum altitudes when operating to an aerodrome in Class D airspace.*

(1) Unless required by the applicable distance–from–cloud criteria, each PIC operating a large or turbine powered airplane must enter the traffic pattern at an altitude of at least 1 500 ft (450 m) above the elevation of the aerodrome and maintain at least 1 500 ft (450 m) until further descent is required for a safe landing.

(2) Each PIC operating a large or turbine–powered airplane approaching to land on a runway served by an instrument approach procedure with vertical guidance (APV), if the airplane is so equipped, must—

(i) Operate the airplane at an altitude at or above the glide path between the published final approach fix and the DA or DH, as applicable or

(ii) If compliance with the applicable distance–from–cloud criteria requires glide path interception closer in, operate the airplane at or above the glide path, between the point of interception of glide path and the DA or the DH.

(3) Each PIC operating an airplane approaching to land on a runway served by a visual approach slope indicator must maintain an altitude at or above the glide path until a lower altitude is necessary for a safe landing.

(4) Paragraphs (e)(2) and (3) of this section do not prohibit normal bracketing maneuvers above or below the glide path that are conducted for the purpose of remaining on the glide path.

(f) *Approaches*. Except when conducting a circling approach or unless otherwise required by ATC, each PIC must—

(1) Circle the aerodrome to the left, if operating an airplane or

(2) Avoid the flow of fixed–wing aircraft, if operating a rotorcraft.

(g) *Departures*. No PIC may operate an aircraft departing from an aerodrome except in compliance with the following:

(1) Each PIC must comply with any departure procedures established for the aerodrome by the GACA.

(2) Unless otherwise required by the prescribed departure procedure for the aerodrome or the applicable distance–from–clouds criteria, each PIC of a large or turbine–powered airplane must climb to an altitude of 1 500 ft (450 m) above the surface as rapidly as practicable.

(h) *Noise abatement*. Where a formal runway use program has been established by the GACA, each PIC of a large or turbine–powered airplane assigned a noise abatement runway by ATC must use that runway. However, consistent with the final authority of the PIC concerning the safe operation of the

aircraft as prescribed in GACAR § 91.3(a), ATC may assign a different runway if requested by the PIC or his designee in the interest of safety.

(i) *Takeoff, landing, taxi clearance.* No person may, at any aerodrome with an operating control tower, operate an aircraft on a runway or taxiway, or take off or land an aircraft, unless an appropriate clearance is received from ATC. A clearance to taxi to the takeoff runway assigned to the aircraft is not a clearance to cross that assigned takeoff runway, or to taxi on that runway at any point, or to cross other runways that intersect the taxi route to that assigned takeoff runway. A clearance to taxi to any point other than an assigned takeoff runway is not a clearance to cross any runways that intersect the taxi route to that point.

§ 91.129 Operations in Class C Airspace.

(a) *Operating rules.* Unless otherwise authorized by ATC, each aircraft operation in Class C airspace must be conducted in compliance with this section and GACAR § 91.127 and the following rules.

(1) *ATC clearance.* The PIC must receive an ATC clearance from the ATC facility having jurisdiction for that area before operating an aircraft in that area.

(2) *Deviations.* A person may deviate from any provision of this section under the provisions of an ATC authorization issued by the ATC facility having jurisdiction over the airspace concerned. ATC may authorize a deviation on a continuing basis or for an individual flight, as appropriate.

(b) *Equipment requirements.* Unless otherwise authorized by the ATC facility having jurisdiction over the Class C airspace area, no person may operate an aircraft within a Class C airspace area designated for an aerodrome unless that aircraft is equipped with the applicable equipment specified in GACAR § 91.303.

§ 91.131 Operations in Class B Airspace.

(a) *Operating rules.* No person may operate an aircraft within a Class B airspace area except in compliance with GACAR § 91.127 and the following rules:

(1) The PIC must receive an ATC clearance from the ATC facility having jurisdiction for that area before operating an aircraft in that area.

(2) Unless otherwise authorized by ATC, each PIC operating a large turbine–engine–powered aircraft to or from a primary aerodrome for which a Class B airspace area is designated must

operate at or above the designated floors of the Class B airspace area while within the lateral limits of that area.

(3) Any person conducting pilot training operations at an aerodrome within a Class B airspace area must comply with any procedures established by ATC for such operations in that area.

(b) *Pilot requirements.*

(1) No person may take off or land an aircraft at an aerodrome within a Class B airspace area or operate an aircraft within a Class B airspace area unless—

(i) The PIC holds at least a private pilot certificate;

(ii) The PIC holds a recreational pilot certificate and has met—

(A) The requirements of GACAR § 61.101(d) or

(B) The requirements for a student pilot seeking a recreational pilot certificate in GACAR § 61.94;

(iii) The aircraft is operated by a student pilot who has met the requirements of GACAR § 61.94 or 61.95, as applicable.

(2) Notwithstanding the provisions of paragraphs (b)(1)(ii) and (iii) of this section, no person may take off or land an aircraft at those aerodromes listed in Appendix A to this part unless the PIC holds at least a private pilot certificate.

(c) *Equipment requirements.* Unless otherwise authorized by ATC, no person may operate an aircraft within a Class B airspace area unless the aircraft is equipped in accordance with GACAR § 91.303.

§ 91.133 Operations in Restricted, Danger, and Prohibited Areas.

(a) No person may operate an aircraft within a restricted area contrary to the restrictions imposed.

(b) No person may operate within a prohibited area unless that person has the permission of the administering authority.

(c) Each person conducting an aircraft operation (approved by the administering authority) within a

restricted area that creates the same hazards as the operations for which the restricted area was designated may deviate from the rules of this subpart that are not compatible with the operation of the aircraft.

(d) Each person operating an aircraft that is not authorized to fly in, or is about to enter, a restricted, prohibited, or danger area who observes a series of projectiles discharged from the ground at intervals of 10 seconds bursting as red and green lights or stars must take any necessary remedial action without delay.

§ 91.135 Operations in Class A Airspace.

Except as provided in paragraph (d) of this section, each person operating an aircraft in Class A airspace must operate under IFR and in compliance with the following:

(a) *Clearance.* Operations may be conducted only under an ATC clearance received prior to entering the airspace.

(b) *Communications.* Unless otherwise authorized by ATC, each aircraft operating in Class A airspace must be equipped with a two way radio capable of communicating with ATC on a frequency assigned by ATC. Each PIC must maintain two way radio communications with ATC while operating in Class A airspace.

(c) *Equipment requirements.* Unless otherwise authorized by ATC, no person may operate an aircraft within Class A airspace unless that aircraft is equipped in accordance with GACAR § 91.303.

(d) *ATC authorizations.* A person may deviate from any provision of this section under the provisions of an ATC authorization issued by the ATC facility having jurisdiction of the airspace concerned. In the case of an inoperative transponder, ATC may immediately approve an operation within a Class A airspace area allowing flight to continue, if desired, to the aerodrome of ultimate destination, including any intermediate stops, or to proceed to a place where suitable repairs can be made, or both. Requests for deviation from any provision of this section must be submitted in writing, at least 4 working days before the proposed operation. ATC may authorize a deviation on a continuing basis or for an individual flight.

<< FLIGHTS DURING SPECIAL CIRCUMSTANCES >>

§ 91.141 Temporary Flight Restrictions in the Vicinity of Disaster/Hazard Areas.

(a) The President will issue a Notice to Airmen (NOTAM) designating an area within which

temporary flight restrictions apply and specifying the hazard or condition requiring their imposition, whenever he determines it is necessary in order to—

(1) Protect persons and property on the surface or in the air from a hazard associated with an incident on the surface.

(2) Provide a safe environment for the operation of disaster relief aircraft.

(3) Prevent an unsafe congestion of sightseeing and other aircraft above an incident or event which may generate a high degree of public interest.

The NOTAM will specify the hazard or condition that requires the imposition of temporary flight restrictions.

(b) When a NOTAM has been issued under paragraph (a)(1) of this section, no person may operate an aircraft within the designated area unless that aircraft is participating in the hazard relief activities and is being operated under the direction of the official in charge of on scene emergency response activities.

(c) When a NOTAM has been issued under paragraph (a)(2) of this section, no person may operate an aircraft within the designated area unless at least one of the following conditions is met:

(1) The aircraft is participating in hazard relief activities and is being operated under the direction of the official in charge of on scene emergency response activities.

(2) The aircraft is carrying law enforcement officials.

(3) The aircraft is operating under an ATC-approved IFR flight plan.

(4) The operation is conducted directly to or from an aerodrome within the area, or is necessitated by the impracticability of VFR flight above or around the area due to weather, or terrain; notification is given to the FIS or ATC facility specified in the NOTAM to receive advisories concerning disaster relief aircraft operations; and the operation does not hamper or endanger relief activities and is not conducted for the purpose of observing the disaster.

(5) The aircraft is carrying properly accredited news representatives, and, prior to entering the area, a flight plan is filed with the appropriate facility specified in the NOTAM and the operation is conducted above the altitude used by the disaster relief aircraft, unless otherwise

authorized by the official in charge of on scene emergency response activities.

(d) When a NOTAM has been issued under paragraph (a)(3) of this section, no person may operate an aircraft within the designated area unless at least one of the following conditions is met:

(1) The operation is conducted directly to or from an aerodrome within the area, or is necessitated by an inability to conduct VFR flight above or around the area due to weather or terrain, and the operation is not conducted for the purpose of observing the incident or event.

(2) The aircraft is operating under an ATC approved IFR flight plan.

(3) The aircraft is carrying incident or event personnel, or law enforcement officials.

(4) The aircraft is carrying properly accredited news representatives and, prior to entering the area, a flight plan is filed with the appropriate facility specified in the NOTAM.

(e) Flight plans filed and notifications made with an FIS or ATC facility under this section must include the following information:

(1) Aircraft identification, type and color;

(2) Radio communications frequencies to be used;

(3) Proposed times of entry to, and exit from, the designated area;

(4) Name of news media or organization and purpose of flight; and

(5) Any other information requested by ATC.

§ 91.143 Emergency Air Traffic Rules.

(a) This section prescribes a process for using NOTAMs to advise of the issuance and operations under emergency air traffic rules and regulations.

(b) Whenever the President determines an emergency condition exists, or will exist, relating to the operation of the ATC system and during which normal flight operations cannot be conducted consistent with the required levels of safety and efficiency—

(1) The President issues an immediately effective air traffic rule or regulation in response to that

emergency condition; and

(2) The President may use the NOTAM system to provide notification of the issuance of the rule or regulation.

These NOTAMs communicate information concerning the rules and regulations that govern flight operations, the use of navigation facilities, and designation of that airspace in which the rules and regulations apply.

(c) When a NOTAM has been issued under this section, no person may operate an aircraft, or other device governed by the regulation concerned, within the designated airspace except in accordance with the authorizations, terms, and conditions prescribed in the regulation covered by the NOTAM.

§ 91.145 Flight Restrictions in the Proximity of the Custodian of the Two Holy Mosques and Other Parties.

No person may operate an aircraft over or in the vicinity of any area to be visited or traveled by the Custodian of the Two Holy Mosques, or other public figures contrary to the restrictions established by the President and published in a NOTAM.

§ 91.147 Temporary Restriction on Flight Operations During Abnormally High Barometric Pressure Conditions.

(a) When any information indicates that barometric pressure on the route of flight currently exceeds or will exceed 1 050 hPa , no person may operate an aircraft or initiate a flight contrary to the requirements established by the President and published in a NOTAM issued under this section.

(b) The President is authorized to waive any restriction issued under paragraph (a) of this section to permit emergency supply, transport, or medical services to be delivered to isolated communities, as long as the operation can be conducted with an acceptable level of safety.

§ 91.149 Management of Aircraft Operations in the Vicinity of Aerial Demonstrations and Major Public Assemblies.

(a) The President will issue a NOTAM designating an area of airspace in which a temporary flight restriction applies when he determines that a temporary flight restriction is necessary to protect persons or property on the surface or in the air, to maintain air safety and efficiency, or to prevent the unsafe congestion of aircraft in the vicinity of an aerial demonstration or major assembly of people on

the ground. These demonstrations and events may include—

(1) Any aerial demonstration or event that the President determines requires a temporary flight restriction in accordance with paragraph (b) of this section.

(b) In deciding whether a temporary flight restriction is necessary for an aerial demonstration or major sporting event not listed in paragraph (a) of this section, the President considers the following factors:

(1) Area where the event will be held,

(2) Effect flight restrictions will have on known aircraft operations,

(3) Any existing ATC airspace traffic management restrictions,

(4) Estimated duration of the event,

(5) Degree of public interest,

(6) Number of people on the ground,

(7) Provisions for safety of people on the ground,

(8) Number and types of participating aircraft,

(9) Use of mixed high and low performance aircraft,

(10) Impact on nonparticipating aircraft,

(11) Weather minimums, and

(12) Emergency procedures that will be in effect.

(c) A NOTAM issued under this section will state the name of the aerial demonstration or event and specify the effective dates and times, the geographic features or coordinates, and any other restrictions or procedures governing flight operations in the designated airspace.

(d) When a NOTAM has been issued in accordance with this section, no person may operate an aircraft or device, or engage in any activity within the designated airspace area, except in accordance

with the authorizations, terms, and conditions of the temporary flight restriction published in the NOTAM, unless otherwise authorized by—

(1) ATC or

(2) A Certificate of Waiver or Authorization issued for the demonstration or event.

(e) For the purpose of this section—

(1) *Flight restricted airspace area for an aerial demonstration.* The amount of airspace needed to protect persons and property on the surface or in the air, to maintain air safety and efficiency, or to prevent the unsafe congestion of aircraft will vary depending on the aerial demonstration and the factors listed in paragraph (b) of this section, but will be no greater than the minimum airspace necessary for the management of aircraft operations in the vicinity of the specified area.

(2) *Flight restricted area for a major assembly of people.* The amount of airspace needed to protect people and property on the ground or in the air, to maintain air safety and efficiency, or to prevent the unsafe congestion of aircraft will vary depending on the size of the event and the factors listed in paragraph (b) of this section, but will not be greater than the minimum airspace necessary for the management of aircraft operations in the vicinity of the specified area.

(f) A NOTAM issued under this section will be issued at least 30 days in advance of an aerial demonstration or event, unless the President finds good cause for a shorter period and explains this in the NOTAM.

(g) When warranted, the President may exclude the following flights from the provisions of this section:

(1) Essential military,

(2) Medical and rescue,

(3) Heads of state and other dignitaries,

(4) Law enforcement and security, and

(5) Public health and welfare.

<< VISUAL FLIGHT RULES >>

§ 91.161 Fuel Supply Requirements for Flights Under VFR.

(a) No person may begin a flight in an airplane under VFR unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed—

(1) During the day, to fly after that for at least 30 minutes; or

(2) At night, to fly after that for at least 45 minutes.

(b) No person may begin a flight in a rotorcraft under VFR unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed, to fly after that for at least 20 minutes.

§ 91.163 VFR Flight Plan: Information Required.

Unless otherwise authorized by ATC, each person filing a VFR flight plan must include the following information:

(a) The aircraft identification number and, if necessary, its radio call sign;

(b) The type of the aircraft or, in the case of a formation flight, the type of each aircraft and the number of aircraft in the formation;

(c) The full name and address of the PIC or, in the case of a formation flight, the formation commander;

(d) The point and proposed time of departure;

(e) The proposed route, cruising altitude (or flight level), and true airspeed at that altitude;

(f) The point of first intended landing and the estimated elapsed time until over that point;

(g) The amount of fuel on board (in hours);

(h) The number of persons in the aircraft, except where that information is otherwise readily available to the GACA;

(i) If an overflight and/or landing approval for KSA airspace is required for the flight, the registration

number on the approval; and

(j) Any other information the PIC or ATC believes is necessary for ATC purposes.

§ 91.165 Basic VFR Weather Minimums.

(a) No person operating an aircraft may begin a flight under VFR unless current meteorological reports or a combination of current reports and forecasts indicate the flight can be operated in accordance with the minimums listed in this section.

(b) Except as provided in paragraph (c) of this section or GACAR § 91.167, no person may operate an aircraft under VFR when the flight visibility is less, or at a distance from clouds that is less, than that prescribed for the corresponding altitude and class of airspace in the following table:

Airspace	**Flight visibility**	**Distance from clouds**
Class A	Not Applicable	Not Applicable.
Class B	5 KM	Clear of Clouds.
Class C	5 KM	500 ft below.
		1,000 ft above.
		2,000 ft horizontal.
Class D	5 KM	500 ft below.
		1,000 ft above.
		2,000 ft horizontal.
Class E:		
Less than 10,000 ft MSL	5 KM	500 ft below.
		1,000 ft above.

		2,000 ft horizontal.
At or above 10,000 ft MSL	8 KM	1,000 ft below.
		1,000 ft above.
		1500 M horizontal.
Class G and F:		
1,200 ft or less above the surface(regardless of MSL altitude)		
For aircraft other than helicopters:		
Day,except as provided in§ 91.165(b)	3 KM	Clear of clouds.
Night,except as provided in§ 91.165(b)	8 KM	500 ft below.
		1,000 ft above.
		2,000 ft horizontal.
For helicopters:		
Day	800 m	Clear of clouds.
Night, except as provided in § 91.165(b)	1500 m	Clear of clouds.
More than 1,200 ft above the surface but less than 3050 m (10,000 ft) MSL		
Day	1500 m	500 ft below.
		1,000 ft above.
		2,000 ft horizontal.
Night	5 KM	500 ft below.
		1,000 ft above.
		2,000 ft horizontal.

More than 1,200 ft above the surface and at or above 3050 m (10,000 ft) MSL	8 KM	1,000 ft below.
		1,000 ft above.
		1500 M horizontal.

(c) Class G Airspace. Notwithstanding the provisions of paragraph (a) of this section, the following operations may be conducted in Class G airspace below 1,200 ft above the surface:

(1) Helicopter. A helicopter may be operated clear of clouds in an airport traffic pattern within 800 m of the runway or helipad of intended landing if the flight visibility is not less than 800 m.

(2) Airplane, powered parachute, or weight-shift-control aircraft. If the visibility is less than 5 KM but not less than 1500 m during night hours and you are operating in an airport traffic pattern within 800 M of the runway, you may operate an airplane, powered parachute, or weight-shift-control aircraft clear of clouds.

(d) Except as provided in Sec. 91.167, no person may operate an aircraft beneath the ceiling under VFR within the lateral boundaries of controlled airspace designated to the surface for an airport when the ceiling is less than 1,000 ft.

(e) Except as provided in Sec. 91.167 of this part, no person may take off or land an aircraft, or enter the traffic pattern of an airport, under VFR, within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport--

(1) Unless ground visibility at that airport is at least 5 KM; or

(2) If ground visibility is not reported at that airport, unless flight visibility during landing or takeoff, or while operating in the traffic pattern is at least 5 KM.

(f) For the purpose of this section, an aircraft operating at the base altitude of a Class E airspace area is considered to be within the airspace directly below that area.

§ 91.167 Special VFR Weather Minimums.

(a) Except as provided in Section I of Appendix A to this part, special VFR operations may be conducted under the weather minimums and requirements of this section, instead of those contained in GACAR § 91.165, below 10 000 ft (3 050 m) MSL within the airspace contained by the upward extension of the lateral boundaries of the controlled airspace designated to the surface for an aerodrome.

(b) Special VFR operations may only be conducted—

(1) With an ATC clearance;

(2) Clear of clouds;

(3) Except for rotorcraft, when flight visibility is at least 1 500 m; and

(4) Except for rotorcraft, between sunrise and sunset unless—

(i) The person being granted the ATC clearance meets the applicable requirements for instrument flight under GACAR Part 61; and

(ii) The aircraft is equipped as required in GACAR § 91.303(f).

(c) No person may take off or land an aircraft (other than a rotorcraft) under special VFR—

(1) Unless ground visibility is at least 1 500 m; or

(2) If ground visibility is not reported, unless flight visibility is at least 1 500 m. For the purposes of this paragraph, the term “flight visibility” includes the visibility from the flightdeck of an aircraft in takeoff position if—

(i) The flight is conducted under this part; and

(ii) The aerodrome at which the aircraft is located is a satellite aerodrome that does not have weather reporting capabilities.

(d) The determination of visibility by a PIC in accordance with paragraph (c)(2) of this section is not an official weather report or an official ground visibility report.

§ 91.169 VFR Cruising Altitude.

Except while holding in a holding pattern of 2 minutes or less, or while turning, each PIC operating an aircraft under VFR in level cruising flight more than 3 000 ft (900 m) AGL must maintain the appropriate altitude prescribed below, unless otherwise authorized by ATC:

(a) When operating below 13 000 ft (3 950 m) MSL and—

(1) On a magnetic course of 0° through 179°, any odd thousand foot MSL altitude +500 ft (such as 3 500 ft, 5 500 ft, or 7 500 ft); or

(2) On a magnetic course of 180° through 359°, any even thousand foot MSL altitude +500 ft (such as 4 500 ft, 6 500 ft, or 8 500 ft).

(b) The maximum VFR cruising altitude is 12 500 ft (3 800 m) MSL.

<< NIGHT >>

§ 91.171 Prohibition of Night VFR Flights.

Unless otherwise authorized by the President or for local flights in accordance with conditions prescribed by the appropriate ATC facility, no person may operate an aircraft under VFR in the period from sunset to sunrise in KSA airspace.

§ 91.173 Use of Aircraft Lights at Night.

No person may—

(a) During the period from sunset to sunrise—

(1) Operate an aircraft unless it has lighted position lights;

(2) Park or move an aircraft in, or in dangerous proximity to, a movement area of an aerodrome unless the aircraft—

(i) Is clearly illuminated.

(ii) Has lighted position lights.

(iii) Is in an area that is marked by obstruction lights.

(3) Operate or anchor an aircraft on the water unless the aircraft—

(i) Displays lights as prescribed in Appendix G to this part or

(ii) When anchored, is in an area where anchor lights are not required on vessels.

(b) Operate an aircraft that is equipped with an anticollision light system, unless it has lighted anticollision lights in accordance with GACAR § 91.241.

<< INSTRUMENT FLIGHT RULES >>

§ 91.181 Fuel Supply Requirements for Flight Under IFR.

(a) No person may operate an aircraft under IFR unless it carries enough fuel (considering weather reports and forecasts and weather conditions) to—

(1) Fly to and execute an instrument approach and missed approach at the first aerodrome of intended landing;

(2) Except as provided in paragraph (b) of this section, fly from that aerodrome to the alternate aerodrome; and

(3) Fly after that for 45 minutes at normal cruising speed or, for rotorcraft, fly after that for 30 minutes at normal cruising speed.

(b) Paragraph (a)(2) of this section does not apply if—

(1) GACAR Part 97 prescribes an instrument approach procedure for the first aerodrome of intended landing; and

(2) Appropriate weather reports or weather forecasts, or a combination of them, indicate the following:

(i) *For aircraft other than rotorcraft.* For at least 1 hour before and for 1 hour after the estimated time of arrival, the ceiling will be at least 2 000 ft (600 m) above the aerodrome elevation and the visibility will be at least 5 km.

(ii) *For rotorcraft.* From at least 2 hours before until 2 hours after the estimated time of

arrival, or from the actual time of departure until 2 hours after the estimated time of arrival, whichever is shorter—

(A) The ceiling will be at least 400 ft (120 m) above the minimum associated with the instrument approach procedure, and

(B) The visibility will be at least 1 500 m more than the minimum associated with the instrument approach procedure.

§ 91.183 ATC Clearance and Flight Plan Required.

No person may operate an aircraft in controlled airspace under IFR unless the PIC has—

(a) Filed an IFR flight plan; and

(b) Received an appropriate ATC clearance.

§ 91.185 IFR Flight Plan: Information Required.

(a) *Information required.* Unless otherwise authorized by ATC, each person filing an IFR flight plan must include the following information:

(1) Information required under GACAR § 91.163;

(2) Except as provided in paragraph (b) of this section, an alternate aerodrome; and

(3) If applicable, the letter R must be inserted in Item 10 (Equipment) of the flight plan to indicate—

(i) The aircraft is equipped with Area Navigation (RNAV) having a navigation accuracy meeting Required Navigation Performance (RNP) 5 or

(ii) For performance based navigation (PBN) operations conducted under GACAR § 91.405, the aircraft and operator are approved for the operation to be conducted and the operation can comply with all conditions of that approval.

(b) Paragraph (a)(2) of this section does not apply if—

(1) An approved instrument approach procedure published in GACAR Part 97 is available for

the first aerodrome of intended landing and

(2) Appropriate weather reports or weather forecasts, or a combination of them, indicate the following:

(i) *For aircraft other than rotorcraft*. For at least 1 hour before and for 1 hour after the estimated time of arrival, the ceiling will be at least 2 000 ft (600 m) above the aerodrome elevation and the visibility will be at least 5 km.

(ii) *For rotorcraft*. From at least 2 hours before until 2 hours after the estimated time of arrival, or from the actual time of departure until 2 hours after the estimated time of arrival, whichever is shorter:

(A) The ceiling will be at least 400 ft (120 m) above the minimum associated with the instrument approach procedure, and

(B) The visibility will be at least 1 500 m more than the minimum associated with the instrument approach procedure.

(c) *IFR alternate aerodrome weather minimums*. Unless otherwise authorized by the President, no person may include an alternate aerodrome in an IFR flight plan unless appropriate weather reports or weather forecasts, or a combination of them, indicate at the estimated time of arrival at the alternate aerodrome, the ceiling and visibility at that aerodrome will be at or above the following weather minimums:

(1) If an instrument approach procedure has been published under GACAR Part 97 for that aerodrome, the following minimums:

(i) *For aircraft other than rotorcraft*. The alternate aerodrome minimums specified in that procedure, or if none are specified the following standard approach minimums:

(A) For a precision approach procedure. Ceiling 600 ft (180 m) and visibility 3 200 m.

(B) For a nonprecision approach procedure or APV. Ceiling 800 ft (240 m) and visibility 3 200 m.

(ii) *For rotorcraft*. Ceiling 200 ft (60 m) above the minimum altitude for the approach to be flown, and visibility at least 1 500 m but never less than the minimum visibility for the

approach to be flown, and

(2) If no instrument approach procedure has been published under GACAR Part 97 for the alternate aerodrome, the ceiling and visibility minimums are those allowing descent from the minimum en route altitude (MEA), approach, and landing under basic VFR.

(d) Rotorcraft offshore operations. Unless otherwise authorized by the President, no person may include an offshore alternate in an IFR flight plan for rotorcraft offshore operations.

§ 91.187 VOR Equipment Check for IFR Operations.

(a) No person may operate an aircraft under IFR using the VOR system of radio navigation unless the VOR equipment in the aircraft—

(1) Is maintained, checked, and inspected in accordance with the applicable requirement of Subpart E of this part; or

(2) Has been operationally checked within the preceding 30 days, and was found to be within the limits of the permissible indicated bearing error set forth in paragraph (b) or (c) of this section.

(b) Except as provided in paragraph (c) of this section, each person conducting a VOR check under paragraph (a)(2) of this section must—

(1) Use, at the aerodrome of intended departure, a test signal operated by an aeronautical telecommunication service provider authorized under GACAR Part 173 or a test signal radiated by a certificated and appropriately rated radio repair station or, outside the Kingdom of Saudi Arabia, a test signal operated or approved by an appropriate authority to check the VOR equipment (the maximum permissible indicated bearing error is ±4°); or

(2) Use, at the aerodrome of intended departure, a point on the aerodrome surface designated as a VOR system checkpoint by the President, or, outside the Kingdom of Saudi Arabia, by an appropriate authority (the maximum permissible bearing error is ±4°);

(3) If neither a test signal nor a designated checkpoint on the surface is available, use an airborne checkpoint designated by the President or, outside the Kingdom of Saudi Arabia, by an appropriate authority (the maximum permissible bearing error is ±6°); or

(4) If no check signal or point is available, while in flight—

(i) Select a VOR radial that lies along the centerline of an established VOR airway;

(ii) Select a prominent ground point along the selected radial preferably more than 20 NM from the VOR ground facility and maneuver the aircraft directly over the point at a reasonably low altitude; and

(iii) Note the VOR bearing indicated by the receiver when over the ground point (the maximum permissible variation between the published radial and the indicated bearing is 6°).

(c) If dual system VOR (units independent of each other except for the antenna) is installed in the aircraft, the person checking the equipment may check one system against the other in place of the check procedures specified in paragraph (b) of this section. Both systems must be tuned to the same VOR ground facility and note the indicated bearings to that station. The maximum permissible variation between the two indicated bearings is 4°.

(d) Each person making the VOR operational check, as specified in paragraph (b) or (c) of this section, must enter the date, place, and bearing error, and sign the aircraft log or other record. In addition, if a test signal radiated by a repair station, as specified in paragraph (b)(1) of this section, is used, an entry must be made in the aircraft log or other record by the repair station certificate holder or the certificate holder's representative certifying to the bearing transmitted by the repair station for the check and the date of transmission.

§ 91.191 Takeoff and Landing Under IFR.

(a) *Instrument approaches to civil aerodromes.* Unless otherwise authorized by the President, when it is necessary to use an instrument approach to a civil aerodrome, each person operating an aircraft must use an approved instrument approach procedure published in GACAR Part 97 for that aerodrome.

(b) *Authorized DA/DH or MDA.* For the purpose of this section, when the approach procedure being used provides for and requires the use of a DA/DH or MDA, the authorized DA/DH or MDA is the highest of the following:

(1) The DA/DH or MDA prescribed by the approach procedure.

(2) The DA/DH or MDA prescribed for the PIC.

(3) The DA/DH or MDA appropriate for the aircraft equipment available and used during the approach.

(c) Unless otherwise authorized by the President, no PIC may continue an approach past the final approach fix, or where a final approach fix is not used, begin the final approach segment of an instrument approach procedure—

(1) At any aerodrome, unless the Presidency of Meteorology and Environment (PME), or a source approved by the President, issues a weather report for that aerodrome; and

(2) At aerodromes within the Kingdom of Saudi Arabia, unless the latest weather report for that aerodrome issued by the PME or a source approved by the President, reports the visibility to be equal to or more than the visibility minimums prescribed for that procedure.

(d) If a PIC has begun the final approach segment of an instrument approach procedure in accordance with paragraph (c) of this section, and after that receives a later weather report indicating below minimum conditions, the PIC may continue the approach to DA/DH or MDA.

(e) *Operations below DA/DH or MDA.* Upon reaching DA/DH or at MDA, and at any time before the missed approach point, the PIC may continue the approach below DA/DH or MDA if the following requirements are met:

(1) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and where that descent rate will allow touchdown to occur within the touchdown zone (TDZ) of the runway of intended landing;

(2) The flight visibility is not less than the visibility prescribed in the instrument approach procedure being used;

(3) Except for lower than standard (LTS) Category (CAT) I, CAT II, or CAT III approaches where any necessary visual reference requirements are specified by authorization of the President, at least one of the following visual references for the intended runway is distinctly visible and identifiable to the PIC:

(i) The approach light system, except that the PIC may not descend below 100 ft (30 m) above the TDZ elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable;

(ii) The threshold;

(iii) The threshold markings;

(iv) The threshold lights;

(v) The runway end identifier lights;

(vi) The visual approach slope indicator;

(vii) The TDZ or TDZ markings;

(viii) The TDZ lights;

(ix) The runway or runway markings; and

(x) The runway lights.

(4) When the aircraft is on a straight in nonprecision approach procedure which incorporates a visual descent point, the aircraft has reached the visual descent point, except where the aircraft is not equipped for or capable of establishing that point, or a descent to the runway cannot be made using normal procedures or rates of descent if descent is delayed until reaching that point.

(f) The conditions of paragraph (e) do not apply if the PIC is authorized to use an enhanced vision system (EVS) for operating below DA/DH or MDA in accordance with GACAR § 91.403.

(g) For the purpose of this section, the final approach segment begins at the final approach fix or facility prescribed in the instrument approach procedure. When a final approach fix is not prescribed for a procedure that includes a procedure turn, the final approach segment begins at the point where the procedure turn is completed and the aircraft is established inbound toward the aerodrome on the final approach course within the distance prescribed in the procedure.

(h) Unless otherwise authorized, each PIC making an IFR takeoff, approach, or landing at a foreign aerodrome must comply with the applicable instrument approach procedures and weather minimums prescribed by the authority having jurisdiction over the aerodrome.

(i) *Landing.* No PIC operating an aircraft may land that aircraft when the flight visibility is less than the visibility prescribed in the instrument approach procedure being used.

(j) *Missed approach procedures.* Each PIC operating an aircraft must immediately execute an appropriate missed approach procedure when either of the following conditions exists:

(1) Whenever operating an aircraft pursuant to paragraph (e) of this section and the requirements of that paragraph are not met at either of the following times:

(i) When the aircraft is being operated below MDA or

(ii) Upon arrival at the missed approach point, including a DA/DH where a DA/DH is specified and its use is required, and at any time after that until touchdown.

(2) Whenever an identifiable part of the aerodrome is not distinctly visible to the PIC during a circling maneuver at or above MDA, unless the inability to see an identifiable part of the aerodrome results only from a normal bank of the aircraft during a circling approach.

(k) *Civil aerodrome takeoff minimums.* Unless otherwise authorized by low visibility takeoff (LVTO) minimums under GACAR § 91.393, no PIC may take off from a civil aerodrome under IFR unless the weather conditions reported by the PME, or a source approved by the President, at time of takeoff are at or above the weather minimums for IFR takeoff prescribed for that aerodrome under GACAR Part 97.

(1) If takeoff weather minimums are not prescribed under GACAR Part 97 for a particular aerodrome, the following standard weather minimums apply to takeoffs under IFR:

(i) For aircraft, other than rotorcraft, having two engines or less—1 600 m visibility.

(ii) For aircraft having more than two engines—800 m visibility.

(iii) For rotorcraft—800 m visibility.

(2) Notwithstanding the requirements of paragraph (k)(1) of this section, no PIC may take off from an aerodrome under IFR unless—

(i) For operations under GACAR Part 121 or 125, the PIC uses a takeoff obstacle clearance or avoidance procedure that ensures compliance with the applicable aircraft performance operating limitations requirements under Subparts F and G of GACAR Part 121 or 125 for takeoff at that aerodrome; or

(ii) For operations under GACAR Part 129, the PIC uses a takeoff obstacle clearance or avoidance procedure that ensures compliance with the aircraft performance operating limitations prescribed by the state of the operator for takeoff at that aerodrome.

(l) *Military aerodromes.* Unless otherwise prescribed by the President, each person operating an aircraft under IFR into or out of a military aerodrome must comply with the instrument approach procedures and the takeoff and landing minimums prescribed by the military authority having jurisdiction of that aerodrome.

(m) *Comparable values of Runway Visual Range (RVR) and ground visibility.*

(1) Except for CAT II or CAT III minimums, if RVR minimums for takeoff or landing are prescribed in an instrument approach procedure, but RVR is not reported for the runway of intended operation, the RVR minimum must be converted to ground visibility in accordance with Table 91–5 and must be the visibility minimum for takeoff or landing on that runway.

(2) Conversion values:

Table 91–5.

RVR – m	Visibility – m
400	400
800	800
1 000	1 000
1 200	1 200
1 400	1 400
1 500	1 600
1 800	2 000

(n) *Operations on unpublished routes and use of radar in instrument approach procedures.*

(1) When operating on an unpublished route or while being radar vectored, the pilot, when an approach clearance is received, must, in addition to complying with GACAR § 91.199, maintain the last altitude assigned until the aircraft is established on a segment of a published route or instrument approach procedure unless a different altitude is assigned by ATC.

(2) After the aircraft is established, published altitudes apply to descent within each succeeding

route or approach segment unless a different altitude is assigned by ATC.

(3) Upon reaching the final approach course or fix, the PIC may either complete the instrument approach in accordance with a procedure approved for the facility or continue a surveillance or precision radar approach to a landing.

(o) *Limitation on procedure turns*. In the case of a radar vector to a final approach course or fix, a timed approach from a holding fix, or an approach for which the procedure specifies "No PT," no PIC may make a procedure turn unless cleared to do so by ATC.

(p) *ILS components*.

(1) The basic components of an ILS are the localizer, glideslope, and outer marker, and, when installed for use with CAT II or CAT III instrument approach procedures, an inner marker.

(2) The outer marker may be substituted with the following:

(i) Compass locator;

(ii) Precision Approach Radar or aerodrome surveillance radar;

(iii) Distance measuring equipment (DME), VOR, or nondirectional beacon fixes authorized in the instrument approach procedure; or

(iv) A suitable RNAV system in conjunction with a fix identified in the instrument approach procedure.

(3) Applicability of, and substitution for, the inner marker for a CAT II or CAT III approach is determined by the appropriate instrument approach procedure or low visibility operations (LVO) authorization issued to a person.

(q) If the PIC of an aircraft establishes a visual reference to terrain before completion of the instrument approach procedure, he must execute the entire procedure unless he requests and is cleared for a visual approach by ATC.

§ 91.193 PIC Qualifications: Increased IFR Landing Weather Minimums.

(a) If the PIC of an aircraft has not served 100 hours as PIC in the type of aircraft he is operating, the

MDA or DA/DH and visibility landing minimums are increased by 100 ft (30 m) and 800 m (or the RVR equivalent). The MDA or DA/DH and visibility minimums need not be increased above those applicable to the aerodrome when used as an alternate aerodrome, but in no event may the landing minimums be less than a ceiling of 300 ft (90 m) and visibility 1 500 m.

(b) The 100 hours of PIC experience required by paragraph (a) of this section may be reduced (not to exceed 50 percent) by substituting one landing in the type of aircraft for 1 required hour of PIC experience, if the pilot has at least 100 hours as PIC of another type aircraft in the same category and class.

(c) CAT II minimums do not apply until the PIC subject to paragraph (a) of this section meets the requirements of that paragraph in the type of aircraft he is operating.

§ 91.195 Applicability of Reported Weather Minimums.

The ceiling and visibility values in the main body of the latest weather report control for VFR and IFR takeoffs and landings and for instrument approach procedures on all runways of an aerodrome. However, if the latest weather report, including an oral report from the control tower, contains a visibility value specified as runway visibility or RVR for a particular runway of an aerodrome, that specified value controls for VFR and IFR landings and takeoffs and straight in instrument approaches for that runway.

§ 91.197 Operating in Icing Conditions.

(a) No PIC may operate an aircraft in ground icing conditions with the intent of takeoff unless a pre takeoff contamination check approved by the President is conducted before takeoff.

(b) No PIC may take off an aircraft that has frost, ice, or snow adhering to any propeller, windshield, stabilizing or control surface; to a powerplant installation; or to an airspeed, altimeter, rate of climb, or flight attitude instrument system or wing, except that takeoffs may be made with frost under the wing in the area of the fuel tanks if authorized by the President.

(c) No PIC may operate under IFR into known or forecast light or moderate icing conditions, or under VFR into known light or moderate icing conditions, unless—

(1) The aircraft has functioning deicing or anti-icing equipment protecting each rotor blade, propeller, windshield, wing, stabilizing or control surface, and each airspeed, altimeter, rate of climb, or flight attitude instrument system; or

(2) The aircraft has ice protection provisions that meet the requirements of GACAR §§ 91.303(p)(1) and (2), as applicable for flights in icing conditions.

(d) Except for an aircraft that has ice protection provisions that meet the requirements of paragraph (c)(2) of this section, no PIC may fly an aircraft into known or forecast severe icing conditions.

(e) If current weather reports and briefing information relied upon by the PIC indicate the forecast icing conditions that would otherwise prohibit the flight will not be encountered during the flight because of changed weather conditions since the forecast, the restrictions in paragraphs (c) and (d) of this section based on forecast conditions do not apply.

§ 91.199 Minimum Altitudes for IFR Operations.

(a) *Operation of aircraft at minimum altitudes*. Except when necessary for takeoff or landing, or unless otherwise authorized by the President, no person may operate an aircraft under IFR below—

(1) The applicable minimum altitudes prescribed by the President in GACAR Parts 71 and 97. However, if both a minimum enroute altitude (MEA) and a minimum obstacle clearance altitude (MOCA) are prescribed for a particular route or route segment, a PIC may operate an aircraft below the MEA down to, but not below, the MOCA, provided the applicable navigation signals and required ATS communications are available. For aircraft using VOR for navigation, this applies only when the aircraft is within 22 NM of that VOR (based on the reasonable estimate by the PIC operating the aircraft of that distance); or

(2) If no applicable minimum altitude is prescribed in GACAR Parts 71 and 97, then—

(i) In the case of operations over an area designated under GACAR Part 71 as a mountainous zone, an altitude of 2 000 ft (600 m) above the highest obstacle within a horizontal distance of 4 NM from the course to be flown; or

(ii) In any other case, an altitude of 1 000 ft (300 m) above the highest obstacle within a horizontal distance of 4 NM from the course to be flown.

(b) *Climb*. Climb to a higher minimum IFR altitude must begin immediately after passing the point beyond which that minimum altitude applies, except that when ground obstructions intervene, the point beyond which that higher minimum altitude applies must be crossed at or above the applicable minimum crossing altitude.

§ 91.201 IFR Cruising Altitude or Flight Level.

Unless otherwise authorized by ATC, the following rules apply—–

(a) *In controlled airspace.* Each PIC operating an aircraft under IFR in level cruising flight in controlled airspace must maintain the altitude or flight level assigned by ATC.

(b) *In uncontrolled airspace.* Except while in a holding pattern of 2 minutes or less or while turning, each PIC operating an aircraft under IFR in level cruising flight in uncontrolled airspace must maintain an appropriate altitude as follows:

(1) When operating below 13 000 ft (3 950 m) MSL and—–

(i) On a magnetic course of 0° through 179°, any odd thousand foot MSL altitude; or

(ii) On a magnetic course of 180° through 359°, any even thousand foot MSL altitude.

(2) When operating at or above FL 150 but below FL 290, and—–

(i) On a magnetic course of 0° through 179°, any odd flight level; or

(ii) On a magnetic course of 180° through 359°, any even flight level.

(3) When operating at FL 290 and above in non Reduced Vertical Separation Minimum (RVSM) airspace, and—–

(i) On a magnetic course of 0° through 179°, a flight level, at nominal 4 000-ft (1200 m) intervals beginning at and including FL 290 (such as flight level 290, 330, 370, 410, etc.); or

(ii) On a magnetic course of 180° through 359°, a flight level, at nominal 4 000-ft (1200 m) intervals beginning at and including FL 310 (such as flight level 310, 350, 390, 430, etc.).

(4) When operating at FL 290 and above in airspace designated as RVSM airspace and—–

(i) On a magnetic course of 0° through 179°, any odd flight level, at nominal 2 000-ft (600 m) intervals beginning at and including FL 290 (such as flight level 290, 310, 330, 350, 370, 390, 410, etc.); or

(ii) On a magnetic course of 180° through 359°, any even flight level, at nominal 2 000-ft (600 m) intervals beginning at and including FL 300 (such as flight level 300, 320, 340, 360, 380, 400, etc.).

(5) Operations between 13 000 ft (3 950 m) MSL and FL 150 are limited to aircraft climbing to or above FL 150 and aircraft descending below 13 000 ft (3 950 m) MSL. Level flight between 13 000 ft (3 950 m) MSL and FL 150 is prohibited.

§ 91.203 Holding Procedures.

Each PIC operating an aircraft in a holding pattern must follow the speed limits, bank angle or rate of turn, entry procedures, and the procedures for the use of RNAV equipment as prescribed in Appendix H to this part.

§ 91.205 Initial Approach Altitude.

When making an initial approach to a radio navigation facility under IFR, no PIC may descend an aircraft below the pertinent minimum altitude for initial approach (as specified in the instrument approach procedure for that facility) until his arrival over that facility has been definitely established.

§ 91.209 IFR Operations: Two Way Radio Communications Failure.

[(a) *General*. Unless otherwise authorized by ATC, a PIC who has two way radio communications failure when operating under IFR must comply with the rules of this section.

(b) *VMC*. If the failure occurs in VMC, or if VMC are encountered after the failure, the PIC must:

(i) Continue the flight under VFR and land at the nearest suitable aerodrome; and report its arrival by the most expeditious means to the appropriate air traffic services unit; or

(ii) If considered advisable, complete an IFR flight in accordance with paragraph (c) of this section.

(c) If in instrument meteorological conditions or when the pilot of an IFR flight considers it inadvisable to complete the flight in accordance with paragraph (b)(ii) of this section, the PIC must:

(i) In airspace where radar is not used in the provision of air traffic control, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 20 minutes

following the aircraft's failure to report its position over a compulsory reporting point and thereafter adjust level and speed in accordance with the filed flight plan;

(ii) In airspace where radar is used in the provision of air traffic control, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 7 minutes following:

(A) The time the last assigned level or minimum flight altitude is reached; or

(B) The time the transponder is set to Code 7600; or

(C) The aircraft's failure to report its position over a compulsory reporting point; whichever is later, and thereafter adjust level and speed in accordance with the filed flight plan;

(iii) When being radar vectored or having been directed by ATC to proceed offset using area navigation (RNAV) without a specified limit, rejoin the current flight plan route no later than the next significant point, taking into consideration the applicable minimum flight altitude;

(iv) Proceed according to the current flight plan route to the appropriate designated navigation aid or fix serving the destination aerodrome and, when required to ensure compliance with subparagraph (v) below, hold over this aid or fix until commencement of descent;

(v) Commence descent from the navigation aid or fix specified in subparagraph (iv) at, or as close as possible to, the expected approach time last received and acknowledged; or, if no expected approach time has been received and acknowledged, at, or as close as possible to, the estimated time of arrival resulting from the current flight plan;

(vi) Complete a normal instrument approach procedure as specified for the designated navigation aid or fix; and

(vii) Land, if possible, within 30 minutes after the estimated time of arrival specified in subparagraph (v) or the last acknowledged expected approach time, whichever is later.]

[Amd. 91-1, Effective June 15, 2016]

§ 91.211 Change From IFR Flight To VFR Flight.

(a) A PIC electing to change the conduct of a flight from IFR to VFR must, if a flight plan was

submitted, notify the appropriate Air Traffic Service unit specifically that the IFR flight is canceled and communicate the changes to be made to the current flight plan.

(b) Only the PIC may initiate a change from IFR flight to VFR flight by stating “CANCELING MY IFR FLIGHT” along with any changes to be made to the current flight plan.

(c) When a PIC operating an aircraft under IFR encounters VMC, the PIC must not cancel the IFR flight unless he anticipates and intends that the flight will be continued for a reasonable period of time in uninterrupted VMC.

<< USE OF EQUIPMENT >>

§ 91.221 Use of Microphones.

Each required flight crew member on flightdeck duty must communicate through boom or throat microphones below the transition altitude or 10 000 ft (3 050 m), whichever is higher.

§ 91.223 Use of Oxygen.

(a) *General.* No person may operate a Saudi Arabian registered aircraft—

(1) At cabin pressure altitudes above 10 000 ft (3 050 m) MSL up to and including 13 000 ft (3 950 m) MSL unless the required minimum flight crew uses supplemental oxygen for that part of the flight at those altitudes more than 30 minutes duration and

(2) At cabin pressure altitudes above 13 000 ft (3 950 m) MSL unless the required minimum flight crew uses supplemental oxygen during the entire flight time at those altitudes.

(b) *Pressurized cabin aircraft.*

(1) No person may operate a Saudi Arabian registered aircraft with a pressurized cabin unless the aircraft has oxygen provisions that meet the requirements of GACAR §§ 91.303(n) and 91.305.

(2) Except as provided in paragraph (b)(3) of this section, when operating at flight altitudes above FL 250 (7 600 m), one flight crew member at the controls of the aircraft must at all times wear and use an oxygen mask secured, sealed, and supplying oxygen.

(3) The one flight crew member need not wear and use an oxygen mask if each flight crew member

on flightdeck duty has a quick donning type of oxygen mask that the operator has shown can be placed on the face from its ready position, properly secured, sealed, and supplying oxygen upon demand, with one hand and within 5 seconds and the mask can be put on without disturbing eyeglasses and without delaying the flight crew member from proceeding with his assigned emergency duties.

(4) Notwithstanding paragraphs (b)(2) and (b)(3) of this section, if for any reason at any time it is necessary for one flight crew member to leave his station at the controls of the airplane when operating at flight altitudes above FL 410 (12 500 m), the remaining flight crew member at the controls must put on and use his oxygen mask until the other flight crew member has returned to his duty station.

(c) *Use of portable oxygen equipment by cabin crew members*. Each mask used for portable oxygen equipment must be connected to its oxygen supply. Above FL 250 (7 600 m), one of the following is required:

(1) Each cabin crew member must carry portable oxygen equipment with a 15-minute supply of oxygen;

(2) There must be sufficient portable oxygen equipment (including masks and spare outlets) distributed throughout the cabin so that such equipment is immediately available to each cabin crew member, regardless of his location in the cabin; or

(3) There are sufficient spare outlets and masks distributed throughout the cabin to ensure immediate availability of oxygen to each cabin crew member, regardless of his location in the cabin.

§ 91.225 Use of Medical Oxygen by Passengers.

(a) Except as provided in paragraph (b) of this section, no operator may allow a person to carry or use medical oxygen on board an aircraft unless it complies with the requirements of GACAR § 91.303(o).

(b) An operator may permit a person to carry and use medical oxygen on board an aircraft provided it meets the following requirements:

(1) Each person using the equipment has a medical need to use it evidenced by a written statement to be kept in that person’s possession, signed by a licensed physician, and which specifies the maximum quantity of oxygen needed each hour and the maximum flow rate needed for the pressure altitude corresponding to the pressure in the cabin of the aircraft under normal

operating conditions. This paragraph does not apply to the carriage of oxygen in an aircraft in which the only passengers carried are persons who may have a medical need for oxygen during flight, no more than one relative or other interested person for each of those persons, and medical attendants.

(2) When a physician's statement is required by paragraph (b)(1) of this section, the total quantity of oxygen carried is equal to the maximum quantity of oxygen needed each hour, as specified in the physician's statement, multiplied by the number of hours used to compute the amount of aircraft fuel required by this part.

(3) The PIC is advised when the equipment is on board, and when it is intended to be used.

(4) The equipment is stowed, and each person using the equipment is seated, so as not to restrict access to or use of any required emergency or regular exit or of the aisle in the passenger compartment.

(c) No person may be allowed to smoke within 3 m of oxygen storage and dispensing equipment carried in accordance with paragraph (a) of this section.

(d) No person may be allowed to connect or disconnect oxygen dispensing equipment to or from a gaseous oxygen cylinder while any passenger is aboard the aircraft.

(e) The requirements of this section do not apply to the carriage of supplemental or first aid oxygen and related equipment required by the GACAR.

(f) *Portable oxygen concentrators.* Paragraphs (f) through (h) of this section prescribe special operating rules for the use of portable oxygen concentrator units on board aircraft. These paragraphs apply to both the operator and the passenger using the portable oxygen concentrator on board the aircraft.

(g) No person may use, and no operator may allow the use of, any portable oxygen concentrator device unless the model to be used has been authorized by the President for use on board aircraft. When the use of a portable oxygen concentrator is authorized, the unit may be carried on and used by a passenger on board an aircraft provided the operator ensures the following conditions are satisfied:

(1) The device does not cause interference with the electrical, navigation, or communication equipment on the aircraft on which the device is to be used;

(2) During movement on the surface, takeoff, and landing, the unit must—

(i) Either be stowed under the seat in front of the user, or in another approved stowage location, so that it does not block the aisle or the entryway into the row; or

(ii) If it is to be operated by the user, be used only at a seat location that does not restrict any passenger's access to, or use of, any required emergency or regular exit, or the aisle(s) in the passenger compartment.

(3) No person using a portable oxygen concentrator is permitted to sit in an exit row;

(4) The PIC must be advised whenever a passenger brings and intends to use a portable oxygen concentrator on board the aircraft and the PIC must be informed about the contents of the physician's written statement (as required in paragraph (b)(1) of this section), including the magnitude and nature of the passenger's oxygen needs.

(5) Whenever the PIC turns off the "Fasten Seat Belt" sign, or otherwise signifies permission is granted to move about the passenger cabin, passengers operating their portable oxygen concentrator may continue to operate it while moving about the cabin.

(h) When the use of a portable oxygen concentrator is authorized, the user of the portable oxygen concentrator must comply with the following conditions to use the device on board the aircraft:

(1) The user must be capable of hearing the unit's alarms, seeing the alarm light indicators, and have the cognitive ability to take the appropriate action in response to the various caution and warning alarms and alarm light indicators, or be traveling with someone who is capable of performing those functions;

(2) The user must ensure the portable oxygen concentrator is free of oil, grease or other petroleum products and is in good condition free from damage or other signs of excessive wear or abuse;

(3) The user must inform the operator that he intends to use a portable oxygen concentrator on board the aircraft and must allow the crew of the aircraft to review the contents of the physician's statement. The user must have a written statement, to be kept in that person's possession, signed by a licensed physician that—

(i) States whether the user of the device has the physical and cognitive ability to see, hear, and understand the device's aural and visual cautions and warnings and is able, without

assistance, to take the appropriate action in response to those cautions and warnings;

(ii) States whether oxygen use is medically necessary for all or a portion of the duration of the flight; and

(iii) Specifies the maximum oxygen flow rate corresponding to the pressure in the cabin of the aircraft under normal operating conditions.

(4) Only lotions or salves that are oxygen approved may be used by persons using the portable oxygen concentrator device;

(5) The user, whose physician statement specifies the duration of oxygen use, must obtain from the operator, or by other means, the duration of the planned flight. The user must carry on the flight a sufficient number of batteries to power the device for the duration of the oxygen use specified in the user's physician statement, including a conservative estimate of any unanticipated delays; and

(6) The user must ensure that all portable oxygen concentrator batteries carried aboard the aircraft in carry on baggage are protected from short circuit and are packaged in a manner that protects them from physical damage. Batteries protected from short circuit include—

(i) Those designed with recessed battery terminals.

(ii) Those packaged so that the battery terminals do not contact metal objects (including the battery terminals of other batteries). When a battery powered oxygen concentrator is carried aboard aircraft as carry on baggage and is not intended to be used during the flight, the battery must be removed and packaged separately unless the concentrator contains at least two effective protective features to prevent accidental operation during transport.

§ 91.227 Use of Airborne Weather Radar.

(a) Each person operating an aircraft required to have approved airborne weather radar equipment installed must operate it in accordance with the following:

(1) No person may begin the flight of an aircraft at night or under IFR when current weather reports indicate that thunderstorms, or other potentially hazardous weather conditions that can be detected with airborne weather radar, may reasonably be expected along the route to be flown, unless the airborne weather radar equipment is in satisfactory operating condition.

(2) If the airborne weather radar becomes inoperative en route, the aircraft must be operated in accordance with the instructions and procedures specified in the operations manual for such an event.

(b) This section does not apply to aircraft used during any training, test, or ferry flight.

§ 91.229 Use of ATC Transponder and Altitude Reporting Equipment.

(a) *All airspace*. Unless otherwise authorized or directed by ATC, no person may operate an aircraft in any airspace, unless that aircraft is equipped with a transponder and altitude reporting equipment in accordance with GACAR §§ 91.303 or 91.304 for Saudi Arabian-registered aircraft, or GACAR §91.477 for foreign-registered aircraft, or in accordance with prescribed operating conditions issued under GACAR Part 101 for unmanned aircraft. No person may operate an aircraft with Mode S transponder equipment installed unless the State of registry has assigned the aircraft a unique Mode S address code.

(b) *Transponder-on operation.* Each person operating an aircraft equipped with an operable ATC transponder maintained in accordance with GACAR § 91.453 must—

(1) Operate the transponder, including Mode C equipment if installed, and must reply on the appropriate code or as assigned by ATC, and

(2) Read back the mode and code to be set when acknowledging mode/code setting instructions assigned by ATC.

(c) *ATC-authorized deviations*. Requests for ATC-authorized deviations must be made to the ATC facility having jurisdiction over the concerned airspace within the time periods specified as follows:

(1) For operation of an aircraft with an operating transponder but without operating automatic pressure altitude reporting equipment having a Mode C capability, the request may be made at any time.

(2) For operation of an aircraft with an inoperative transponder to the aerodrome of ultimate destination, including any intermediate stops, or to proceed to a place where suitable repairs can be made or both, the request may be made at any time.

(3) For operation of an aircraft that is not equipped with a transponder, the request must be made

at least 1 hour before the proposed operation.

(d) When requested by ATC to CONFIRM SQUAWK (code), the PIC must—

(1) Verify the Mode A code setting on the transponder;

(2) Reselect the assigned code if necessary; and

(3) Confirm to ATC the setting displayed on the controls of the transponder.

(e) A pilot must not SQUAWK IDENT unless requested by ATC.

(f) Whenever Mode C is operated, a pilot must, in air-ground voice communications where level information is required, give such information by stating his level to the nearest full 100 ft as indicated on the pilot's altimeter.

(g) The PIC of an aircraft losing two-way communications must set the transponder to Mode A Code 7600.

(h) If there is unlawful interference with an aircraft in flight, the PIC must attempt to set the transponder to indicate the situation. If a pilot has selected an emergency or interference transponder and ATC has requested the pilot confirm this code, the pilot must, according to circumstances, either confirm this or not reply at all.

§ 91.231 Data Correspondence Between Automatically Reported Pressure Altitude Data and the Pilot's Altitude Reference.

(a) No person may operate any automatic pressure altitude reporting equipment associated with a radar beacon transponder when deactivation of the equipment is directed by ATC.

(b) No person may operate any automatic pressure altitude reporting equipment associated with a radar beacon transponder or with Automatic Dependent Surveillance–Broadcast (ADS–B) Out equipment unless the pressure altitude reported for ADS–B Out and Mode C or S is derived from the same source for aircraft equipped with both a transponder and ADS–B Out.

§ 91.233 Use of Flight Recorders and Retention of Recordings.

(a) If a flight recorder required by the GACAR is installed, it must be operated continuously prior to the aircraft moving under its own power until the termination of the flight when the aircraft is no

longer capable of moving under its own power.

(b) If a cockpit voice recorder (CVR) required by the GACAR is installed and is controllable from the flightdeck, it must be operated continuously from the use of the checklist before the flight to completion of the final checklist at the end of the flight.

(c) In complying with this section, an approved CVR having an erasure feature may be used, so that at any time during the operation of the recorder, information recorded more than 30 minutes earlier may be erased or otherwise obliterated.

(d) To preserve flight recorder records, flight recorders must be deactivated upon completion of flight time following an aircraft accident or incident. The flight recorders must not be reactivated before their records are retained and the operator must keep the flight recorder records for at least 60 working days or, if requested by the President or the Aviation Investigation Bureau (AIB), for a longer period.

(e) Prior to the first flight of the day, the built in test features for the flight recorders and associated flight data acquisition unit (FDAU), when installed, must be monitored by manual and/or automatic checks.

§ 91.235 Use of Altitude Alerting System or Device: Turbojet Powered Civil Airplanes.

(a) Each person required by GACAR § 91.303 to have an altitude alerting system or device must establish and assign procedures for the use of the altitude alerting system or device and each flight crew member must comply with those procedures assigned to him.

(b) Paragraph (a) of this section and the requirement to have an altitude alerting system or device does not apply to the operation of any airplane for the following purposes:

(1) Ferrying a newly acquired airplane from the place where possession of it was taken to a place where the altitude alerting system or device is to be installed.

(2) Continuing a flight as originally planned, if the altitude alerting system or device becomes inoperative after the airplane has taken off; however, the flight may not depart from a place where repair or replacement can be made.

(3) Ferrying an airplane with any inoperative altitude alerting system or device from a place where repairs or replacements cannot be made to a place where it can be made.

(4) Conducting an airworthiness flight test of the airplane.

(5) Ferrying an airplane to a place outside the Kingdom of Saudi Arabia for the purpose of registering it in a foreign country.

(6) Conducting a sales demonstration of the operation of the airplane.

(7) Training foreign flight crews in the operation of the airplane before ferrying it to a place outside the Kingdom of Saudi Arabia for the purpose of registering it in a foreign country.

§ 91.237 Use of ACAS Equipment.

(a) Each PIC operating an aircraft equipped with an operable ACAS must have that system on and operating and comply with the use of ACAS indicators as prescribed in paragraph (c) of this section.

(b) The procedures specified in paragraph (c) of this section do not prevent a PIC from exercising his judgment and full authority in the choice of the course of action to resolve a traffic conflict or avert a potential collision.

(c) *Use of ACAS indicators.* A pilot must use the indications generated by ACAS in accordance with the following safety considerations:

(1) A pilot must not maneuver his aircraft in response to traffic advisories (TA) only;

(2) On receipt of a traffic advisory, a pilot must use all available information to prepare for appropriate action if an RA occurs; and

(3) In the event of an RA, a pilot must—

(i) Respond immediately by following the RA as indicated, unless doing so would jeopardize the safety of the aircraft;

(ii) Follow the RA even if there is a conflict between the RA and an ATC instruction to maneuver;

(iii) Not maneuver in the opposite sense to an RA;

(iv) As soon as possible, as permitted by the workload, notify the appropriate ATC facility of the RA, including the direction of any deviation from the current ATC instruction or

clearance;

(v) Promptly comply with any modified RAs;

(vi) Limit the alterations of the flight path to the minimum extent necessary to comply with the RAs;

(vii) Promptly return to the terms of the ATC instruction or clearance when the conflict is resolved; and

(viii) Notify ATC when returning to the current clearance.

§ 91.239 Use of ADS–B Out.

(a) Each PIC operating an aircraft equipped with ADS–B Out must operate this equipment in the transmit mode at all times unless otherwise instructed by the ATC.

(b) When the ATC requests to terminate ADS-B transmissions, the PIC must comply with the ATC instructions if the flight deck control capabilities allow the flight crew to disable ADS-B OUT functions without affecting or disabling the operation of the aircraft transponder.

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

(1) For operation of an aircraft with an inoperative ADS–B OUT, to the aerodrome of ultimate destination, including any intermediate stops, or to proceed to a place where suitable repairs can be made or both, the request may be made at any time.

(2) For operation of an aircraft that is not equipped with ADS–B Out, the request must be made at least 24 hours before the proposed operation.

§ 91.241 Use of Aircraft Anticollision Lights.

(a) Except as provided in paragraph (c) of this section, all aircraft equipped with anticollision lights must display those lights at all times during flight.

(b) Except as provided in paragraph (c) of this section, all aircraft equipped with anticollision lights

must display those lights at all times when the engines are operating while on the movement area of an aerodrome.

(c) A pilot may switch off or reduce the intensity of any flashing lights fitted to meet the requirements of paragraphs (a) or (b) of this section if the lights do or are likely to—

(1) Adversely affect the satisfactory performance of duties; or

(2) Subject an outside observer to a harmful glare.

§ 91.243 Use of Life Preservers: Offshore Rotorcraft Operations.

For rotorcraft offshore operations, the life preserver required by GACAR § 91.303(j) must be worn at all times during the operation unless the occupant is wearing an integrated survival suit that includes the functionality of the life preserver.

<< MISCELANEOUS >>

§ 91.251 Reporting of Adverse Conditions.

(a) Each PIC must make a report as specified in paragraph (b) of this section whenever any of the following conditions are encountered or observed:

(1) Moderate or severe turbulence;

(2) Moderate or severe icing;

(3) Severe mountain wave;

(4) Thunderstorms, without hail, that are obscured, embedded, widespread or in squall lines;

(5) Thunderstorms, with hail, that are obscured, embedded, widespread or in squall lines;

(6) Heavy dust storm or heavy sandstorm;

(7) Volcanic ash cloud;

(8) Pre-eruption volcanic activity or a volcanic eruption; or

(9) Any other condition which, in the opinion of the PIC, may affect the safety or markedly affect the efficiency of other aircraft operations.

(b) Reports required by this section must be—

(1) Transmitted by air ground data link when available or by voice communication to the nearest Air Traffic Service without delay after observation, and

(2) Reported as air reports.

§ 91.253 Notification of Suspected Communicable Diseases, or Other Public Health Risk, on Board an Aircraft.

Each PIC of an en route aircraft must, upon identifying a suspected case(s) of communicable disease or other public health risk on board the aircraft, promptly notify the Air Traffic Service unit with which the pilot is communicating, the information listed below:

(a) Aircraft identification,

(b) Departure aerodrome,

(c) Destination aerodrome,

(d) Estimated time of arrival,

(e) Number of persons on board,

(f) Number of suspected case(s) on board, and

(g) Nature of the public health risk, if known.

§ 91.255 Interception of a Distress Transmission.

Whenever a distress transmission is intercepted by an aircraft, a pilot must, if feasible—

(a) Acknowledge the distress transmission;

(b) Record the position of the craft in distress if given;

(c) Take a bearing on the transmission;

(d) Inform a rescue coordination center or Air Traffic Service unit of the distress transmission, giving all available information; and

(e) At the PIC's discretion, while awaiting instructions, proceed to the position given in the transmission.

§ 91.257 Actions in the Event of an Engine Inoperative.

(a) Except as provided in paragraph (b) of this section, whenever an aircraft engine fails or is shut down to prevent possible damage, the PIC must land the aircraft at the nearest suitable aerodrome at which a safe landing can be made.

(b) On an aircraft having three or more engines, if not more than one engine fails or is shut down to prevent possible damage, the PIC may proceed to an aerodrome other than the nearest suitable aerodrome if, after considering the following, the PIC makes a reasonable decision that proceeding to that aerodrome is as safe as landing at the nearest suitable aerodrome:

(1) The nature of the malfunction and the possible mechanical difficulties that may occur if flight is continued;

(2) The altitude, mass, and usable fuel at the time that the engine is shut down;

(3) The weather conditions en route and at possible landing points;

(4) The air traffic congestion;

(5) The kind of terrain; and

(6) Familiarity with the aerodrome to be used.

(c) The PIC must report each engine shutdown in flight to the appropriate communication facility as soon as practicable and must keep that facility fully informed of the progress of the flight.

(d) If the PIC lands at an aerodrome other than the nearest suitable aerodrome, the PIC must, upon completing the trip, send a written report to the President, and for an aircraft operated by a GACAR Part 119 or 129 certificate holder, to the certificate holder's Director of Operations, stating the reasons for determining it was as safe to land at that aerodrome as at the nearest suitable aerodrome.

§ 91.259 Intercepted Aircraft: Required Action.

(a) A pilot operating an aircraft that is intercepted by another aircraft must immediately—

(1) Follow the instructions given by the intercepting aircraft, interpreting and responding to visual signals in accordance with the specifications in Appendix E to this part;

(2) Notify, if possible, the appropriate Air Traffic Service unit;

(3) Attempt to establish radio communication with the intercepting aircraft or with the appropriate intercept control unit, by making a general call on the emergency frequency 121.500 MHz, giving the identity of the intercepted aircraft and the nature of the flight; and if no contact has been established and if practicable, repeating this call on the emergency frequency 243 MHz;

(4) If equipped with an SSR transponder, select Mode A, Code 7700 on the transponder, unless otherwise instructed by the appropriate Air Traffic Service unit.

(5) If equipped with ADS–B or ADS–Contract, select the appropriate emergency functionality, if available, unless otherwise instructed by the appropriate Air Traffic Service unit.

(b) If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual signals, the pilot of the intercepted aircraft must request immediate clarification while continuing to comply with the visual instructions given by the intercepting aircraft.

(c) If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by radio, the pilot of the intercepted aircraft must request immediate clarification while continuing to comply with the radio instructions given by the intercepting aircraft.

(d) If radio contact is established during interception but communication in a common language is not possible, the pilot must attempt to convey instructions, acknowledgement of instructions and essential information by using the phrases and pronunciations in Table 91-6 and transmitting each phrase twice.

Table 91-6.

Phrases for use by INTERCEPTING aircraft			**Phrases for use by INTERCEPTED aircraft**		
Phrase	*Pronunciation* [1]	*Meaning*	*Phrase*	*Pronunciation* [1]	*Meaning*
CALL SIGN	KOL SA-IN	What is your call sign?	CALL SIGN (call sign)[2]	KOL SA-IN (Call sign)	My call sign is (call sign)
FOLLOW	FOL-LO	Follow me	WILCO Will comply	VILL-KO	Understood
DESCEND	DEE-SEND	Descend for landing	CAN NOT	KANN NOTT	Unable to comply
YOU LAND	YOULAAND	Land at this aerodrome	REPEAT	REE-PEET	Repeat your instruction
PROCEED	PRO-SEED	You may proceed	AM LOST	AMLOSST	Position unknown
			MAYDAY	MAYDAY	I am in distress
			HIJACK[3]	HI-JACK	I have been hijacked
			LAND (place name)	LAAND (place name)	I request to land at (place name)
			DESCEND	DEE-SEND	I require descent

1.In the second column, syllables to be emphasized are underlined.

2.The call sign required to be given is that used in radiotelephony communications with Air Traffic Services units and corresponding to the aircraft identification in the flight plan.

3.Circumstances may not always permit, nor make desirable, the use of the phrase “HIJACK”.

§ 91.261 Operation of Restricted Category Aircraft.

No person may operate an aircraft type certificated in the restricted category—

(a) For other than the special purpose for which it is certificated; and

(b) Unless the aircraft is included in operations specifications issued under GACAR Part 133.

§ 91.263 Fuel Dumping.

When operating an aircraft within controlled airspace that needs to dump fuel, the PIC must advise ATC prior to commencing the fuel dump operation.

§ 91.265 Direction Finding Services.

(a) A pilot must make requests for bearings, courses, or positions to the Air Traffic Service facility responsible or to the station controlling the direction finding network.

(b) To request a bearing, heading or position, the pilot must call the Air Traffic Service facility or the direction finding control station on the listening frequency and specify the type of service that is desired.

(c) A pilot that requests a bearing must end the transmission by repeating his call sign.

(d) If the transmission has been too short for the direction finding station to obtain a bearing, the pilot must give a longer transmission for two periods of approximately 10 seconds, or alternatively provide other signals as requested by the direction finding station.

(e) As soon as the pilot has received the bearing, heading, or position according to the estimate by the direction finding station as noted in Table 91–7 below, he must repeat back the message for confirmation or correction.

Table 91–7.

Class	Bearings	Positions
Class A	Accurate within plus or minus 2°	Accurate within 5 NM
Class B	Accurate within plus or minus 5°	Accurate within 20 NM
Class C	Accurate within plus or minus 10°	Accurate within 50 NM
Class D	Accuracy less than Class C	Accuracy less than Class C

§ 91.267 In-Flight Fuel Management.

(a) Each PIC must monitor the amount of usable fuel remaining on board to ensure it is not less than the fuel required to proceed to an aerodrome where a safe landing can be made with the planned final reserve fuel remaining.

(b) *Airplanes*.

(1) The PIC must continually ensure that the amount of usable fuel remaining on board is not less than the fuel required to proceed to an aerodrome where a safe landing can be made with the planned final reserve fuel remaining upon landing.

(2) The PIC must request delay information from ATC when unanticipated circumstances may result in landing at the destination aerodrome with less than the final reserve fuel plus any fuel required to proceed to an alternate aerodrome or the fuel required to operate to an isolated aerodrome.

(3) The PIC must advise ATC of a minimum fuel state by declaring MINIMUM FUEL when, having committed to land at a specific aerodrome, the pilot calculates that any change to the existing clearance to that aerodrome may result in landing with less than the planned final reserve fuel.

(4) The PIC must declare a situation of fuel emergency by broadcasting MAYDAY MAYDAY MAYDAY FUEL, when the calculated usable fuel predicted to be available upon landing at the nearest aerodrome where a safe landing can be made is less than the planned final reserve fuel.

(c) *Rotorcraft*.

(1) The PIC must continually ensure that the amount of usable fuel remaining on board is not less than the fuel required to proceed to an aerodrome or operating site where a safe landing can be made with the final reserve fuel remaining upon landing.

(2) The PIC must declare a situation of fuel emergency by broadcasting MAYDAY MAYDAY MAYDAY FUEL, when the actual usable fuel on board is less than the final reserve fuel.

SUBPART C – AIRCRAFT INSTRUMENTS, EQUIPMENT, AND CERTIFICATE REQUIREMENTS

§ 91.301 Civil Aircraft: Certifications Required.

(a) Except as provided in GACAR § 91.479, no person may operate an aircraft unless it has within it the following:

(1) An appropriate and current airworthiness certificate.

(2) An effective KSA registration certificate issued to its owner or, for operation within the Kingdom of Saudi Arabia, the second duplicate copy (pink) of the Aircraft Registration Application as provided for in GACAR Part 47 or a registration certificate issued under the laws of a foreign country.

(b) No person may operate an aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under GACAR § 91.479 is displayed at the cabin or flightdeck entrance so that it is legible to passengers or crew.

§ 91.303 Instruments and Equipment Requirements: Powered Aircraft With Standard Airworthiness Certificates and Certificate of Authorization under GACAR Part-91.

(a) General. Except as provided in GACAR § 91.309, no person may operate a powered Saudi Arabian registered aircraft with a standard airworthiness certificate in any kind of operation described in paragraphs (c) through (u) of this section unless that aircraft contains the instruments and equipment specified in those paragraphs for that kind of operation, and those instruments and items of equipment are in operable condition and are used in accordance with the applicable requirements in Subpart B of this part. If two or more kinds of operations require the same item of equipment, only one such item is required, unless stated otherwise.

(b) Instruments and equipment that have already been installed do not need to comply with a revised technical standard order (TSO), unless a retroactive requirement is prescribed in this subpart.

Para.	Kind of Operation	Required Instruments & Equipment

Para.	Kind of Operation	Required Instruments & Equipment
(c)	Operation of all aircraft on all flights.	(1) A seat or berth for each person over the age of 2 years. (2) An approved safety belt with a metal-to-metal latching device for each seat and restraining belts for each berth. (3) An approved shoulder harness for each seat required to have one in accordance with Section III of Appendix C to this part. (4) Airspeed indicator. (5) Altimeter. (6) Magnetic direction indicator. (7) Tachometer for each engine. (8) Oil pressure gauge for each engine using pressure system. (9) Temperature gauge for each liquid-cooled engine. (10) Oil temperature gauge for each air-cooled engine. (11) Manifold pressure gauge for each altitude engine. (12) Fuel gauge indicating the quantity of fuel in each tank. (13) Landing gear position indicator, if the aircraft has a retractable landing gear. (14) For small airplanes certificated after 11 March 1996, in accordance with airworthiness standards

Para.	Kind of Operation	Required Instruments & Equipment
		specified in GACAR Part 23, an approved aviation red or aviation white anticollision light system.In the event of failure of any light of the anticollision light system, operation of the aircraft may continue to a location where repairs or replacement can be made. (15) An accurate timepiece indicating the time in hours, minutes, and seconds. (16)A means of displaying mach number for aircraft with speed limitations expressed in terms of mach number. (17) An emergency locator transmitter (ELT) in accordance with Section V of Appendix C to this part. (18) An accessible first aid kit in accordance with Appendix B to this part. (19) Hand fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the aircraft.At least one must be located in— (i) The pilot's compartment and must contain Halon 1211 or equivalent as the extinguishing agent; and (ii) Each passenger compartment that is separate from the pilot's compartment and that is not readily accessible to the flight crew. (20) The AFM or other documents or information concerning any operating limitations prescribed for the aircraft.

Para.	Kind of Operation	Required Instruments & Equipment
		(21) Checklists to ensure compliance with the operating procedures contained in the AFM or other documents associated with the airworthiness certificate and otherwise in the operations manual.The design and utilization of checklists must observe Human Factors principles. (22) 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. (23) Procedures for PICs of intercepted aircraft and visual signals for use by intercepting and intercepted aircraft in accordance with Appendix E to this part. (24) Where the aircraft is fitted with fuses that are accessible in flight, spare electrical fuses of appropriate ratings for replacement of those fuses. (25) VOR/DME. (26) ATC transponder equipment that meet the performance and environmental requirements of any class of Federal Aviation Administration (FAA) of the United States TSO–C74b (Mode A) or any class of FAA TSO–C74c (Mode A with altitude reporting capability) as appropriate, or the appropriate class of FAA TSO–C112 (Mode S). (27) Two-way radio communication equipment suitable for the route to be flown, in accordance with Section IX of Appendix C to this part. (28) A placard on each door that is the means of access

Para.	Kind of Operation	Required Instruments & Equipment
		to a required passenger emergency exit, to indicate that it must be open during takeoff and landing. (29) Air-ground signal codes for search and rescue purposes.

Para.	Kind of Operation	Required Instruments & Equipment
(d)	Operation of single-engine aircraft or multi-engine aircraft that are not capable of maintaining the minimum safe altitude in the event of an engine failure or aircraft operating over an uninhabited area or any other area that the President requires equipment for search and rescue in case of an emergency.	(1) Survival equipment, sufficient for the survival on the ground of each person on board, given the geographical area, the season of the year, and anticipated seasonal climatic variations, that provides the means for— (i) Starting a fire, (ii) Providing shelter, (iii) Providing or purifying water, and (iv) Visually signaling distress. (2) Paragraph (d)(1) of this section does not apply to— (i) A balloon, a glider, a hang glider, a gyroplane, or an ultralight vehicle; (ii) An aircraft that is operated within 25 NM of the aerodrome of departure and that has the capability of radio communication with a surface-based radio station for the duration of the flight; (iii) An aircraft that is operated by an air operator, where the aircraft is equipped with equipment specified in the air operator's operations manual; or (iv) An aircraft that is operated in a geographical area where, and at a time of year when, the survival of the persons on board is not jeopardized.

Para.	Kind of Operation	Required Instruments & Equipment
(e)	Aircraft operated under IFR, under VFR over-the-top, or in controlled flight under VFR.	(1) Instruments and equipment specified for VFR flight plus; (2) An airspeed indicating system with means of preventing malfunctioning due to either condensation or icing. (3) A rate-of-climb and descent indicator. (4) A means of indicating in the flight crew compartment the outside air temperature. (5) Two-way radio communication and navigation equipment suitable for the route to be flown, in accordance with Sections IX and X of Appendix C to this part, respectively. (6) Gyroscopic rate-of-turn indicator, except on aircraft with a third gyroscopic pitch and bank indicator installed in accordance with the instrument requirements prescribed later in this table and in accordance with Section VI of Appendix C to this part. (7) Slip-skid indicator. (8) Sensitive altimeter adjustable for barometric pressure. (9) A clock displaying hours, minutes, and seconds with a sweep-second pointer or digital presentation. (10) Generator or alternator of adequate capacity. (11) Gyroscopic pitch and bank indicator (artificial horizon).

Para.	Kind of Operation	Required Instruments & Equipment
		(12) Gyroscopic direction indicator (directional gyro or equivalent). (13) A means of indicating whether the power supply to the gyroscopic instruments is adequate.

Para.	Kind of Operation	Required Instruments & Equipment
(f)	Operation of aircraft in certain designated classes of airspace.	Class A Airspace (1) Two-way voice communications equipment capable of communicating with ATC on applicable frequencies. (2) During IFR; VOR, Tactical Air Navigation (TACAN), or RNAV equipment. (3) After 1 January 2023,ADS–B OUT equipment in accordance with the technical and performance defined under Section VII of Appendix C to this part. Class B Airspace (1) Two-way voice communications equipment capable of communicating with ATC on applicable frequencies. (2) During IFR; VOR, TACAN, or RNAV equipment. (3) Unless authorized by the ATC facility having jurisdiction over the concerned airspace, after 1 January 2023, ADS–B OUT equipment in accordance with the technical and performance requirements defined under Section VII of Appendix C to this part. Class C Airspace (1) Two-way voice communications equipment capable of communicating with ATC on applicable frequencies.

Para.	Kind of Operation	Required Instruments & Equipment
		(2) Unless authorized by the ATC facility having jurisdiction over the concerned airspace, after 1 January 2023, ADS–B OUT equipment in accordance with the technical and performance requirements defined under Section VII of Appendix C to this part.
		Class D Airspace
		Unless authorized by the ATC facility having jurisdiction over the concerned airspace, after 1 January 2023, ADS–B OUT equipment in accordance with the technical and performance requirements defined under Section VII of Appendix C to this part.
		Class E Airspace
		Unless authorized by the ATC facility having jurisdiction over the concerned airspace, after 1 January 2023, ADS–B OUT equipment in accordance with the technical and performance requirements defined under Section VII of Appendix C to this part.

Para.	Kind of Operation	Required Instruments & Equipment
(g)	Operation of aircraft at night.	(1) All instruments and equipment specified for IFR as provided in paragraph (e) of this section. (2) Approved position lights. (3) An approved aviation red or aviation white anticollision light system. (4) One electric landing light. (5) An adequate source of electrical energy for all installed electrical and radio equipment. (6) Illumination for all instruments and equipment that is essential for the safe operation of the aircraft that is used by the flight crew. (7) Lights in all passenger compartments. (8) A flashlight with adequate stowage provisions for each crew member station.
(h)	Operation of seaplanes on flights over water.	(1) One life preserver, 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. (3) One anchor. (4) One sea anchor (drogue).

Para.	Kind of Operation	Required Instruments & Equipment
(i)	Operation of rotorcraft on flights over water.	(1) A permanent or rapidly deployable means of flotation so as to ensure a safe ditching of the rotorcraft when engaged in— (i) Rotorcraft offshore operations, (ii) 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; (iii) Flying over water in a nonhostile environment at a distance from land prescribed by the President when operating in performance Class 1; or (iv) Flying over water beyond autorotational or safe forced landing distance from land when operating in performance Class 3. (2) For hostile environments, the rotorcraft must be certificated in accordance with ditching provisions.

Para.	Kind of Operation	Required Instruments & Equipment
(j)	Operation of aircraft on flights over water beyond gliding distance from shore (landplanes and rotorcraft).	(1) Except as provided in paragraph (j)(2) of this section, one life preserver equipped with a means of electric illumination to assist in the locating of persons 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) Upon application by an operator, the President may authorize the operation of an aircraft over water without the life preservers or flotation means required by paragraph (j)(1) of this section, if the operator shows that the water over which the aircraft is to be operated is not of such size and depth that life preservers or flotation means would be required for the survival of its occupants in the event the flight terminates in that water.

Para.	Kind of Operation	Required Instruments & Equipment
(k)	Extended over-water operations (landplanes and rotorcraft).	(1) All equipment for flights beyond gliding distance from shore as provided in paragraph (j) of this section; (2) Life 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 distress signals described in Annex 2 to the Convention on International Civil Aviation. (4) Upon application by an operator, the President may authorize extended over-water operations in an airplane without sufficient life rafts required by paragraph (k)(2) of this section, if the operator shows that the water conditions and search and rescue services available for the routes flown are such that the survival of its occupants in the event the flight terminates in that water is extremely probable. (5) The following signaling equipment must be carried in each life raft: (i) Two signal flares of the day and night type, (ii) Eight red signal cartridges and a means of firing them, (iii) A signal sheet (minimum 1 m by 1 m) in a reflecting color, (iv) A signal mirror, and (v) An electric hand flashlight.

Para.	Kind of Operation	Required Instruments & Equipment
(l)	Operation of unpressurized aircraft at cabin pressure altitudes greater than 10 000 ft (3 050 m).	Oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in GACAR § 91.305(a) or (c), as applicable.
(m)	Operation of pressurized aircraft.	(1) A device to provide positive warning to the flight crew of any dangerous loss of pressurization. (2) An aircraft intended to be operated at cabin pressure altitudes greater than 10 000 ft (3 050 m) must be equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in GACAR § 91.305(b) or (d), as applicable. (3) Aircraft that cannot descend safely within 4 minutes to a flight altitude less than or equal to 13 000 ft (3 950 m) must be provided with automatically deployable oxygen equipment to satisfy the requirements of GACAR § 91.305(b) or (d), as applicable.The total number of oxygen dispensing units must exceed the number of passenger and cabin crew member seats by at least 10 percent.

Para.	Kind of Operation	Required Instruments & Equipment
(n)	Operation of pressurized aircraft above 25 000 ft (7 600 m).	(1) Automatically deployable oxygen equipment to satisfy the requirements of GACAR § 91.305(b) or (d), as applicable.The total number of oxygen dispensing units must exceed the number of passenger and number of cabin crew member seats by at least 10 percent. (2) Each flight crew member on flightdeck duty must be provided with an oxygen mask designed so it can be rapidly placed on his face from its ready position, properly secured, sealed, and supplying oxygen upon demand; and so designed that after being placed on the face it does not prevent immediate communication between the flight crew member and other crew members over the aircraft intercommunication system.When it is not being used at flight altitudes above FL 250 (7 600 m), the oxygen mask must be kept in condition for ready use and located within the immediate reach of the flight crew member while at his duty station. (3) Supply of first aid oxygen in accordance with the requirements of GACAR § 25.1443(d) for 2 percent of the occupants for the entire flight after cabin depressurization at cabin pressure altitudes above 8 000 ft (2 450 m), but in no case to less than one person.An appropriate number of acceptable dispensing units, but in no case fewer than two, must be provided, with a means for the cabin crew members to use this supply.

Para.	Kind of Operation	Required Instruments & Equipment
(o)	Operation of aircraft with oxygen for medical use by passengers.	(1) Except as provided in paragraph (o)(5) of this section, no person or certificate holder may allow the carriage or operation of equipment for the storage, generation or dispensing of medical oxygen unless the unit to be carried is constructed so that all valves, fittings, and gauges are protected from damage during that carriage or operation and unless the following conditions are met: (2) The equipment must be— (i) Of an approved type or in conformity with the manufacturing, packaging, marking, labeling, and maintenance requirements of the Transportation of Dangerous Goods, Technical Instructions to the Convention on International Civil Aviation; (ii) When owned by a certificate holder, maintained under the certificate holder's approved maintenance program; (iii) Free of flammable contaminants on all exterior surfaces; and (iv) Appropriately secured. (3) When the oxygen is stored in the form of a liquid, the equipment must have been under a certificate holder's approved maintenance program since its purchase new or since the storage container was last purged. (4) When the oxygen is stored in the form of a compressed gas as defined in the Transportation of Dangerous Goods, Technical Instructions to the Convention on International Civil Aviation—

Para.	Kind of Operation	Required Instruments & Equipment
		(i) When owned by a certificate holder, (A) It must be maintained under its approved maintenance program; and (B) The pressure in any oxygen cylinder must not exceed the rated cylinder pressure. (ii) When owned by a person other than a certificate holder and carried aboard an aircraft by a passenger, it must be approved for transportation by the aircraft operator before flight. (5) Paragraph (o)(1) of this section does not apply when that equipment is furnished by a professional or medical emergency service for use on board an aircraft in a medical emergency when no other practical means of transportation (including any other properly equipped certificate holder) is reasonably available and the person carried under the medical emergency is accompanied by a person trained in the use of medical oxygen.

Para.	Kind of Operation	Required Instruments & Equipment
(p)	Operation of aircraft in icing conditions.	(1) Suitable deicing and/or anti-icing devices when operated in circumstances in which icing conditions are reported to exist or are expected to be encountered. The aircraft must be certificated for flight into known icing conditions. (2) For operation of aircraft in icing conditions at night, means must be provided for illuminating or otherwise determining the formation of ice on the parts of the wings that are critical from the standpoint of ice accumulation.Any illumination that is used must be of a type that will not cause glare or reflection that would handicap crew members in the performance of their duties.
(q)	Operation of turbine-powered airplanes with six or more passenger seats.	Terrain Awareness and Warning System (TAWS) in accordance with Section XII of Appendix C to this part.
(r)	Operation of multi-engine, turbine-powered airplanes with six or more passenger seats and for which two pilots are required by type certification or operating rule.	CVR in accordance with Section I of Appendix C to this part.
(s)	Operation of performance Class 1 and 2 rotorcraft.	(1) One automatic ELT in accordance with Section V of Appendix C to this part. (2) When conducting offshore operations as described in GACAR § 1.1 or other operations where substantial portions of the flight are conducted over water, one automatic ELT in a life raft or life preserver.

Para.	Kind of Operation	Required Instruments & Equipment
(t)	Operation of performance Class 3 rotorcraft.	(1) One automatic ELT in accordance with Section V of Appendix C to this part. (2) When operating over water beyond autorotational or safe forced landing distance from land, one automatic ELT in a raft or life preserver.
(u)	Operation of rotorcraft on flights with passengers in areas where thunderstorms or other potentially hazardous weather conditions may be expected to exist along the route either at night or under IMC.	Weather radar or airborne thunderstorm detection equipment for aircraft.

§ 91.304 Instruments and Equipment Requirements: All Other Manned Saudi Arabian Registered Aircraft.

(a) General. Except as provided in GACAR § 91.309, no person may operate a manned Saudi Arabian registered aircraft of a kind other than described in GACAR § 91.303, in any kind of operation described in paragraphs (c) through (g) of this section, unless that aircraft contains the instruments and equipment specified in those paragraphs for that kind of operation, and those instruments and items of equipment are in operable condition and are used in accordance with the applicable requirements in Subpart B of this part. If two or more kinds of operations require the same item of equipment, only one such item is required, unless stated otherwise.

(b) Instruments and equipment that have already been installed do not need to comply with a revised technical standard order (TSO), unless a retroactive requirement is prescribed in this subpart.

Para.	Kind of Operation	Required Instruments & Equipment

Para.	Kind of Operation	Required Instruments & Equipment
(c)	Operation of all aircraft on all flights.	(1) Altimeter. (2) Rate of climb indicator. (3) An accurate timepiece indicating the time in hours, minutes and seconds. (4) Except for balloons; an approved safety belt with a metal to metal latching device for each seat. (5) An emergency locator transmitter (ELT) in accordance with Section V of Appendix C to this part. (6) An accessible first aid kit in accordance with Appendix B to this part. (7) A hand fire extinguisher of a type which, when discharged, will not cause dangerous contamination of the air within the aircraft. (8) The AFM or other documents or information concerning any operating limitations prescribed for the aircraft. (9) Checklists to ensure compliance with the operating procedures contained in the AFM or other documents associated with the certificate of airworthiness and otherwise in the operations manual.The design and utilization of checklists must observe Human Factors principles. (10) 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.

Para.	Kind of Operation	Required Instruments & Equipment
		(11) When required by the airspace being flown; ATC transponder equipment that must meet the performance and environmental requirements of any class of Federal Aviation Administration (FAA) of the United States TSO–C74b (Mode A) or any class of FAA TSO–C74c (Mode A with altitude reporting capability) as appropriate, or the appropriate class of FAA TSO–C112 (Mode S). (12) When required by the airspace being flown; two-way radio communication equipment suitable for the route to be flown, in accordance with Section IX of Appendix C to this part. (13) Air-ground signal codes for search and rescue purposes.
(d)	Operation of hot air balloons on all flights.	(1) Protective gloves for the pilot. (2) An alternate source of ignition. (3) A means of measuring and indicating fuel quantity. (4) A fire blanket of fire resistant cover. (5) A drop line at least 25 m in length.
(e)	Operation of gas balloons on all flights.	(1) A knife. (2) A drop line at least 20 m in length made of natural fiber or electrostatic conductive material.
(f)	Operation of gliders on all flights..	(1) Airspeed indicator. (2) Magnetic direction indicator.

Para.	Kind of Operation	Required Instruments & Equipment
(g)	Operation of aircraft on flights over water beyond gliding distance from shore.	(1) Except as provided in (g)(2) of this section, one life preserver equipped with a means of electrical illumination to assist in the locating of persons or equivalent 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) Upon application by an operator, the President may authorize the operation of an aircraft without the life preserver or flotation means required by paragraph (g)(1) of this section, if the operator shows that the water over which the aircraft is to be operated is not of such size or depth that life preservers or flotation means would be required for the survival of occupants in the event the flight terminates in that water.

§ 91.305 Supplemental Oxygen Supply Requirements.

(a) Minimum requirements for supplemental oxygen supply for nonpressurized aircraft in noncommercial operations.

Table 91–8.

Supply For:	Duration And Pressure Altitude
All required crew members	Entire flight time at pressure altitudes above 13 000 ft (3 950 m) and for any period exceeding 30 minutes at pressure altitudes above 10 000 ft (3 050 m) but not exceeding 13 000 ft (3 950 m).
100% of passengers (Note 1)	Entire flight time at pressure altitudes above 13 000 ft (3 950 m).
10% of passengers (Note 1)	Entire flight time after 30 minutes at pressure altitudes greater than 10 000 ft (3 050 m) but not exceeding 13 000 ft (3 950 m).

Note 1: For the purpose of this table “passengers” means passengers actually carried and includes infants under the age of 2.

(b) Minimum requirements for supplemental oxygen supply for pressurized aircraft in noncommercial operations.

Table 91–9.

Supply For: (Note 1)	Duration And Cabin Pressure Altitude
All required crew members	Entire flight time when the cabin pressure altitude exceeds 13 000 ft (3 950 m) and entire flight time when the cabin pressure altitude exceeds 10 000 ft (3 050 m) but does not exceed 13 000 ft (3 950 m) after the first 30 minutes at those altitudes, but in no case less than 10 minutes for flights operated at flight altitudes above 25 000 ft (7 600 m), or which, if operated at flight altitudes below 25 000 ft (7 600 m) cannot descend safely within 4 minutes to a flight altitude of 13 000 ft (3 950 m) or less.
100% of passengers (Note 3)	Entire flight time when the cabin pressure altitude exceeds 13 000 ft (3 950 m) but in no case less than 10 minutes for operated at flight altitudes above 25 000 ft (7 600 m), or which, if operated at flight altitudes below 25 000 ft (7 600 m) cannot descend safely within 4 minutes to a flight altitude of 13 000 ft (3 950 m) or less.(Note 2).
10% of passengers (Note 3)	Entire flight time when the cabin pressure altitude exceeds 10 000 ft (3 050 m) but does not exceed 13 000 ft (3 950 m) after the first 30 minutes at these altitudes.

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

Note 2:The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft’s maximum certificated operating altitude to 13 000 ft (3 950 m) in 10 minutes.

Note 3:For the purpose of this table “passengers” means passengers actually carried and includes infants under the age of 2.

(c) Minimum requirements for supplemental oxygen supply for nonpressurized aircraft in commercial operations.

Table 91–10.

Supply For:	Duration and Pressure Altitude
All occupants of flightdeck seats on flightdeck duty	Entire flight time at pressure altitudes above 10 000 ft (3 050 m).
All required cabin crew members	Entire flight time at pressure altitudes above 13 000 ft (3 950 m) and for any period exceeding 30 minutes at pressure altitudes above 10 000 ft (3 050 m) but not exceeding 13 000 ft (3 950 m).
100% of passengers (Note 1)	Entire flight time at pressure altitudes above 13 000 ft (3 950 m).
10% of passengers (Note 1)	Entire flight time after 30 minutes at pressure altitudes greater than 10 000 ft (3 050 m) but not exceeding 13 000 ft (3 950 m).

Note 1:For the purpose of this table “passengers” means passengers actually carried and includes infants under the age of 2.

(d) Minimum requirements for supplemental oxygen supply for pressurized aircraft in commercial operations.

Table 91–11.

Supply For: (Note 1)	Duration And Cabin Pressure Altitude

Supply For: (Note 1)	Duration And Cabin Pressure Altitude
All occupants of flightdeck seats on flightdeck duty (Note 6)	Entire flight time when the cabin pressure altitude exceeds 13 000 ft (3 950 m) and entire flight time when the cabin pressure altitude exceeds 10 000 ft (3 050 m) but does not exceed 13 000 ft (3 950 m) after the first 30 minutes at those altitudes, but in no case less than: (i)30 minutes for aircraft certificated to fly at altitudes not exceeding 25 000 ft (7 600 m). (Note 2) (ii)Two hours for aircraft certificated to fly at altitudes more than 25 000 ft (7 600 m). (Note 3).
All required cabin crew members	Entire flight time when cabin pressure altitude exceeds 13 000 ft (3 950 m) but not less than 30 minutes (Note 2), and entire flight time when cabin pressure altitude is greater than 10 000 ft (3 050 m) but does not exceed 13 000 ft (3 950 m) after the first 30 minutes at these altitudes.
100% of passengers (Note 5)	Entire flight time when the cabin pressure altitude exceeds 15 000 ft (4 550 m) but in no case less than 10 minutes (Note 4).
30% of passengers (Note 5)	Entire flight time when the cabin pressure altitude exceeds 14 000 ft (4 250 m) but does not exceed 15 000 ft (4 550 m).
10% of passengers (Note 5)	Entire flight time when the cabin pressure altitude exceeds 10 000 ft (3 050 m) but does not exceed 14 000 ft (4 250 m) after the first 30 minutes at these altitudes.

Supply For: (Note 1)	Duration And Cabin Pressure Altitude

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

Note 2: The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum certificated operating altitude to 10 000 ft (3 050 m) in 10 minutes and followed by 20 minutes at 10 000 ft (3 050 m).

Note 3: The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum certificated operating altitude to 10 000 ft (3 050 m) in 10 minutes and followed by 110 minutes at 10 000 ft (3 050 m).The oxygen required for protective breathing equipment (PBE) may be included in determining the supply required.

Note 4: The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum certificated operating altitude to 15 000 ft (4 550 m) in 10 minutes.

Note 5: For the purpose of this table, "passengers" means passengers actually carried and includes infants under the age of 2.

Note 6: Required crew members who are not on flightdeck duty must be provided with an amount of supplemental oxygen equal to that provided for crew members on duty other than on flight duty.If a standby crew member is not on call and will not be on flightdeck duty during the remainder of the flight, he is considered to be a passenger for the purposes of supplemental oxygen requirements.

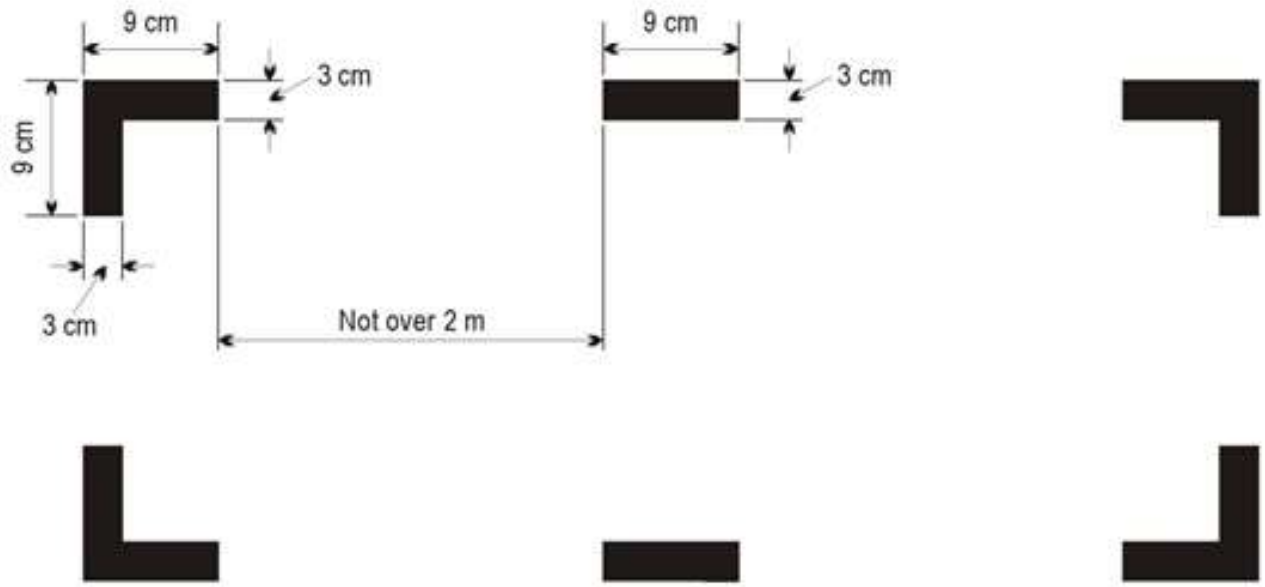
§ 91.307 Exterior Break In Point Markings.

(a) If displayed, markings designating an area of an airplane's fuselage as suitable for break in by emergency rescue crews must—

(1) Be red or yellow and, if necessary, outlined in white to contrast with the background.

(2) Comply with the markings as shown in Figure 91–9. If the corner markings are more than 2 m apart, intermediate lines 9 cm by 3 cm must be inserted so that there is no more than 2 m between adjacent markings.

Figure 91–9. Marking of Break in Points



§ 91.309 Inoperative Instruments and Equipment.

(a) Except as provided in paragraph (d) of this section, no person may take off an aircraft with inoperative instruments or equipment installed unless—

(1) An approved Minimum Equipment List (MEL) exists for that aircraft.

(2) The President has issued an authorization to operate the aircraft under the approved MEL.

(3) The approved MEL must—

(i) Be derived from the aircraft Master Minimum Equipment List (MMEL) that has been accepted by the President;

(ii) Be prepared in accordance with the limitations specified in paragraph (b) of this section and

(iii) Provide for the operation of the aircraft with the instruments and equipment in an inoperable condition.

(4) The aircraft records available to the pilot must include an entry describing the inoperable instruments and equipment.

(5) The aircraft is operated under all applicable conditions and limitations contained in the MEL and the authorizing document issued by the President authorizing the use of the list.

(b) The following instruments and equipment must not be included in an MEL—

(1) Instruments and equipment that are either specifically or otherwise required by the airworthiness requirements under which the aircraft is type certificated and which are essential for safe operations under all operating conditions.

(2) Instruments and equipment required by an airworthiness directive (AD) to be in operable condition unless the AD provides otherwise.

(3) Instruments and equipment required for specific operations by this part.

(c) A person authorized to use an approved MEL issued for a specific aircraft under GACAR Part 121, 125, 133, or 135 must use that MEL to comply with the requirements in this section.

(d) Except for operations conducted in accordance with paragraph (a) or (c) of this section, a person may take off an aircraft in operations conducted under this part with inoperative instruments and equipment without an approved MEL provided—

(1) The flight operation is conducted in a—

(i) Rotorcraft, non-turbine-powered airplane, glider, lighter-than-air aircraft, powered parachute, or weight-shift-control aircraft, for which an MMEL has not been developed; or

(ii) Small rotorcraft, non turbine powered small airplane, glider, or lighter than air aircraft for which an MMEL has been developed; and

(2) The inoperative instruments and equipment are not—

(i) Part of the VFR-day type certification instruments and equipment prescribed in the applicable airworthiness regulations under which the aircraft was type certificated;

(ii) Indicated as required on the aircraft's equipment list, or on the Kinds of Operations Equipment List for the kind of flight operation being conducted;

(iii) Required by GACAR § 91.303 or any other rule of this part for the specific kind of flight operation being conducted; or

(iv) Required to be operational by an AD; and

(3) The inoperative instruments and equipment are—

(i) Removed from the aircraft, the flightdeck control placarded, and the maintenance recorded in accordance with GACAR § 43.11; or

(ii) Deactivated and placarded "Inoperative." If deactivation of the inoperative instrument or equipment involves maintenance, it must be accomplished and recorded in accordance with GACAR Part 43; and

(4) A determination is made by a pilot, who is certificated and appropriately rated under GACAR Part 61, or by a person, who is certificated and appropriately rated to perform maintenance on the aircraft, that the inoperative instrument or equipment does not constitute a hazard to the aircraft.

An aircraft with inoperative instruments or equipment as provided in paragraph (d) of this section is considered to be in a properly altered condition acceptable to the President.

(e) Notwithstanding any other provision of this section, an aircraft with inoperable instruments or equipment may be operated under a special flight permit issued in accordance with GACAR §§ 21.179 and 21.181.

SUBPART D – SPECIAL FLIGHT OPERATIONS

§ 91.391 Applicability.

(a) This subpart prescribes the requirements for—

(1) Obtaining special flight operations authorizations to perform certain operations in Saudi Arabian registered civil aircraft and foreign civil aircraft and

(2) Operating a Saudi Arabian registered civil aircraft or foreign civil aircraft in certain other special flight operations.

(b) Requirements for other special flight operations specifically associated with aerial work are specified under GACAR Part 133.

§ 91.393 LVO: LVTO.

No person may perform LVTO operations in an aircraft unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section II of Appendix D to this part;

(b) The operator is authorized by the President or the state of the operator to conduct LVTO; and

(c) The LVTO is conducted in accordance with the operator's authorized procedures.

§ 91.395 LVO: LTS Category I.

No person may perform LTS CAT I operations in an aircraft unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section II of Appendix D to this part;

(b) The operator is authorized by the President or the state of the operator to conduct LTS CAT I operations; and

(c) The LTS CAT I operation is conducted in accordance with the operator's authorized procedures.

§ 91.397 LVO: Standard Category II.

No person may perform standard CAT II operations in an aircraft unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section II of Appendix D to this part;

(b) The operator is authorized by the President or the state of the operator to conduct CAT II operations; and

(c) The CAT II operation is conducted in accordance with the operator's authorized procedures.

§ 91.399 LVO: Other Than Standard Category II.

No person may perform other than standard (OTS) CAT II operations in an aircraft unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section II of Appendix D to this part;

(b) The operator is authorized by the President or the state of the operator to conduct OTS CAT II operations; and

(c) The OTS CAT II operation is conducted in accordance with the operator's authorized procedures.

§ 91.401 LVO: Standard Category III.

No person may perform standard CAT III operations in an aircraft unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section II of Appendix D to this part;

(b) The operator is authorized by the President or the state of the operator to conduct CAT III operations; and

(c) The CAT III operation is conducted in accordance with the operator's authorized procedures.

§ 91.403 LVO: Use of Enhanced Vision Systems or Head-Up Display.

No person may perform low visibility approach operations in an aircraft using EVS or HUD for which an operational credit on the aerodrome operating minimums is applied unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section II of Appendix D to this part;

(b) The operator is authorized by the President or the state of the operator to conduct low visibility operations using EVS or HUD; and

(c) The use of EVS or HUD is conducted in accordance with the operator's authorized procedures.

§ 91.404 Performance Based Communication and Surveillance (PBCS).

No person may operate an aircraft in airspace or on routes where Performance Based Communication and Surveillance (PBCS) has been designated unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section IX of Appendix D to this part;

(b) The operator is authorized by the President or the state of the operator to conduct (PBCS) operations in the designated (PBCS) airspace; and

(c) The flight is conducted in accordance with the operator's authorized procedures.

§ 91.405 Performance Based Navigation Operations.

No person may operate an aircraft in airspace, on routes or in accordance with procedures where PBN specifications lower than RNAV 5 are established unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section III of Appendix D to this part,

(b) The operator is authorized by the President or the state of the operator to conduct PBN operations lower than RNAV 5, and

(c) The flight using PBN is conducted in accordance with the operator's authorized procedures.

§ 91.407 Minimum Navigation Performance Specifications Operations.

No person may operate an aircraft in airspace designated as Minimum Navigation Performance Specifications (MNPS) unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section IV of Appendix D to this part.

(b) The operator is authorized by the President or the state of the operator to conduct MNPS

operations.

(c) The flight within MNPS designated airspace is conducted in accordance with the operator's authorized procedures.

§ 91.409 Reduced Vertical Separation Minimum Operations.

No person may operate an aircraft in airspace designated as RVSM unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section V of Appendix D to this part.

(b) The operator is authorized by the President or the State of registry to conduct RVSM operations.

(c) The flight within RVSM designated airspace is conducted in accordance with the operator's authorized procedures.

(d) The letter W is inserted in Item 10 (Equipment) of the flight plan regardless of the requested flight level.

§ 91.411 Rotorcraft Emergency Medical Service Operations.

No person may perform Rotorcraft Emergency Medical Service (REMS) operations in a rotorcraft unless—

(a) The operator and the operator's rotorcraft comply with the minimum standards of Section VI of Appendix D to this part.

(b) The operator is authorized by the President or the state of the operator to conduct REMS operations.

(c) The REMS operation is conducted in accordance with the operator's authorized procedures.

§ 91.413 Rotorcraft Hoist Operations.

No person may perform Rotorcraft Hoist Operations (RHO) in a rotorcraft unless—

(a) The operator and the operator's rotorcraft comply with the minimum standards of Section VII of Appendix D to this part.

(b) The operator is authorized by the President or the state of the operator to conduct RHO

operations.

(c) The RHO operation is conducted in accordance with the operator's authorized procedures.

§ 91.415 Rotorcraft Use of Night Vision Imaging Systems.

No person may operate a rotorcraft with the aid of Night Vision Imaging Systems (NVIS) unless—

(a) The operator and the operator's aircraft comply with the minimum standards of Section VIII of Appendix D to this part.

(b) The operator is authorized by the President or the state of the operator to conduct NVIS operations.

(c) The NVIS operation is conducted in accordance with the operator's authorized procedures.

§ 91.416 Air Ambulance Operations.

No person may engage in an air ambulance operation unless—

(a) The operator is authorized by the President or the state of the operator to conduct air ambulance operations.

(b) The air ambulance operation is conducted in accordance with the operator's authorized procedures.

§ 91.417 Aerobatic Flight.

No person may operate an aircraft in aerobatic flight—

(a) Over any congested area of a city, town, or settlement;

(b) Over an open air assembly of persons;

(c) Within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an aerodrome;

(d) Within 4 NM of the center line of any airway;

(e) Below an altitude of 1 500 feet (460 m) above the surface; or

(f) When flight visibility is less than 5 km.

§ 91.419 Flight Test Areas.

No person may flight test an aircraft except over open water, or sparsely populated areas, having light air traffic.

§ 91.421 Aircraft With Experimental Certificates: Operating Limitations.

(a) Except as provided in paragraphs (e) of this section, no person may operate an aircraft that has an experimental certificate—

(1) For other than the purpose for which the certificate was issued or

(2) Carrying persons or property for compensation or hire.

(b) No person may operate an aircraft that has an experimental certificate outside of an area assigned by the President until it is shown that—

(1) The aircraft is controllable throughout its normal range of speeds and throughout all the maneuvers to be executed and

(2) The aircraft has no hazardous operating characteristics or design features.

(c) Unless otherwise authorized by the President in special operating limitations, no person may operate an aircraft that has an experimental certificate over a densely populated area or in a congested airway. The President may issue special operating limitations for particular aircraft to permit takeoffs and landings to be conducted over a densely populated area or in a congested airway, in accordance with terms and conditions specified in the authorization in the interest of safety.

(d) Each person operating an aircraft that has an experimental certificate must—

(1) Advise each person carried of the experimental nature of the aircraft.

(2) Operate under VFR, day only, unless otherwise specifically authorized by the President.

(3) Notify the control tower of the experimental nature of the aircraft when operating the aircraft into or out of aerodromes with operating control towers.

(e) The President may authorize relief from the provisions of paragraph (a)(2) of this section for the

purpose of conducting flight training.

(1) The President may cancel or amend such authority at any time.

(2) An applicant must submit a request for relief to the President at least 60 working days before the date of intended operations. A request for relief must contain a complete description of the proposed operation and justification that establishes a level of safety equivalent to that provided under the regulations for the relief requested.

(f) The President may prescribe additional limitations that he considers necessary, including limitations on the persons that may be carried in the aircraft.

§ 91.423 Parachutes and Parachuting.

(a) No pilot of an aircraft may allow a parachute that is available for emergency use to be carried in that aircraft unless it is an approved type and has been packed—

(1) Within the preceding 180 days, if its canopy, shrouds, and harness are composed exclusively of nylon, rayon, or other similar synthetic fiber or materials that are substantially resistant to damage from mold, mildew, or other fungi and other rotting agents propagated in a moist environment or

(2) Within the preceding 60 days, if any part of the parachute is composed of silk, pongee, or other natural fiber or materials not specified in paragraph (a)(1) of this section.

(b) Except in an emergency, no PIC may allow, and no person may conduct, a parachute operation from an aircraft within the Kingdom of Saudi Arabia unless it complies with GACAR Part 105.

(c) Unless each occupant of the aircraft is wearing an approved parachute, no pilot of a civil aircraft carrying any person (other than a crew member) may execute any intentional maneuver that exceeds—

(1) A bank of 60°relative to the horizon or

(2) A nose up or nose down attitude of 30°relative to the horizon.

(d) Paragraph (c) of this section does not apply to—

(1) Flight tests for pilot certification or rating or

(2) Spins and other flight maneuvers required by the regulations for any certificate or rating when given by a certificated flight instructor.

(e) For the purposes of this section, approved parachute means—

(1) A parachute manufactured under a type certificate or an FAA TSO (C–23 series) or

(2) A personnel carrying military parachute identified by a military designation or specification number acceptable to the President.

§ 91.425 Towing.

(a) No person may operate a civil aircraft towing a glider or unpowered ultralight vehicle unless—

(1) The PIC of the towing aircraft meets the requirements of GACAR § 61.85;

(2) The towing aircraft is equipped with a tow hitch of a kind, and installed in a manner, approved by the President;

(3) The towline used has breaking strength not less than 80 percent of the maximum certificated operating mass of the glider or unpowered ultralight vehicle and not more than twice this operating mass. However, the towline used may have a breaking strength more than twice the maximum certificated operating mass of the glider or unpowered ultralight vehicle if—

(i) A safety link is installed at the point of attachment of the towline to the glider or unpowered ultralight vehicle with a breaking strength not less than 80 percent of the maximum certificated operating mass of the glider and not greater than twice this operating mass; or

(ii) A safety link is installed at the point of attachment of the towline to the towing aircraft with a breaking strength greater, but not more than 25 percent greater, than that of the safety link at the towed glider or unpowered ultralight vehicle end of the towline and not greater than twice the maximum certificated operating mass of the glider or unpowered ultralight vehicle;

(4) Before conducting any towing operation within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an aerodrome, or before making each towing flight within such controlled airspace if required by ATC, the PIC notifies the control tower. If a control tower does not exist or is not in operation, the PIC must notify the

aeronautical information service serving that controlled airspace before conducting any towing operations in that airspace; and

(5) The pilots of the towing aircraft and the glider or unpowered ultralight vehicle have agreed upon a general course of action, including takeoff and release signals, airspeeds, and emergency procedures for each pilot.

(b) No pilot of a civil aircraft may intentionally release a towline, after release of a glider or unpowered ultralight vehicle, in a manner that endangers the life or property of another.

(c) No pilot of a civil aircraft may tow anything with that aircraft other than as prescribed under paragraphs (a) and (b) of this section, except in accordance with the terms of a certificate of waiver issued by the President under Subpart H of this part or under GACAR Part 133.

§ 91.427 Primary Category Aircraft: Operating Limitations.

(a) No person may operate a primary category aircraft carrying persons or property for compensation or hire.

(b) No person may operate a primary category aircraft that is maintained by the pilot owner under an approved special inspection and maintenance program except—

(1) The pilot-owner; or

(2) A designee of the pilot-owner, provided that the pilot-owner does not receive compensation for the use of the aircraft.

§ 91.429 Aircraft Having a Special Airworthiness Certificate in the Light Sport Category: Operating Limitations.

(a) No person may operate an aircraft that has a special airworthiness certificate in the light sport category for compensation or hire except—

(1) To tow a glider or an unpowered ultralight vehicle in accordance with GACAR § 91.425; or

(2) To conduct flight training.

(b) No person may operate an aircraft that has a special airworthiness certificate in the light sport category unless—

(1) The aircraft is maintained by a certificated LSA repairman with a maintenance rating and appropriate aircraft class endorsement, an appropriately rated mechanic, or an appropriately rated repair station in accordance with the applicable provisions of GACAR Part 43 and maintenance and inspection procedures developed by the aircraft manufacturer or a person acceptable to the President. Gyroplanes must be maintained by an appropriately rated mechanic or an appropriately rated repair station;

(2) A condition inspection is performed once every 12 months by a certificated LSA repairman with a maintenance rating and appropriate aircraft class endorsement, an appropriately rated mechanic, or an appropriately rated repair station in accordance with inspection procedures developed by the aircraft manufacturer or a person acceptable to the President;

(3) The owner or operator complies with all applicable ADs;

(4) The owner or operator complies with each safety directive applicable to the aircraft that corrects an existing unsafe condition. In lieu of complying with a safety directive an owner or operator may—

(i) Correct the unsafe condition in a manner different from that specified in the safety directive provided the person issuing the directive concurs with the action; or

(ii) Obtain from the President a waiver from the provisions of the safety directive based on a conclusion that the safety directive was issued without adhering to the applicable consensus standard;

(5) Each alteration accomplished after the aircraft's date of manufacture meets the applicable and current consensus standard and has been authorized by either the manufacturer or a person acceptable to the President;

(6) Each major alteration to an aircraft product produced under a consensus standard is authorized, performed and inspected in accordance with maintenance and inspection procedures developed by the manufacturer or a person acceptable to the President; and

(7) The owner or operator complies with the requirements for the recording of major repairs and major alterations performed on type certificated products in accordance with GACAR § 43.11(d), and with the retention requirements in GACAR § 91.457.

(c) No person may operate an aircraft issued a special airworthiness certificate in the light sport

category to tow a glider or unpowered ultralight vehicle for compensation or hire or conduct flight training for compensation or hire in an aircraft which that person provides unless within the preceding 100 hours of time in service the aircraft has—

(1) Been inspected by a certificated LSA repairman with a maintenance rating and appropriate aircraft class endorsement, an appropriately rated mechanic, or an appropriately rated repair station in accordance with inspection procedures developed by the aircraft manufacturer or a person acceptable to the President and been approved for return to service in accordance with GACAR Part 43; or

(2) Received an inspection for the issuance of an airworthiness certificate in accordance with GACAR Part 21.

(d) Each person operating an aircraft issued a special airworthiness certificate in the light sport category must operate the aircraft in accordance with the aircraft's operating instructions, including any provisions for necessary operating equipment specified in the aircraft's equipment list.

(e) Each person operating an aircraft issued a special airworthiness certificate in the light sport category must advise each person carried of the special nature of the aircraft and that the aircraft does not meet the airworthiness requirements for an aircraft issued a standard airworthiness certificate.

(f) The President may prescribe additional limitations that he considers necessary.

§ 91.431 Special Aviation Events.

No person may conduct a special aviation event unless the event is specifically authorized by the President.

§ 91.433 Other Special Flight Operations.

Except for special flight operations associated with aerial work which are authorized in accordance with GACAR Part 133, the President may authorize any other special flight operation if the operator demonstrates to the President that the special flight operation can be conducted with an acceptable level of safety when it is conducted in accordance with specified limitations, conditions, and any other relevant parameter.

SUBPART E – MAINTENANCE, PREVENTIVE MAINTENANCE, AND ALTERATIONS

§ 91.441 Applicability.

(a) This subpart prescribes rules governing the maintenance, preventive maintenance, and alterations of Saudi Arabian registered civil aircraft operating within or outside of the Kingdom of Saudi Arabia.

(b) GACAR §§ 91.445, 91.449, 91.451, 91.457, and 91.459 do not apply to an aircraft maintained in accordance with a Continuous Airworthiness Maintenance Program (CAMP) as provided in GACAR Part 121 or 135.

(c) GACAR §§ 91.445 and 91.449 do not apply to an aircraft inspected in accordance with GACAR Part 125.

§ 91.443 General.

(a) The owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an airworthy condition, including compliance with GACAR Part 39.

(b) No person may perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in this subpart and other applicable regulations, including GACAR Part 43.

(c) No person may operate an aircraft for which a manufacturer’s maintenance manual or instructions for continued airworthiness (ICA) has been issued that contains an airworthiness limitations section unless the mandatory replacement times, inspection intervals, and related procedures specified in that section or alternative inspection intervals and related procedures set forth in a CAMP approved by the President under GACAR Part 121 or 135, or in accordance with an aircraft inspection program approved by the President under GACAR § 91.449(e) or GACAR Part 125, 133, or 135 have been complied with.

(d) A person must not alter an aircraft based on a supplemental type certificate (STC) issued or accepted in accordance with GACAR Part 21 unless the owner or operator of the aircraft is the holder of the STC, or has written permission from the holder.

§ 91.445 Maintenance Required.

Each owner or operator of an aircraft—

(a) Must have that aircraft inspected as prescribed in this subpart and, except as provided in paragraph (c) of this section, must have discrepancies repaired between required inspections as prescribed in GACAR Part 43;

(b) Must ensure that maintenance personnel make appropriate entries in the aircraft maintenance records indicating the aircraft has been approved for return to service;

(c) Must have any inoperative instrument or item of equipment, permitted to be inoperative by GACAR § 91.309(d)(2), repaired, replaced, removed, or inspected at the next required inspection; and

(d) When listed discrepancies include inoperative instruments or equipment, must ensure a placard has been installed as required by GACAR § 43.15.

§ 91.447 Operation After Maintenance, Preventive Maintenance, Rebuilding, or Alteration.

(a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—

(1) It has been approved for return to service by a person authorized under GACAR § 43.9; and

(2) The maintenance record entry required by GACAR § 43.11 or 43.15, as applicable, has been made.

(b) No person may carry any person (other than crew members) in an aircraft that has been maintained, rebuilt, or altered in a manner that may have appreciably changed its flight characteristics or substantially affected its operation in flight until an appropriately rated pilot with at least a private pilot certificate flies the aircraft, makes an operational check of the maintenance performed or alteration made, and logs the flight in the aircraft records.

(c) The aircraft does not have to be flown as required by paragraph (b) of this section if, prior to flight, ground tests, inspection, or both show conclusively that the maintenance, preventive maintenance, rebuilding, or alteration has not appreciably changed the flight characteristics or substantially affected the flight operation of the aircraft.

§ 91.449 Inspections.

(a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 months, it has had—

(1) An annual inspection in accordance with GACAR Part 43 and has been approved for return to service by a person authorized by GACAR § 43.9 or

(2) An inspection for the acceptance or approval of an airworthiness certificate in accordance with GACAR Part 21.

No inspection performed under paragraph (b) of this section may be substituted for any inspection required by this paragraph unless it is performed by a person authorized to perform annual inspections and is entered as an “annual” inspection in the required maintenance records.

(b) Except as provided in paragraph (c) of this section, no person may operate an aircraft carrying any person (other than a crew member) for hire, and no person may give flight instruction for hire in an aircraft which that person provides, unless within the preceding 100 hours of time in service the aircraft has received an annual or 100 hour inspection and been approved for return to service in accordance with GACAR Part 43 or has received an inspection for the acceptance or approval of an airworthiness certificate in accordance with GACAR Part 21. The 100 hour limitation may be exceeded by not more than 10 hours while en route to reach a place where the inspection can be done. The excess time used to reach a place where the inspection can be done must be included in computing the next 100 hours of time in service.

(c) Paragraphs (a) and (b) of this section do not apply to—

(1) An aircraft that carries a special flight permit or a current experimental certificate;

(2) An aircraft inspected in accordance with an approved aircraft inspection program under GACAR Part 125 or 135 and so identified by the registration number in the operations specifications of the certificate holder having the approved aircraft inspection program;

(3) An aircraft subject to the requirements of paragraph (d) or (e) of this section; or

(4) Turbine powered rotorcraft when the operator elects to inspect that rotorcraft in accordance with paragraph (e) of this section.

(d) *Progressive inspection*. Each registered owner or operator of an aircraft desiring to use a progressive inspection program must submit a written request to the President, and must provide—

(1) A certificated mechanic holding an inspection authorization, a certificated airframe repair station, or the manufacturer of the aircraft to supervise or conduct the progressive inspection;

(2) A current inspection procedures manual available and readily understandable to pilot and maintenance personnel containing, in detail—

(i) An explanation of the progressive inspection, including the continuity of inspection responsibility, the making of reports, and the keeping of records and technical reference material;

(ii) An inspection schedule, specifying the intervals in hours or days when routine and detailed inspections will be performed and including instructions for exceeding an inspection interval by not more than 10 hours while en route and for changing an inspection interval because of service experience;

(iii) Sample routine and detailed inspection forms and instructions for their use; and

(iv) Sample reports and records, and instructions for their use.

(3) Enough housing and equipment for necessary disassembly and proper inspection of the aircraft; and

(4) Appropriate current technical information for the aircraft.

The frequency and detail of the progressive inspection must provide for the complete inspection of the aircraft within each 12 months and be consistent with the manufacturer's recommendations, field service experience, and the kind of operation in which the aircraft is engaged. The progressive inspection schedule must ensure the aircraft, at all times, be airworthy and conform to all applicable approved aircraft specifications, type certificate data sheets, ADs, and other approved data. If the progressive inspection is discontinued, the owner or operator must immediately notify the President, in writing, of the discontinuance. After the discontinuance, the first annual inspection under GACAR § 91.449(a)(1) is due within 12 months after the last complete inspection of the aircraft under the progressive inspection. The 100 hour inspection under GACAR § 91.449(b) is due within 100 hours after that complete inspection. A complete inspection of the aircraft, for the purpose of determining when the annual and 100 hour inspections are due, requires a detailed inspection of the aircraft and all its components in accordance with the progressive inspection. Conducting a routine inspection of the aircraft and a detailed inspection of several components is not considered a complete inspection.

(e)*Airplanes with a maximum takeoff mass greater than 5 700 kg, turbine powered multi engine airplanes, and turbine powered rotorcraft that were certificated in other than the transport or*

commuter categories.

No person may operate airplanes with a maximum takeoff mass greater than 5 700 kg, turbine powered multi engine airplanes, or turbine powered rotorcraft that were certificated in other than the transport or commuter categories unless the replacement times for life limited parts specified in the ICA produced in accordance with GACAR Part 21 are complied with; and the airplane or turbine powered rotorcraft, including the airframe, engines, propellers, rotors, appliances, survival equipment, and emergency equipment, is inspected in accordance with an aircraft inspection program selected under the provisions of paragraph (f) of this section, except that, the owner or operator of a turbine powered rotorcraft may elect to use the inspection provisions of GACAR § 91.449(a), (b), (c), or (d) in lieu of an inspection option of GACAR § 91.449(f).

(f) *Selection of aircraft inspection program under paragraph (e) of this section.* The registered owner or operator of each airplane or turbine powered rotorcraft described in paragraph (e) of this section must select, identify in the aircraft maintenance records, and use one of the following programs for the inspection of the aircraft:

(1) A continuous airworthiness inspection program that is part of a continuous airworthiness maintenance program (CAMP) currently in use by a person holding an Air Operator Certificate (AOC) issued under GACAR Part 119 and operating that make and model aircraft under GACAR Part 121 or GACAR Part 135 and maintaining it under GACAR §135.239(a)(2).

(2) An aircraft inspection program approved under GACAR § 135.245 and currently in use by a person holding an AOC issued under GACAR Part 119 and operating that make and model aircraft under GACAR Part 135.

(3) Inspection programs currently recommended by the manufacturer of the aircraft, aircraft engines, propellers, appliances, or survival and emergency equipment.

(4) Any other aircraft inspection program established by the registered owner or operator of that airplane or turbine powered rotorcraft and approved by the President under paragraph (g) of this section. However, the President may require revision of this aircraft inspection program in accordance with the provisions of GACAR § 91.455.

Each operator must include in the selected program the name and address of the person responsible for scheduling the inspections required by the program, and make a copy of that program available to the person performing inspections on the aircraft and, upon request, to the President.

(g) *Aircraft inspection program approved under paragraph (e) of this section.* Each operator of an

airplane or turbine powered rotorcraft desiring to establish or change an approved aircraft inspection program under paragraph (f)(4) of this section must submit the program for approval to the GACA. The program must be in writing and include at least the following information:

(1) Instructions and procedures for the conduct of inspections for the particular make and model airplane or turbine powered rotorcraft, including necessary tests and checks. The instructions and procedures must set forth in detail the parts and areas of the airframe, engines, propellers, rotors, and appliances, including survival and emergency equipment, required to be inspected.

(2) A schedule for performing the inspections that must be performed under the program expressed in terms of the time in service, calendar time, number of system operations, or any combination of these. Inspection tasks and intervals specified as mandatory in the approved type design must be identified as such.

(h) *Changes from one inspection program to another*. When an operator changes from one inspection program under paragraph (f) of this section to another, the time in service, calendar times, or cycles of operation accumulated under the previous program must be applied in determining inspection due times under the new program.

§ 91.451 Altimeter System and Altitude Reporting Equipment Tests and Inspections.

(a) No person may operate an airplane, or rotorcraft, in controlled airspace under IFR unless—

(1) Within the preceding 24 months, each static pressure system, each altimeter instrument, and each automatic pressure altitude reporting system has been tested and inspected and found to comply with Appendixes D and E to GACAR Part 43;

(2) Except for the use of system drain and alternate static pressure valves, following any opening and closing of the static pressure system, that system has been tested and inspected and found to comply with paragraph (a) of Appendix D to GACAR Part 43; and

(3) Following installation or maintenance on the automatic pressure altitude reporting system of the ATC transponder where data correspondence error could be introduced, the integrated system has been tested, inspected, and found to comply with paragraph (c) of Appendix D to GACAR Part 43.

(b) The tests required by paragraph (a) of this section must be conducted by—

(1) The manufacturer of the airplane or rotorcraft on which the tests and inspections are to be

performed;

(2) A certificated repair station properly equipped to perform those functions and holding—

(i) An instrument rating, Class I,

(ii) A limited instrument rating appropriate to the make and model of appliance to be tested,

(iii) A limited rating appropriate to the test to be performed,

(iv) An airframe rating appropriate to the airplane or helicopter to be tested, or

(3) A certificated mechanic with an airframe rating (static pressure system tests and inspections only).

(c) Altimeter and altitude reporting equipment approved under TSOs are considered to be tested and inspected as of the date of their manufacture.

(d) No person may operate an airplane or rotorcraft in controlled airspace under IFR at an altitude above the maximum altitude at which all altimeters and the automatic altitude reporting system of that airplane or rotorcraft have been tested.

§ 91.452 Inspections and Recalibration of Flight Recorders.

(a) Annual inspections of flight recorders must be conducted as follows:

(1) An analysis of the recorded data from the flight recorders must ensure that the recorder operates correctly for the nominal duration of the recording.

(2) The analysis of the flight data recorder (FDR) must evaluate the quality of the recorded data to determine if the bit error rate (including those errors introduced by the recorder, the acquisition unit, the source of the data on the aircraft and by the tools used to extract the data from the recorder) is within acceptable limits and to determine the nature and distribution of the errors.

(3) A complete flight from the FDR must be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention must be given to parameters from sensors dedicated to the FDR. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems.

(4) The readout facility must have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals.

(5) An examination of the recorded signal on the CVR must be conducted by replay of the CVR recording. While installed in the aircraft, the CVR must record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards.

(6) A sample of in flight recordings of the CVR must be examined for evidence that the intelligibility of the signal is acceptable.

(7) An examination of the recorded images on the airborne image recorder (AIR) must be conducted by replay of the AIR recording. While installed in the aircraft, the AIR must record test images from each aircraft source and from relevant external sources to ensure that all required images meet recording quality standards.

(b) Flight recorder systems must 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.

(c) A report of the annual inspection must be made available, on request, to the President or the AIB for monitoring purposes.

(d) *Recalibration of the FDR system.*

(1) For those parameters which have sensors dedicated only to the FDR and are not checked by other means, recalibration must be conducted at least every 5 years or in accordance with the recommendations of the sensor manufacturer to determine any discrepancies in the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; and

(2) When the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, there must be a recalibration performed as recommended by the sensor manufacturer, or at least every 2 years.

§ 91.453 ATC Transponder Tests and Inspections.

(a) No person may use an ATC transponder that is specified in GACAR Part 91 unless, within the preceding 24 months, the ATC transponder has been tested and inspected and found to comply with

Appendix E to GACAR Part 43.

(b) Following any installation or maintenance on an ATC transponder where data correspondence error could be introduced, the integrated system has been tested, inspected, and found to comply with paragraph (c) of Appendix D to GACAR Part 43.

(c) The tests and inspections specified in this section must be conducted by—

(1) A certificated repair station properly equipped to perform those functions and holding a limited radio rating appropriate to the transponder to be tested and the test to be performed.

(2) A holder of a CAMP as provided in GACAR Part 121, 125, or 135; or

(3) The manufacturer of the aircraft on which the transponder to be tested is installed, if the transponder was installed by that manufacturer.

§ 91.455 Changes to Aircraft Inspection Programs.

(a) Whenever the President finds that revisions to an approved aircraft inspection program under GACAR § 91.449(f)(4) are necessary for the continued adequacy of the program, the owner or operator must, after notification by the President, make any changes in the program the President finds necessary.

(b) The owner or operator may petition the President to reconsider the notice to make any changes in accordance with the specified procedures of GACAR Part 13.

§ 91.457 Maintenance Records.

(a) Except for work performed in accordance with GACAR §§ 91.451 and 91.453, each registered owner or operator must keep the following records for the periods specified in paragraph (b) of this section:

(1) Records of the maintenance, preventive maintenance, and alteration and records of the 100 hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—

(i) A description (or reference to data acceptable to the President) of the work performed,

(ii) The date of completion of the work performed, and

(iii) The signature and certificate number of the person approving the aircraft for return to service.

(2) Records containing the following information:

(i) The total time in service of the airframe, each engine, each propeller, and each rotor.

(ii) The current status of life limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.

(iv) The current inspection status of the aircraft, including the time since the last inspection required by the aircraft inspection program under which the aircraft and its appliances are maintained.

(v) The current status of applicable ADs and safety directives including, for each, the method of compliance, the AD or safety directive number and revision date. If the AD or safety directive involves recurring action, the time and date when the next action is required.

(vi) Copies of the forms prescribed by GACAR § 43.11(a) for each major alteration and major repair to the airframe and currently installed engines, rotors, propellers, and appliances.

(b) The owner or operator must retain the following records for the periods prescribed:

(1) The records specified in paragraph (a)(1) of this section must be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.

(2) The records specified in paragraph (a)(2) of this section must be retained and transferred with the aircraft at the time the aircraft is sold.

(3) A list of defects furnished to a registered owner or operator under GACAR § 43.15 must be retained until the defects are repaired and the aircraft is approved for return to service.

(4) The records prescribed (a)(2)(i) through (a)(2)(iv) of this section must be kept for a period of

90 days after the end of the operating life of the unit to which they refer.

(c) The owner or operator must make all maintenance records required to be kept by this section available for inspection by the President.

§ 91.459 Transfer of Maintenance Records.

Any owner or operator who sells a Saudi Arabian registered aircraft must transfer to the purchaser, at the time of sale, the following records of that aircraft, in plain language form or in coded form at the election of the purchaser, if the coded form provides for the preservation and retrieval of information in a manner acceptable to the President:

(a) The records specified in GACAR § 91.457(a)(2).

(b) The records specified in GACAR § 91.457(a)(1) which are not included in the records covered by paragraph (a) of this section, except that the purchaser may permit the seller to keep physical custody of such records. However, custody of records by the seller does not relieve the purchaser of the responsibility under GACAR § 91.457(c) to make the records available for inspection by the President.

§ 91.461 Rebuilt Engine Maintenance Records.

(a) The owner or operator may use a new maintenance record, without previous operating history, for an aircraft engine rebuilt by the manufacturer or by an agency approved by the manufacturer.

(b) Each manufacturer or agency that grants zero time to an engine rebuilt by it must enter in the new record—

(1) A signed statement of the date the engine was rebuilt;

(2) Each change made as required by ADs; and

(3) Each change made in compliance with manufacturer’s service bulletins, if the entry is specifically requested in that bulletin.

(c) For the purposes of this section, a rebuilt engine is a used engine that has been completely disassembled, inspected, repaired as necessary, reassembled, tested, and approved in the same manner and to the same tolerances and limits as a new engine with either new or used parts. However, all parts used in it must conform to the production drawing tolerances and limits for new parts or be of approved oversized or undersized dimensions for a new engine.

SUBPART F – FOREIGN AIRCRAFT OPERATIONS AND OPERATIONS OF SAUDI ARABIAN REGISTERED CIVIL AIRCRAFT OUTSIDE OF THE KINGDOM OF SAUDI ARABIA AND RULES GOVERNING PERSONS ON BOARD SUCH AIRCRAFT

§ 91.471 Applicability.

(a) This subpart applies to the operations of Saudi Arabian registered civil aircraft outside of the Kingdom of Saudi Arabia and the operations of foreign civil aircraft within the Kingdom of Saudi Arabia.

(b) GACAR § 91.473 also applies to each person on board an aircraft operated as follows:

(1) A Saudi Arabian registered civil aircraft operated outside the Kingdom of Saudi Arabia;

(2) Any aircraft operated outside the Kingdom of Saudi Arabia—

(i) That has its next scheduled destination or last place of departure in the Kingdom of Saudi Arabia if the aircraft next lands in the Kingdom of Saudi Arabia, or

(ii) If the aircraft lands in the Kingdom of Saudi Arabia with the individual still on the aircraft regardless of whether it was a scheduled or otherwise planned landing site.

§ 91.473 Persons on Board.

GACAR § 91.15, concerning the prohibitions on interference with crew members, applies to each person on board an aircraft.

§ 91.475 Operations of Saudi Arabian Registered Civil Aircraft Outside of the Kingdom of Saudi Arabia.

(a) Each person operating a Saudi Arabian registered civil aircraft outside of the Kingdom of Saudi Arabia must—

(1) When over the high seas, comply with Annex 2 (Rules of the Air) to the Convention on International Civil Aviation and with GACAR §§ 91.65(c), 91.125, 91.127, 91.129, and 91.131;

(2) When within a foreign country, comply with the regulations relating to the flight and

maneuver of aircraft applicable in that country; and

(3) Except for the aircraft speed limits specified in GACAR §§ 91.65 and 91.203, comply with this part so far as it is consistent with either the applicable regulations of the foreign country where the aircraft is operated or Annex 2 to the Convention on International Civil Aviation.

(b) Annex 2 to the Convention on International Civil Aviation, as amended, to which reference is made in this subpart, is incorporated into this subpart and made a part hereof.

§ 91.476 Prohibition of Operations of Saudi Arabian Registered Civil Aircraft in Certain Airspace Outside of the Kingdom of Saudi Arabia.

(a) *Applicability.* This rule applies to the following persons:

(1) All KSA commercial air operators;

(2) All persons exercising the privileges of an airman certificate issued by the President; and

(3) All operators of Saudi Arabian registered aircraft.

(b) *Prohibited Airspace Areas*. Except as provided in paragraphs (c) and (d) of this section, no person may conduct flight operations in the airspace areas listed in Section II of Appendix A to this part.

(c) *Permitted Operations*. This section does not prohibit persons described in paragraph (a) of this section from conducting flight operations in the areas listed in paragraph (b) of this section, provided that such flight operations are conducted under a contract, grant, or cooperative agreement with a department, agency, or official body of the KSA government (or under a subcontract between the prime contractor of the department, agency, or official body, and the person described in paragraph (a)), with the approval of the President, or under an exemption issued by the President.

(d) *Emergency Situations*. In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command of an aircraft may deviate from this section to the extent required by that emergency. Except for KSA commercial air operators that are subject to the requirements of GACAR Parts 119, 121 or 135, each person who deviates from this section must, within 10 days of the deviation, excluding Fridays, Saturdays, and Saudi national holidays, submit to the President a complete report of the operations of the aircraft involved in the deviation, including a description of the deviation and the reasons for it.

§ 91.477 Special Rules for Foreign Civil Aircraft.

(a) *General.* In addition to the other applicable regulations of this part, each person operating a foreign civil aircraft within the Kingdom of Saudi Arabia must comply with this section.

(b) *Navigation and communication equipment for flights within the Kingdom of Saudi Arabia.* No person may operate a foreign civil manned aircraft within the Kingdom of Saudi Arabia unless—

(1) That aircraft is equipped with at least—

(i) A calibrated and adjusted magnetic compass;

(ii) VOR/DME;

(iii) Mode C SSR transponder with 4096 codes;

(iv) A personal or aircraft survival beacon;

(v) Radio equipment allowing two way radio communication with ATC when it is operated in controlled airspace;

(vi) After 1 January 2023, all foreign civil aircraft intending to operate in Classes A,B,C,D, or E airspace must be equipped with a serviceable 1090 MHz ES ADS-B equipment that has been certified in accordance with EASA CS-ACNS.D.ADSB, or FAA AC 20-165A – Airworthiness Approval of ADS-B; and

(vii) Additional navigation equipment suitable for the route to be flown.

(2) Each person piloting the aircraft under IFR—

(i) Holds a current instrument rating issued under GACAR Part 61 or is authorized by his foreign airman certificate to pilot under IFR and

(ii) Is thoroughly familiar with KSA en route, holding, and descent procedures; and

(3) At least one flight crew member of that aircraft is able to conduct two way radiotelephone communications in the English language and that flight crew member is on duty while the aircraft is approaching, operating within, or departing the Kingdom of Saudi Arabia.

(c) For overflights of the Kingdom of Saudi Arabia, no request for diplomatic clearance will be

granted unless the request indicates the requirements of GACAR § 91.477(b) can be met.

(d) *Over water.* Each person operating a foreign civil aircraft over water off the shores of the Kingdom of Saudi Arabia must give flight notification or file a flight plan in accordance with the Supplementary Procedures for the ICAO region concerned.

(e) *DME exceptions*.

(1) When the DME required by paragraph (b)(1)(ii) of this section fails, the PIC of the aircraft must notify ATC immediately and may then continue operations to the next aerodrome of intended landing where repairs or replacement of the equipment can be made.

(2) A foreign civil aircraft may be operated within the Kingdom of Saudi Arabia without DME when operated for the following purposes, and ATC is notified before each takeoff:

(i) Ferry flights to and from a place in the Kingdom of Saudi Arabia where repairs or alterations are to be made,

(ii) Ferry flights to a new State of registry, or

(iii) Ferry, demonstration, and test flight of an aircraft brought to the Kingdom of Saudi Arabia for the purpose of demonstration or testing the whole or any part thereof.

§ 91.479 Special Flight Authorizations for Foreign Civil Aircraft.

(a) Foreign civil aircraft may be operated without airworthiness certificates required under GACAR § 91.301 if a special flight authorization for that operation is issued under this section. Application for a special flight authorization must be made—

(1) In a form and manner prescribed by the President and

(2) Containing any information the President requires the applicant to submit.

(b) The President may issue a special flight authorization for a foreign civil aircraft subject to any conditions and limitations the President considers necessary for safe operation in KSA airspace.

SUBPART G – ENVIRONMENTAL PROTECTION

§ 91.501 Applicability.

This subpart prescribes environmental protection measures that apply to the operation of Saudi Arabian registered civil aircraft and foreign registered aircraft in the Kingdom of Saudi Arabia, specifically—

(a) Operating noise limits, and

(b) Fuel venting and exhaust emissions requirements.

§ 91.503 Operating Noise Limits: General.

(a) No person may operate to or from any aerodrome in the Kingdom of Saudi Arabia any civil subsonic jet (turbojet) airplane over 34 020 kg, unless that airplane has been shown to comply with Chapter 3 or Chapter 4 noise levels under GACAR Part 36.

(b) For purposes of this subpart, the cited Chapters 3 and 4 noise levels, the terms used to describe airplanes with respect to those, and the term “subsonic airplane” have the meanings specified under GACAR Part 36.

(1) Chapter 3 noise level means a noise level at or below the maximum noise level prescribed in Chapter 3, Paragraph 3.4, Maximum Noise Levels, of Annex 16 to the Convention on International Civil Aviation, Volume I, Amendment 8, effective 18 November 2008, as amended.

(2) Chapter 4 noise level means a noise level at or below the maximum noise level prescribed in Chapter 4, Paragraph 4.4, Maximum Noise Levels, Annex 16 to the Convention on International Civil Aviation, Volume I, Amendment 8, effective 18 November 2008, as amended.

§ 91.505 Modification To Meet Chapter 3 or Chapter 4 Noise Levels.

A person may request a one time authorization from the President to fly a noncompliant aircraft into the Kingdom of Saudi Arabia for any modifications to achieve the required noise limits.

§ 91.507 Aircraft Sonic Boom.

No person may operate an aircraft in the Kingdom of Saudi Arabia at a true flight mach number greater than 1.

§ 91.509 Agricultural and Firefighting Airplanes.

(a) This section applies to propeller driven, small airplanes having standard airworthiness certificates that are designed for “agricultural aircraft operations” (as defined in GACAR Part 1), or for dispensing firefighting materials.

(b) If the AFM, or other approved manual materials, markings, or placards for the airplane indicate that it has not been shown to comply with the noise limits under GACAR Part 36, no person may operate that airplane, except—

(1) To the extent necessary to accomplish the work activity directly associated with the purpose for which it is designed,

(2) To provide flight crew member training in the special purpose operation for which the airplane is designed, and

(3) To conduct aerial work operations under GACAR Part 133.

§ 91.511 Fuel Venting and Exhaust Emissions.

No person may operate to or from any aerodrome in the Kingdom of Saudi Arabia any aircraft unless that aircraft has been shown to comply with the fuel venting and exhaust emissions requirements of GACAR Part 34.

SUBPART H – WAIVERS

§ 91.601 Policy and Procedures.

(a) The President may issue a certificate of waiver authorizing the operation of aircraft in deviation from any rule listed in this subpart if he finds that the proposed operation can be safely conducted under the terms of that certificate of waiver.

(b) An application for a certificate of waiver under this part is made on a form and in a manner prescribed by the President.

(c) A certificate of waiver is effective as specified in that certificate of waiver.

§ 91.611 List of Rules Subject to Waivers.

Subject to the requirements prescribed in GACAR § 91.601, the President may waive the following GACAR sections:

§ 91.11 Empty Mass and Center of Gravity: Currency Requirement.

§ 91.49 Use of Safety Belts, Shoulder Harnesses and Child Restraint Systems.

§ 91.59 Operating Near Other Aircraft.

§ 91.61 Right-of-Way Rules: Except Water Operations.

§ 91.63 Right of Way Rules: Water Operations.

§ 91.65 Aircraft Speed.

§ 91.67 Minimum Safe Altitudes: General.

§ 91.71 Altimeter Settings.

§ 91.101 Compliance with ATC Clearances and Instructions.

§ 91.107 ATC Light Signals.

§ 91.121 Operating on or in the Vicinity of an Aerodrome in Class G Airspace.

§ 91.209 IFR Operations: Two Way Radio Communications Failure.

§ 91.261 Operation of Restricted Category Aircraft.

§ 91.417 Aerobatic Flight.

§ 91.419 Flight Test Areas.

§ 91.425 Towing.

§ 91.429 Aircraft Having a Special Airworthiness Certificate in the Light Sport Category: Operating Limitations.

SUBPART I – SEARCH AND RESCUE

§ 91.701 Applicability.

This subpart prescribes rules governing—

(a) All pilots in command who intercept a distress transmission or who observe another person, aircraft or a surface craft in distress; and

(b) Each owner, operator or pilot in command of an aircraft that has been requested by the search and rescue (SAR) authorities to assist in SAR activities.

§ 91.703 Obligation to Provide Search and Rescue Assistance.

(a) In providing assistance to aircraft in distress and to survivors of aircraft accidents, each person must do so regardless of the nationality or status of such persons or the circumstances in which such persons are found.

(b) The owner, operator or pilot in command of an aircraft must conduct search and rescue operations required by the SAR authorities whenever necessary, if the condition of the aircraft so allows.

(c) Each owner, operator or pilot in command of an aircraft that has been requested by the SAR authorities to assist in SAR activities need not obtain formal authorization from the President under this part in order to assist in SAR activities.

§ 91.705 Procedures at the Scene of an Accident.

(a) When a pilot in command observes that either another aircraft or a surface craft is in distress, the pilot must, unless considered unsafe, unreasonable or unnecessary:

(1) Keep the craft in distress in sight until compelled to leave the scene or advised by the rescue coordination center (RCC) that it is no longer necessary;

(2) Determine the position of the craft in distress;

(3) As appropriate, report to the RCC or air traffic service unit (ATSU) as much of the following information as possible:

(i) Type of craft in distress, its identification and condition;

(ii) Its position, expressed in geographical or grid coordinates or in distance and true bearing from a distinctive landmark or from a radio navigation aid;

(iii) Time of observation expressed in hours and minutes Coordinated Universal Time (UTC);

(iv) Number of persons observed;

(v) Whether persons have been seen to abandon the craft in distress;

(vi) On-scene weather conditions;

(vii) Apparent physical condition of survivors;

(viii) Apparent best ground access route to the distress site; and

(4) Act as instructed by the RCC or ATSU.

(b) If the first aircraft to reach the scene of an aircraft accident is not a search and rescue aircraft, it must take charge of on-scene activities of all other aircraft subsequently arriving until the first search and rescue aircraft reaches the scene of the aircraft accident. If, in the meantime, such aircraft is unable to establish communication with the RCC or ATSU, it must, by mutual agreement, hand over to an aircraft capable of establishing and maintaining such communications until the arrival of the first search and rescue aircraft.

(c) When it is necessary for an aircraft to convey information to survivors or surface rescue units, and two-way communication is not available, it must, if practicable, drop communication equipment that would enable direct contact to be established, or convey the information by dropping a hard copy message.

(d) When a ground signal has been displayed, the aircraft must indicate whether the signal has been understood or not by the means described in Appendix I to this part, or, if this is not practicable, by making the appropriate visual signal.

(e) When it is necessary for an aircraft to direct a surface craft to the place where an aircraft or surface craft is in distress, the aircraft must do so by transmitting precise instructions by any means at its disposal. If no radio communication can be established, the aircraft must make the appropriate visual signal.

§ 91.707 Search and Rescue Signals.

(a) The air-to-surface and surface-to-air visual signals in Appendix I to this part must, when used, have the meaning indicated therein. They must be used only for the purpose indicated and no other signals likely to be confused with them may be used.

(b) Upon observing any of the signals in the Appendix I to this part, aircraft must take such action as may be required by the interpretation of the signal given in that Appendix I to this part.

APPENDIX A TO GACAR PART 91 – AERODROMES/LOCATIONS: SPECIAL OPERATING RESTRICTIONS

I. Locations at Which Special VFR Operations Are Prohibited.

RESERVED

APPENDIX A TO GACAR PART 91 – AERODROMES/LOCATIONS: SPECIAL OPERATING RESTRICTIONS

II. Foreign Locations Where Flight Operations Are Prohibited or Restricted.

(a) *Prohibited Airspace Areas. Except as provided in GACAR § 91.476, no person may conduct flight operations in the airspace areas listed in this section.*

(1) Tripoli (HLLL) Flight Information Region (FIR);

(2) Simferopol (UKFV) and the Dnipropetrovsk (UKDV) Flight Information Regions (FIR);

(3) All airspace within the territorial limits of the Republic of Yemen; and

(4) Any other airspace area designated by the President and communicated to the public via special alerts or directives.

APPENDIX B TO GACAR PART 91 – MEDICAL KIT, UNIVERSAL PRECAUTION KIT, FIRST AID KIT SPECIFICATIONS

I. Location and Contents of Medical Supplies.

(a) *Location.*

(1) First aid and universal precaution kits should be distributed as evenly as practicable throughout the passenger cabins. They must be readily accessible to crew members.

(2) The medical kit, when carried, must be stored in an appropriate secure location to prevent unauthorized entry or use.

(3) Medical supplies must be stored in a manner to keep them free from dust, moisture, and damaging temperatures.

(b) *Contents.*

(1) *First aid kit.*

(i) *Aircraft with 19 or fewer Passenger Seats.* The first aid kit must contain at least the supplies and quantities listed in Table 91–12. A first aid kit complying with paragraph (b)(1)(ii) of this appendix also meets this requirement.

(ii) *Aircraft with 20 or more Passenger Seats.* The first aid kit(s) must contain at least the supplies listed in Table 91–12 or contents otherwise acceptable to the President.

NOTE: Due to limited availability in the KSA, ammonia inhalants are optional items for all first aid kits.

Table 91–12.

Item	Quantity Required (≤19 Passenger Seats)*	Quantity Required (≥20 Passenger Seats)*
List of Contents	1	1
Adhesive wound closures (Leukostrip, Steri-Strip, butterfly strips, or equivalent)	10	20
Ammonia Inhalants	10	10
Antiseptic Swabs	10	20
Bandage: Adhesive Compresses, 2.5 cm (1 in)	6	16
Bandage: Gauze 7.5 cm by 4.5 m (4 in by 15 ft)	2	4
Bandage: Triangular, 100 cm (40 in), 2 safety pins	2	5
Dressing: Burn 10 cm by 10 cm (4 in by 4 in)	0	1
Dressing: Gauze, sterile 10.4 cm by 10.4 cm (4 in by 4 in)	8	8
Eye pad	0	1
Gloves, Disposable	4	6
Scissors, Bandage, 10 cm (4 in), blunt tip	1	1
Splint, Arm, non-inflatable	0	1**
Splint, Leg, non-inflatable	0	1**
Tape: Adhesive 2.5 cm (1 in)	2 rolls	2 rolls
Towelettes, Antiseptic or Cleansing	10	10
Tweezers: Splinter	1	1

(2) *Universal precaution kit* —

(i) Dry powder that can convert small liquid spill into a sterile granulated gel

(ii) Germicidal disinfectant for surface cleaning

(iii) Skin wipes

(iv) Face/eye mask (separate or combined)

(v) Gloves (disposable)

(vi) Protective apron

(vii) Large absorbent towel

(viii) Pick up scoop with scraper

(ix) Biohazard disposal waste bag

(x) Instructions

(3) *Medical kit* —

(i) Equipment

(A) List of contents

(B) Stethoscope

(C) Sphygmomanometer (electronic preferred)

(D) Airways, oropharyngeal (three sizes)

(E) Syringes (appropriate range of sizes)

(F) Needles (appropriate range of sizes)

(G) Intravenous catheters (appropriate range of sizes)

(H) Antiseptic wipes

(I) Gloves (disposable)

(J) Needle disposal box

(K) Urinary catheter

(L) System for delivering intravenous fluids: including alcohol sponges and tape scissors

(M) Venous tourniquet

(N) Sponge gauze

(O) Tape: adhesive

(P) Surgical mask

(Q) Emergency tracheal catheter (or large gauge intravenous cannula)

(R) Umbilical cord clamp

(S) Thermometers (nonmercury)

(T) Basic life support cards

(U) Bag valve mask

(V) Flashlight and batteries

(W) Cardiopulmonary resuscitation mask (three sizes)

(X) Saline solutions: 500 cc

(Y) Self inflating manual resuscitation device with 3 masks

(ii) Medication

(A) Epinephrine 1:1 000

(B) Antihistamine: injectable and tablets: 25 mg

(C) Dextrose 50 percent (or equivalent): injectable: 50 ml

(D) Nitroglycerin tablets, or spray

(E) Major analgesic

(F) Sedative anticonvulsant: injectable

(G) Antiemetic: injectable

(H) Bronchial dilator: inhaler

(I) Atropine: injectable

(J) Adrenocortical steroid: injectable

(K) Diuretic: injectable

(L) Medication for postpartum bleeding

(M) Sodium chloride 0.9 percent (minimum 250 ml)

(N) Acetyl salicylic acid (aspirin) for oral use

(O) Oral beta blocker

(P) Lidocaine: injectable: 5 cc, 20 mg/ml

(Q) Aspirin tablets, 325 mg

(R) Basic instructions for use of the drugs in the kit

(iii) If a cardiac monitor is available (with or without an automated external defibrillator) add to the above list: Epinephrine 1:10 000 (can be a dilution of epinephrine 1:1 000).

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

I. Crash Protected Flight Recorders.

(a) ***FDR***.

(1) *Equipment standards for all FDR.* Unless otherwise indicated, each FDR must—

(i) Meet, at a minimum, the requirements in FAA TSO–C124 and/or EUROCAE ED–55 or ED–112 and be capable of recording no less than—

(A) 25 hours for all airplanes and

(B) 10 hours for all rotorcraft.

(ii) For all commuter and transport category aircraft and all aircraft in commercial operations, have an approved underwater locating device on or adjacent to the container which is secured in such a manner that it is not likely to be separated during crash impact, unless the CVR and the flight recorder are installed adjacent to each other in such a manner that they are not likely to be separated during crash impact;

(iii) For all aircraft the FDR must retain at least the last 25 hours of recorded information using a recorder that meets the standards of FAA TSO–C124a, or later revision.

(2) *Use of combination recorders*. Each FDR must be in a separate container from the CVR when both are required. If the FDR is used to comply with only the FDR requirements, a combination unit may be installed. If a combination unit is installed to meet CVR requirements, a combination unit must also be used to comply with the FDR requirement.

(3) *Use of combination recorders for certain airplanes certificated on or after 1 January 2016.* All airplanes in commercial operations of a maximum certificated takeoff mass of greater than 15 000 kg for which the type certificate is first issued on or after 1 January 2016, and which are required to be equipped with both a CVR and an FDR, must be equipped with 2 combination recorders. One recorder must be located as close to the flightdeck as practicable and the other recorder located as far aft as practicable.

(4) *Filtered data.*

(i) A flight data signal is filtered when an original sensor signal has been changed in any way, other than changes necessary to—

(A) Accomplish analog to digital conversion of the signal,

(B) Format a digital signal to be digital FDR (DFDR) compatible, or

(C) Eliminate a high frequency component of a signal that is outside the operational bandwidth of the sensor.

(ii) An original sensor signal for any flight recorder parameter required to be recorded may be filtered only if the recorded signal value continues to meet the requirements of the applicable FDR Type.

(iii) For parameters (12) through (17), (42), and (88) found in paragraph (a)(9) of this section, if the recorded signal value is filtered and does not meet the parameter requirements of the applicable FDR Type, as applicable, the certificate holder must—

(A) Remove the filtering and ensure that the recorded signal value meets the parameter requirements of the applicable FDR Type, as applicable, or

(B) Demonstrate by test and analysis that the original sensor signal value can be reconstructed from the recorded data. This demonstration requires the following:

(I) The GACA determination that the procedure and the test results submitted by the certificate holder are repeatable; and

(II) The certificate holder maintains documentation of the procedure required to reconstruct the original sensor signal value. This documentation is also subject to the AIB retention and safeguarding requirements applicable for FDR recordings.

(5) *Filtered data requirements.*

(i) Each operator must determine, for each airplane on its operations specifications, whether the airplane’s DFDR system is filtering any of the parameters listed in this section. The operator must create a record of this determination for each airplane it operates, and maintain it as part of the correlation documentation required by this part.

(ii) For airplanes that are not filtering any listed parameter, no further action is required unless the airplane's DFDR system is modified in a manner that would cause it to meet the definition of filtering on any listed parameter.

(iii) For airplanes found to be filtering a parameter listed in this section, the operator must either—

(A) No later than 21 April 2014, remove the filtering; or

(B) No later than 22 April 2013, submit the necessary procedure and test results required by this section.

(6) *Installation standards.* The FDR installation must meet the following standards:

(i) The requirements of GACAR § 23.1459, 25.1459, 27.1459, or 29.1459, as applicable, except that;

(ii) Only for aircraft manufactured on or after 7 April 2010, the FDR must be installed so that any single electrical failure external to the recorder does not disable both the CVR and the FDR.

(7) *Correlation requirements.* Except for aircraft having separate altitude and airspeed sensors integral to the FDR system, the correlation required by GACAR § 23.1459, 25.1459, 27.1459, or 29.1459, as appropriate, must be established on only one of a group of aircraft—

(i) That are of the same type.

(ii) On which the flight recorder models and their installations are the same.

(iii) On which there are no differences in the type designs with respect to the installation of the instruments at the duty station normally occupied by the PIC associated with the flight recorder. The certificate holder must retain the most recent instrument calibration, including the recording medium from which this calibration is derived, and the recorder correlation.

(8) *Special note for certain aircraft with Aeronautical Radio, Incorporated (ARINC) 717 digital flight data acquisition unit (DFDAU).* No person may operate an airplane equipped with a digital data bus and ARINC 717 DFDAU or equivalent unless it is equipped with one or more approved flight recorders that use a digital method of recording and storing data and a

method of readily retrieving that data from the storage medium. Any required parameters available on the digital data bus must be recorded within the ranges, accuracies, resolutions, and sampling intervals specified.

(9) *FDR parameters.*

(i) *Type R1.* (Equivalent to ICAO Type V)

Table C–1.

Serial No.	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording Resolution[3]
1	Time (UTC when available, otherwise relative time count or Global Positioning System (GPS) time sync)	24 hours	4	±0.125% per hour	1 second
2	Pressure Altitude	−1 000 ft (−300 m) to maximum certificated altitude of aircraft +5 000 ft (+1 500 m)	1	±100 ft to ±700 ft (±30 m to ±200 m). (see Table 1, FAA TSO C51−a)	5 ft (1.5 m)
3	Indicated airspeed	As the installed pilot display measuring system	1	±3%	1 kt
4	Magnetic heading	360°	1	±2°	0.5°
5	Normal acceleration (Vertical)	−3 g to +6 g	0.125	±0.09 g excluding a datum error of ±0.045 g	0.004 g
6	Pitch attitude	±75° or 100% of usable range whichever is greater	0.5	±2°	0.5°
7	Roll attitude	±180°	0.5	±2°	0.5°
8	Radio transmitter keying	On/off (discrete)	1		

Serial No.	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording Resolution[3]
9	Power on each engine: Free or power turbine and Engine Torque	Full range	1 (per engine)	±2%	0.1% of full range
10	Main rotor speed	50–130%	0.51	±2%	0.3% of full range
11	Collective Pitch[4]	Full range	0.5 (0.25 recommended)	±2% unless higher accuracy uniquely required	0.5% of operating range
11	Tail Rotor Pedal Position[4]	Full range	0.5 (0.25 recommended)	±2% unless higher accuracy uniquely required	0.5% of operating range
11	Lat. Cyclic Pitch[4]	Full range	0.5 (0.25 recommended)	±2% unless higher accuracy uniquely required	0.5% of operating range
11	Long. Cyclic Pitch[4]	Full range	0.5 (0.25 recommended)	±2% unless higher accuracy uniquely required	0.5% of operating range
12	Hydraulics, each system (low pressure and selection) Primary (discrete)	Discrete	1		
13	Outside Air Temperature	Sensor range −50°C to +90°C	2	±2°C	0.3°C
14*	Autopilot/ autothrottle/ Automatic Flight Control System (AFCS) mode and engagement status	A suitable combination of discretes	1		
15*	Stability augmentation system (SAS) engagement	Discrete	1		

Serial No.	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording Resolution[3]
20	Longitudinal acceleration	±1.0 g	0.25	±0.015 g excluding a datum error of ±0.05 g;	0.004 g
34*	Altitude rate	As installed	1	As installed	
The following parameters are not ICAO requirements:					
No ICAO Equivalent	Engine torque	Maximum range	1	±5%	1%[2]
No ICAO Equivalent	Secondary—if applicable (discrete)	High/low	1		
No ICAO Equivalent	SAS fault status (discrete)	Fault/OK	1		
No ICAO Equivalent	Controllable Stabilator Position[4]	Full range	2	±3%	1%[2]

1 When data sources are aircraft instruments (except altimeters) of acceptable quality to fly the aircraft the recording system excluding these sensors (but including all other characteristics of the recording system) must contribute no more than half of the values in this column.

2 Percent of full range.

3 This column applies to aircraft manufactured after 11 October 1991.

4 For all aircraft manufactured on or after 6 December 2010, the sampling interval per second is 4.

The parameters designated by an asterisk (*) must 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.

(ii) *Type R2*. (Equivalent to ICAO Type IV)

Table C–2.

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording Resolution[2]
1	Time (UTC when available, otherwise relative time count or GPS time sync)	24 hrs	4	±0.125% Per Hour	1 sec
2	Pressure Altitude	-1 000 ft (-300 m) to max certificated altitude of aircraft +5 000 ft (+1 500 m)	1	±100 ft to ±700 ft (±30 m to ±200 m) (See Table 1, FAA TSO–C51a)	5 ft (1.5 m)
3	Indicated Airspeed	As the installed pilot display measuring system	1	±3%	1 kt
4	Heading	360°	1	±2°	0.5°
5	Normal Acceleration (Vertical)	–(Vertical)[1]	0.125	±0.09 g excluding a datum error of ±0.045 g	0.004 g
6	Pitch Attitude	±75° or 100% of usable range whichever is greater	0.5	±2°	0.5°
7	Roll Attitude	±180°	0.5	±2°	0.5°
8	Radio Transmitter Keying	On-Off (Discrete)	1		0.25 sec
9	Power in Each Engine: Free Power Turbine Speed *and* Engine Torque	0–130% (Power Turbine Speed) Full range (Torque)	1 speed 1 torque (per engine)	±2%	0.1%[1]
10	Main Rotor Speed	50–130%	0.5	±2%	0.3%[1]

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording Resolution[2]
-	Main Rotor Brake	Discrete			
11	Pilot Input and/or control surface position—Primary Controls (Collective pitch, Longitudinal Cyclic pitch, Lateral Cyclic pitch, tail rotor Pedal)[3]	Full range	0.5 (0.25 recommended)	±2% unless higher accuracy uniquely required	0.5% of operating range
12	Hydraulics, each system (low pressure selection)	Discrete, each circuit	1		
13	Outside Air Temperature	Sensor range	2	±2°C	0.3°C
14	Autopilot/Autothrottle/ AFCS Mode and Engagement Status	Discrete (5 bits necessary)	1		
15	SAS Engage	Discrete	1		
16	Main gearbox oil pressure	As installed	1	As installed	6.895 kN/m^2 (1 psi)
17[4]	Main gearbox oil temperature	As installed	2	As installed	1°C
17[4]	Main gearbox temperature Low	As installed	4	As installed	0.5%[1]
17[4]	Main gearbox temperature High	As installed	2	As installed	0.5%[1]
20	Longitudinal Acceleration	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g; or	0.004 g

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording Resolution[2]
21	Lateral Acceleration	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g; or	0.004 g
26	Master Warning	Discrete	1		
27	Navigation (NAV) 1 and NAV 2 Frequency Selection	Full range	4	As installed	
34	Altitude Rate	±6 000 ft/min (±1 830 m/min)	1	As installed	0.2%[1]
The following parameters are not ICAO requirements:					
No ICAO Equivalent	Flight Control Hydraulic Pressure Selector Switch Position, 1st and 2nd stage	Discrete	1		
No ICAO Equivalent	SAS Fault Status	Discrete	0.25		
No ICAO Equivalent	Controllable Stabilator Position	Full Range	0.5	±3%	0.4%[1]

1 Percent of full range.

2 This column applies to aircraft manufactured after 11 October 1991.

3 For all aircraft manufactured on or after 6 December 2010, the sampling interval per second is 4.

4 Operators have a choice to record gearbox temperature or both the high and low temperature discretes.

(iii) *Type R3*. (Equivalent to ICAO Type IVA)

Table C–3.

Serial Number	Parameters	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 GPS time sync)	24 hours	4	±0.125% per hour	1 s
2	Pressure altitude	–1 000 ft (–300 m) to maximum certificated altitude of aircraft +5 000 ft (+1 500 m)	1	±100 ft to ±700 ft (±30 m to ±200 m)	5 ft (1.5 m)
3	Indicated airspeed	As the installed pilot display measuring system	1	±3%	1 kt
4	Heading	360°	1	±2°	0.5°
5	Normal acceleration	–3 g to +6 g	0.125	±0.09 g excluding a datum error of ±0.045 g	0.004 g
6	Pitch attitude	±75° or 100% of useable range whichever is greater	0.5	±2°	0.5°
7	Roll attitude	±180°	0.5	±2°	0.5°
8	Radio transmission keying	On-off (one discrete)	1	—	—
9	Power on each engine	Full range	1 (per engine)	±2%	0.1% of full range
10	Main rotor:				
	Main rotor speed	50–130%	0.51	±2%	0.3% of full range
					—

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording Resolution
	Rotor brake	Discrete		—	
11	Pilot input and/or control surface position — primary controls (collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal)	Full range	0.5 (0.25 recommended)	±2% unless higher accuracy uniquely required	0.5% of operating range
12	Hydraulics, each system (low pressure and selection)	Discrete	1	—	—
13	Outside air temperature	Sensor range	2	±2°C	0.3°C
14*	Autopilot/ autothrottle/AFCS mode and engagement status	A suitable combination of discretes	1	—	—
15*	SAS engagement	Discrete	1	—	—
16*	Main gearbox oil pressure	As installed	1	As installed	6.895 kN/m^2 (1 psi)
17*	Main gearbox oil temperature	As installed	2	As installed	1°C
18	Yaw rate	±400°/second	0.25	±1.5% maximum range excluding datum error of ±5%	±2°/s
19*	Sling load force	0 to 200% of certified load	0.5	±3% of maximum range	0.5% for maximum certified load

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording Resolution
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	–20 ft to 2 500 ft (–6 m to 750 m)	1	±2 ft (±0.6 m) or ±3% whichever is greater below 500 ft (150 m) and ±5% above 500 ft (150 m)	1 ft (0.3 m) below 500 ft (150 m), 1 ft (0.3 m) + 0.5% of full range above 500 ft (150 m)
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	0–200 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	—	—

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording Resolution
31*	Engine exhaust gas temperature (EGT)(T4)	As installed	1	As installed	
32*	Turbine inlet temperature	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 copilot)	As installed	64 (4 recommended)	As installed	0.1 hPa
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

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording Resolution
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 DH	As installed	4	As installed	Sufficient to determine crew selection
46*	Electronic Flight Instrument System (EFIS) display format (pilot and copilot)	Discrete(s)	4	—	—
47*	Multi-function/ engine/alerts display format	Discrete(s)	4	—	—
48*	Event marker	Discrete	1	—	—

The parameters designated by an asterisk (*) must 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.

(iv) *Type A2*. (Equivalent to ICAO Type II)

Table C–4.

Serial Number	Parameters	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 GPS time sync)	24 hours	4	±0.125% per hour	1 second
2	Pressure altitude	-1 000 ft (-300 m) to maximum certificated altitude of aircraft +5 000 ft (+1 500 m)	1	±100 ft to ±700 ft (±30 m to ±200 m)	5 ft (1.5 m)
3	Indicated airspeed or calibrated airspeed	50 kt (95 km/h) to max V_{So} V_{So} to 1.2 Vd	1	±5% ±3%	1 kt (0.5 kt recommended)
4	Heading (primary flight crew reference)	360°	1	±2°	0.5°
5	Normal acceleration	−3 g to +6 g	0.125	±1% of maximum range excluding datum error of ±5%	0.004 g
6	Pitch attitude	±75° or usable range whichever is greater	0.25	±2°	0.5°
7	Roll attitude	±180°	0.25	±2°	0.5°
8	Radio transmission keying	On-off (one discrete)	1		
9	Power on each engine[1]	Full range	1 (per engine)	±2%	0.2% of full range or the resolution required to operate the aircraft

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording resolution
10*	Trailing edge flap and flightdeck control selection	Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
11*	Leading edge flap and flightdeck control selection	Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
12*	Thrust reverser position	Stowed, in transit, and reverse	1 (per engine)		
13*	Ground spoiler/speed brake selection (selection and position)	Full range or each discrete position	1	±2% unless higher accuracy uniquely required	0.2% of full range
14	Outside air temperature	Sensor range	2	±2°C	0.3°C
15*	Autopilot/autothrottle/AFCS mode and engagement status	A suitable combination of discretes	1		
16	Longitudinal acceleration	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g

1. Record sufficient inputs to determine power.

The parameters designated by an asterisk (*) must be recorded if an information data source for the parameter is used by airplane systems or the flightcrew to operate the airplane. However, other parameters may be substituted with due regard to the airplane type and the characteristics of the recording equipment.

(v) *Type A3*. [Note the ARINC 717 DFDAU special provisions apply to these aircraft] (Equivalent to ICAO Type I)

Table C–5.

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording resolution[4]
1	Time (UTC when available, otherwise relative time count or GPS time sync) [5,6]	24 hours	4	±0.125% per hour	1 sec.
2	Pressure altitude[5,6]	–1 000 ft (–300 m) to maximum certificated altitude of aircraft +5 000 ft (+1 500 m)	1	±100 ft to ±700 ft (±30 m to ±200 m) (See Table 1, FAA TSO–C51a)	5 ft (1.5 m)
3	Indicated airspeed[5,6]	50 kt (95 km/h) to max V_{So} V_{So} to 1.2 VD	1	±5% ±3%	1 kt (0.5 kt recommended)
4	Heading (primary flight crew reference) [5,6]	360°	1	±2°	0.5°
5	Normal Acceleration (Vertical) [5,6]	–3 g to +6 g	0.125	±1% of max range excluding datum error of ±5%	0.004 g
6	Pitch Attitude[5,6]	±75° or usable range whichever is greater	0.25	±2°	0.5°
7	Roll Attitude[5,6]	±180°	0.25	±2°	0.5°
8	Radio Transmitter Keying[5,6]	On-Off (One Discrete)	1		
9	Power on each engine Thrust/Power on Each Engine[5,6]	Full range	1 (per engine)	±2%	0.2% of full range or the resolution required to operate the aircraft

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording resolution[4]
10*	Trailing Edge Flap or Flightdeck Control Selection[6]	Full range or each discrete position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
11*	Leading Edge Flap on or Flightdeck Control Selection[6]	Full range or each discrete position	0.5	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
12*	Thrust Reverser Position[6]	Stowed, in transit, and reverse (discretion)	1 (per engine)		
13*	Ground Spoiler Position/Speed Brake Selection (selection and position)	Full range or each discrete position	1	±2% unless higher accuracy uniquely required	0.2%[2]
14	Outside Air Temperature or Total Air Temperature	Sensor Range	2	±2°C	0.3°C
15*	Autopilot/autothrottle/ AFCS mode and engagement status	A suitable combination of discretes	1		
15*	Autopilot/autothrottle/ AFCS mode and engagement status	A suitable combination of discretes	1		

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording resolution[4]
16	Longitudinal Acceleration[5,6]	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
17	Lateral Acceleration (Refer to Annex 6.3.1.2.11 to the Convention on International Civil Aviation for increased recording requirements)	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g ±1.5% max range excluding datum error of ±5%	0.004 g
18	Pilot Input And/or Surface Position-Primary Controls (Pitch, Roll, Yaw)[3,5,6]	Full range	0.25	±2° unless higher accuracy uniquely required	0.2% of full range or as installed
19	Pitch Trim Position[6]	Full range	1	±3% unless higher accuracy uniquely required	0.3% of full range or as installed
20*	Radio Altitude	–20 ft to 2 500 ft (–6 m to 750 m)	1	±2 ft (±0.6 m) or ±3% whichever is greater below 500 ft (150 m) and ±5% above 500 ft (150 m)	1 ft (0.3 m) below 500 ft (150 m) 1 ft (0.3 m) + 0.5% of full range above 500 ft (150 m)
23	Marker Beacon Passage	Discrete	1		
24	Master Warning	Discrete	1		
29*	Angle of Attack (if recorded directly)	Full Range	0.5	As installed	0.3%[2]
30*	Hydraulics, Each System Low Pressure	Discrete	2		0.5%[2]

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording resolution[4]
33*	Groundspeed	As installed	1	Data should be obtained from the most accurate system	1 kt
If additional recording capacity is available, recording of the following parameters is recommended. The parameters are listed in order of significance:					
25	Each NAV receiver frequency selection	Full range	4	As installed	
26*	DME 1 and 2 distance (includes Distance to runway threshold (Global Navigation Satellite System (GNSS) Landing System (GLS)) and Distance to missed approach point (integrated area navigation/ Integrated Approach Navigation (IRNAV/IAN))	0 – 200 NM	4	As installed	1 852 m (1 NM)
28*	Ground Proximity Warning System (GPWS)/TAWS/ Ground Collision Avoidance System (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		

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording resolution[4]
31*	Navigation data (latitude/longitude, ground speed and drift angle)	When available. As installed		As installed	
31	Wind Speed and Direction	When available. As installed	4	As installed	
31	Latitude and Longitude	When available. As installed	4	As installed	
32*	Landing gear or gear selector position	Discrete	4	As installed	
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 (engine pressure ratio (EPR), N1, indicated vibration level, N2, EGT, fuel flow, fuel cutoff lever position, N3)	As installed	Each engine each second	As installed	2% of full range
35*	EPR	As installed	1 (per engine)	As installed	
35*	N1	As installed	1 (per engine)	As installed	
35*	N2	As installed	1 (per engine)	As installed	
35*	EGT	As installed	1 (per engine)	As installed	
35*	Throttle Lever Position	As installed	1 (per engine)	As installed	

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording resolution[4]
35*	Fuel Flow	As installed	1 (per engine)	As installed	
36*	Traffic Collision and Avoidance System (TCAS)/ACAS	Discretes	1	As installed	
36*	Traffic Alert	As installed	1	As installed	
36	RA	As installed	1	As installed	
36	Sensitivity level (as selected by crew)	As installed	2	As installed	
The following parameters are not ICAO requirements:					
No ICAO Equivalent	Glideslope Deviation	±400 µA	1	±3%	0.3%[2]
No ICAO Equivalent	Localizer Deviation	±400 µA	1	±3%	0.3%[2]
No ICAO Equivalent	Main Gear Squat Switch Status	Discrete	1		

Serial Number	Parameters	Measurement Range	Maximum Sampling and Recording Interval (seconds)	Accuracy Limits (sensor input compared to FDR readout)	Recording resolution[4]

1 [Reserved].

2 Percent of full range.

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

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

5 For aircraft manufactured before 1 October 1969.

6 For aircraft manufactured on or after 1 October 1969 but before 11 October 1991.

The parameters designated by an asterisk (*) must be recorded if an information data source for the parameter is used by airplane systems or the flight crew to operate the airplane. However, other parameters may be substituted with due regard to the airplane type and the characteristics of the recording equipment.

(vi) Type A4. (Equivalent to ICAO Type IA)

Table C–6.

Serial Number	Parameters	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 GPS time sync)[1]	24 hours	4	±0.125% per hour	1 sec
2	Pressure Altitude	−1 000 ft (−300 m) to maximum certificated altitude of aircraft +5 000 ft (+1 500 m)	1	±100 ft to ±700 ft (±30 m to ±200 m) (see table, FAA TSO–C124a or TSO–C51a)	5 ft (1.5 m)
3	Indicated airspeed or Calibrated airspeed	50 kt (95 km/h) to max V_{So} V_{So} to 1.2 VD	1	±5%	1 kt (0.5 kt recommended)
4	Heading (Primary Flight Crew Reference)	360°	1	±2°	0.5°
5	Normal Acceleration (Vertical)[9,20]	−3 g to +6 g	0.125	±1% of max range excluding datum error of ±5%	0.004 g
6	Pitch Attitude	±75° or usable range whichever is greater	1 or 0.25 for airplanes manufactured after 19 August 2002	±2°	0.5°
7	Roll Attitude[2]	±180°	1 or 0.5 for manufactured after 19 August 2002	±2°	0.5°
8	Manual Radio Transmitter Keying	On-Off (Discrete)	1		

Serial Number	Parameters	Measurement Range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording Resolution
9	Power On Each Engine	Full Range	1 (per engine)	±2%	0.2% of full range or the resolution required to operate the aircraft
10*	Trailing Edge Flap or Flightdeck Control Selection.[10]	Full Range or Each Position (Discrete)	2	±5° or as Pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
10*	Trailing Edge Flap and Flightdeck Flap Control Position	Full Range or Each Discrete Position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
11*	Leading Edge Flap or Flightdeck Control Selection.[11]	Full Range or Each Discrete Position	2	±5° or as Pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
11*	Leading Edge Flap and Flightdeck Flap Control Position	Full Range or Each Discrete Position	2	±5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft

Serial Number	Parameters	Measurement Range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording Resolution
12*	Thrust reverser position Each Thrust Reverser Position (or equivalent for propeller airplane)	Stowed, In Transit, and Reverse (Discrete)	1 (per engine)		
13*	Ground Spoiler Position and Speed Brake Selection (selection and position)	Full Range or Each Discrete Position	1	±2% unless higher accuracy uniquely required	0.2% of full range
13*	Ground Spoiler Position or Speed Brake Selection[12]	Full Range or Each Position (Discrete)	1 or 0.5 for airplanes manufactured after 19 August 2002	±2° Unless higher accuracy uniquely required	0.2% of full range
14	Outside Air Temperature or Total Air Temperature[13]	Sensor Range	2	±2°C	0.3°C
15*	Autopilot/Autothrottle/ AFCS Mode and Engagement Status	A Suitable Combination of Discretes	1		
16	Longitudinal Acceleration[20]	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
17	Lateral Acceleration[20]	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
18-P1	Pitch Control(s) Position (non-fly-by-wire systems).[18]	Full Range	0.5 or 0.25 for airplanes manufactured after 19 August 2002[21]	±2° unless higher accuracy uniquely required	0.5% of full range
18-P2	Pitch Control(s) Position (fly-by-wire systems)[3, 18]	Full Range	0.5 or 0.25 for airplanes manufactured after 19 August 2002[21]	±2° unless higher accuracy uniquely required	0.2% of full range

Serial Number	Parameters	Measurement Range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording Resolution
18-L1	Lateral Control Position(s) (non-fly-by-wire)[18]	Full Range	0.5 or 0.25 for airplanes manufactured after 19 August 2002[21]	±2° unless higher accuracy uniquely required	0.2% of full range
18-L2	Lateral Control Position(s) (fly-by-wire)[4, 18]	Full Range	0.5 or 0.25 for airplanes manufactured after 19 August 2002[21]	±2° unless higher accuracy uniquely required	0.2% of full range
18-Y1	Yaw Control Position(s) (non-fly-by-wire)[18]	Full Range	0.5[21]	±2° unless higher accuracy uniquely required	0.3% of full range
18-Y2	Yaw Control Position(s) (fly-by-wire)[5, 18]	Full Range	0.5[21]	±2° unless higher accuracy uniquely required	0.2% of full range
18-P3	Pitch Control Surface(s) Position[6, 18]	Full Range	0.5 or 0.25 for airplanes manufactured after 19 August 2002[21]	±2° unless higher accuracy uniquely required	0.3% of full range
18-L3	Lateral Control Surface(s) Position[7, 18]	Full Range	0.5 or 0.25 for airplanes manufactured after 19 August 2002[21]	±2° unless higher accuracy uniquely required	0.2% of full range
18-Y3	Yaw Control Surface(s) Position[8, 18]	Full Range	0.5[21]	±2° unless higher accuracy uniquely required	0.2% of full range
19	Pitch Trim Surface Position	Full Range	1	±3° Unless higher accuracy uniquely required	0.3% of full range or as installed

Serial Number	Parameters	Measurement Range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording Resolution
20*	Radio Altitude[14]	−20 ft to 2 500 ft (−6 m to 750 m)	1	±2 ft (±0.6 m) or ±3% whichever is greater below 500 ft (150 m) and ±5% above 500 ft (150 m)	1 ft (0.3 m) below 500 ft (150 m) 1 ft (0.3 m) +0.5% of full range above 500 ft (150 m)
21*	Vertical beam deviation (ILS/GPS/GLS glide path, Microwave Landing System (MLS) elevation, IRNAV/IAN vertical deviation)	Signal Range	1	±3%	0.3% of full range
22*	Horizontal beam deviation (ILS/GPS/GLS localizer, MLS azimuth, IRNAV/IAN lateral deviation)	Signal Range	1	±3%	0.3% of full range
23	Marker Beacon Passage	Discrete	1		
24	Master Warning	Discrete	1		
25	Each NAV receiver frequency selection	Full Range	4	As installed	
26*	DME 1 and 2 distance (includes GLS and Distance to Missed Approach Point (IRNAV/IAN))	(0–200 NM)	4	As installed	1 852 m (1 NM)

Serial Number	Parameters	Measurement Range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording Resolution
27	Air/ground Sensor (primary airplane system reference nose or main gear)	Discrete	1 (0.25 recommended).		
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 (If measured directly)	Full Range	2 or 0.5 for airplanes manufactured after 19 August 2002	As Installed	0.3% of full range
30*	Hydraulic Pressure Low, Each System	Discrete	2		0.5% of full range
31*	Navigation data (latitude/longitude, ground speed and drift angle) [15]	As installed	1	As installed	
31*	Wind Speed and Direction	As installed	4	As installed	1 kt, and 1.0°
31*	Latitude and Longitude	As installed	4	As installed	0.002°, or as installed
32*	Landing Gear and Gear Selector Position	Discrete	4	As installed	
33*	Groundspeed	As Installed	1	Most Accurate Systems Installed	1 kt

Serial Number	Parameters	Measurement Range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording Resolution
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
34	Brake Pedal Application (left and right)	Discrete or Analog "applied" or "off"	1	±5% (Analog)	
35*	Additional Engine Parameters (EPR, N1, indicated vibration level, N2, EGT, fuel flow, fuel cutoff lever position, N3)	As Installed	Each engine each second	As installed	2% of full range
36*	TCAS/ACAS	Discretes	1	As installed	
37*	Windshear Warning	Discrete	1	As installed	
38*	Selected Barometric Setting (pilot, copilot)	As Installed	64	As installed	0.1 hPa
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

Serial Number	Parameters	Measurement Range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording Resolution
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 (desired track), path angle, final approach path (IRNAV/IAN))	As installed	1	As installed	Sufficient to determine crew selection
45*	Selected DH	As installed	64	As installed	Sufficient to determine crew selection
46*	EFIS Display Format (pilot, copilot)	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*	Auxiliary Power Unit Bleed Valve Position	Discrete(s)	4	As installed	

Serial Number	Parameters	Measurement Range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording Resolution
52*	Computer Failure critical flight and engine control systems)	Discrete(s)	4	As installed	
53*	Engine Thrust command.[17]	As installed	2	As installed	2% of full range.
54*	Engine Thrust target	As installed	4	As installed	2% of full range.
55*	Computed Center of Gravity	As installed	64	As installed	1% of full range.
56*	Fuel Quantity in center of gravity Trim Tank	As installed	64	As installed	1% of full range.
57*	Head-Up Display (HUD) in Use (when an information source is installed)	As installed	4	As installed	
58*	Para Visual Display On/Off (when an information source is installed)	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, Inertial Navigation System, VOR/DME, MLS, long-range navigation C, localizer glideslope)	As installed	4	As installed	
61*	Ice Detection	As installed	4	As installed	

Serial Number	Parameters	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 Temp	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*	Deicing or anti-icing system selection	Discrete(s)	4		
70	Hydraulic Pressure (each system)	Full Range	2	±5%	100 psi
71*	Loss of Cabin Pressure	Discrete	1		
72*	Flightdeck Trim Control Input Position—Pitch	Full Range	1	±5%	0.2% of full range or as installed
73*	Flightdeck Trim Control Input Position—Roll	Full Range	1	±5%	0.2% of full range or as installed
74*	Flightdeck Trim Control Input Position—Yaw	Full Range	1	±5%	0.2% of full range or as installed

Serial Number	Parameters	Measurement Range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording Resolution
75*	All Flightdeck Flight Control Input Forces (control wheel, control column, rudder pedal)[18, 19]	Full Range (±311 N, ±378 N, ±734 N)	1	±5%	0.2% of full range
The following parameters are not ICAO requirements:					
No ICAO Equivalent	Throttle/power lever position.[16]	Full Range	1 for each lever	±2%	2% of full range
No ICAO Equivalent	Yaw Damper Status	Discrete (on/off)		0.5	
No ICAO Equivalent	Yaw Damper Command	Full Range	0.5	As installed	1% of full range
No ICAO Equivalent	Standby Rudder Valve Status	Discrete		0.5	

1 For A300 B2/B4 airplanes, resolution = 6 seconds.

2 For A330/A340 series airplanes, resolution = 0.703°.

3 For A318/A319/A320/A321 series airplanes, resolution = 0.275% (0.088°>0.064°). For A330/A340 series airplanes, resolution = 2.20% (0.703°>0.064°)

4 For A318/A319/A320/A321 series airplanes, resolution = 0.22% (0.088°>0.080°). For A330/A340 series airplanes, resolution = 1.76% (0.703°>0.080°)

5 For A330/A340 series airplanes, resolution = 1.18% (0.703°>0.120°) and seconds per sampling =1.

6 For A330/A340 series airplanes, resolution = 0.783% (0.352°>0.090°)

7 For A330/A340 series airplanes, aileron resolution = 0.704% (0.352°>0.100°). For A330/A340 series airplanes, spoiler resolution = 1.406% (0.703°>0.100°).

8 For A330/A340 series airplanes, resolution = 0.30% (0.176°>0.12°). For A330/A340 series airplanes, seconds per sampling interval = 1

9 For B–717 series airplanes, resolution = .005 g. For Dassault F900C/F900EX airplanes, resolution = .007 g.

10 For A330/A340 series airplanes, resolution = 1.05% (0.250°>0.120°)

11 For A330/A340 series airplanes, resolution = 1.05% (0.250°>0.120°). For A330 B2/B4

series airplanes, resolution = 0.92% (0.230°>0.125°).

12 For A330/A340 series airplanes, spoiler resolution = 1.406% (0.703°>0.100°).

13 For A330/A340 series airplanes, resolution = 0.5°C.

14 For Dassault F900C/F900EX airplanes, Radio Altitude resolution = 1.25 ft.

15 For A330/A340 series airplanes, resolution = 0.352°.

16 For A318/A319/A320/A321 series airplanes, resolution = 4.32%. For A330/A340 series airplanes, resolution is 3.27% of full range for throttle lever angle; for reverse thrust, reverse throttle lever angle resolution is nonlinear over the active reverse thrust range, which is 51.54° to 96.14°. The resolved element is 2.8° uniformly over the entire active reverse thrust range, or 2.9% of the full range value of 96.14°.

17 For A318/A319/A320/A321 series airplanes, with IAE engines, resolution = 2.58%.

18 For all aircraft manufactured on or after 6 December 2010, the seconds per sampling interval is 0.125. Each input must be recorded at this rate. Alternately sampling inputs (interleaving) to meet this sampling interval is prohibited.

19 For all 737 model airplanes manufactured between 19 August 2000, and 6 April 2010: The seconds per sampling interval is 0.5 per control input; the remarks regarding the sampling rate do not apply; a single control wheel force transducer installed on the left cable control is acceptable provided the left and right control wheel positions also are recorded.

20 All airplanes which are required to record normal acceleration, lateral acceleration and longitudinal acceleration for which a type certificate is first issued on or after 1 January 2016, and which are required to be fitted with an FDR must record those parameters at a maximum sampling and recording interval of 0.0625 seconds.

21 All airplanes which are required to record pilot input and/or control surface position of primary controls (pitch, roll, yaw) for which a type certificate is first issued on or after 1 January 2016, and which are required to be fitted with an FDR must record those parameters at a maximum sampling and recording interval of 0.125 seconds.

The parameters designated by an asterisk (*) must be recorded if an information data source for

the parameter is used by airplane systems or the flight crew to operate the airplane. However, other parameters may be substituted with due regard to the airplane type and the characteristics of the recording equipment

(10) *Permitted Relief in Range and Accuracies*:

(i) For all turbine engine powered transport category airplanes manufactured on or before 11 October 1991, —

(A) For airplanes not equipped as of 16 July 1996, with a FDAU, the parameters (1) through (9), (15) through (18), and (75) must be recorded within the ranges and accuracies specified in Type A3, and—

(I) For airplanes with more than two engines, the parameter (17) is not required unless sufficient capacity is available on the existing recorder to record that parameter.

(II) Parameters (17), (18), and (75) each may be recorded from a single source.

(B) For airplanes that were equipped as of 16 July 1996, with an FDAU, the parameters (1) through (12), (15) through (19), and (75) must be recorded within the ranges, accuracies, and recording intervals specified in Type A4. Parameters (17), (18), and (75) each may be recorded from a single source.

(ii) For all turbine engine powered transport category airplanes manufactured on or before 11 October 1991—

(A) That were equipped as of 16 July 1996, with one or more digital data bus(es) and an ARINC 717 DFDAU or equivalent, the parameters (1) through (12), (15) through (19), and (75) must be recorded within the ranges, accuracies, resolutions, and sampling intervals specified in Type A4. Parameters (18) and (75) each may be recorded from a single source.

(B) Commensurate with the capacity of the recording system (DFDAU or equivalent and the DFDR), all additional parameters for which information sources are installed and which are connected to the recording system must be recorded within the ranges, accuracies, resolutions, and sampling intervals specified in Type A4.

(iii) For all turbine engine powered transport category airplanes that were manufactured after 11 October 1991—

(A) The parameters (1) through (24), (27), (29), (30), (33), and (75) must be recorded within the ranges, accuracies, resolutions, and recording intervals specified in Type A4. Parameters (18) and (75) each may be recorded from a single source.

(B) Commensurate with the capacity of the recording system, all additional parameters for which information sources are installed and which are connected to the recording system, must be recorded within the ranges, accuracies, resolutions, and sampling intervals specified in Type A4.

(iv) For all turbine engine powered transport category airplanes that are manufactured after 18 August 2000—

(A) The parameters (1) through (25), (27) through (33), (35) through (47), (53), (59), and (75) must be recorded within the ranges, accuracies, resolutions, and recording intervals specified in Type A4.

(B) Commensurate with the capacity of the recording system, all additional parameters for which information sources are installed and which are connected to the recording system, must be recorded within the ranges, accuracies, resolutions, and sampling intervals specified in Type A4.

(C) In addition to the requirements of paragraphs (d)(1) and (2) of this section, all Boeing 737 model airplanes must also comply with the requirements of paragraph (f) of this section, as applicable.

(v) For all Boeing 737 model aircraft the parameters (1) through (75) of this section must be recorded within the ranges, accuracies, resolutions, and recording intervals specified in Type A4 specified for all airplanes manufactured after 19 August 2002.

(vi) In addition to all other applicable requirements of this section, all Boeing 737 model airplanes manufactured after 18 August 2000, must record the parameter (75) and the additional parameters listed that are not required by ICAO within the ranges, accuracies, resolutions, and recording intervals specified in Type A4.

(b) ***CVR***.

(1) *Equipment performance standards for all CVR.* Unless otherwise indicated, each CVR must—

(i) Meet, at a minimum, the requirements in FAA TSO–C123 and/or EUROCAE ED–56A or ED–112;

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

(iii) For commuter and transport category aircraft, have an approved underwater locating device on or adjacent to the container which is secured in such a manner that it is not likely to be separated during crash impact, unless the CVR and the flight recorder are installed adjacent to each other in such a manner that they are not likely to be separated during crash impact.

(2) *Installation standards—airplanes* The CVR installation must meet the following standards:

(i) Is installed in compliance with GACAR §§ 23.1457(a)(1) and (2); (b); (c); (d)(1)(i), (2), and (3), (e); (f); and (g); or GACAR §§ 25.1457(a)(1) and (2); (b); (c); (d)(1)(i), (2), and (3); (e); (f); and (g), as applicable;

(ii) For all airplanes with a maximum takeoff mass of greater than 5 700 kg manufactured after 1 October 1991, or on which a CVR has been installed after 11 October 1991, the CVR must be equipped to record the uninterrupted audio signal received by a boom or mask microphone in accordance with GACAR § 25.1457(c)(5).

(iii) By 7 April 2012, all airplanes manufactured before 7 April 2010, required to have a CVR must have a CVR installed that also—

(A) Meets the requirements of GACAR § 23.1457(d)(6) or 25.1457(d)(6), as applicable and

(B) If transport category, meets the requirements of GACAR §§ 25.1457(a)(3), (4), and (5).

(iv) All transport category airplanes in commercial service manufactured on or after 7 April 2010; and all other airplanes required to have a CVR, must have a CVR installed that also:

(A) Meets the requirements of GACAR § 23.1457 (except for paragraphs (a)(6) and (d)(5)) or GACAR § 25.1457 (except for paragraphs (a)(6) and (d)(5)), as applicable, and

(B) Except for airplanes 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 2022; the CVR must retains at least the last 2 hours of recorded information using a recorder that meets the standards of FAA TSO–C123a, or later revision.

(C) All airplanes 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 31 December 2021 must be equipped with a CVR which must retain the information recorded during at least the last 25 hours of its operation and meet the standards of FAA TSO–C123c, or later revision.

(v) Airplanes manufactured on or after 6 April 2012, required to have a CVR, must have a CVR installed that also meets the data link recording requirements and independent power supply requirements of GACAR §§ 23.1457(a)(6) and (d)(5) or GACAR §§ 25.1457(a)(6) and (d)(5), as applicable.

(vi) All airplanes required to have a CVR that install data link communication equipment on or after 6 December 2010 must record all data link messages as required by the certification rule applicable to the airplane.

(vii) All airplanes in commercial operation with a maximum certificated takeoff mass of greater than 15 000 kg for which the type certificate is first issued on or after 1 January 2016, and which are required to be equipped with both a CVR and an FDR, must be equipped with two combination recorders (FDR/CVR). One recorder must be located as close to the flightdeck as practicable and the other recorder located as far aft as practicable.

(3) *Installation standards—rotorcraft.* The CVR installation must meet the following standards:

(i) Is installed in compliance with GACAR §§ 27.1457(a)(1) and (2); (b); (c); (d)(1)(i), (2), and (3); (e); (f); and (g); or GACAR §§ 29.1457(a)(1) and (2); (b); (c); (d)(1)(i), (2), and (3); (e); (f); and (g), as applicable;

(ii) All rotorcraft required to have a CVR that are manufactured on or after 7 April 2010, must have a CVR installed that also:

(A) Meets the requirements of GACAR § 27.1457 (except for paragraphs (a)(6) and (d)(5)) or GACAR § 29.1457 (except for paragraphs (a)(6) and (d)(5)), as applicable and

(B) Retains at least the last 2 hours of recorded information using a recorder that meets the standards of FAA TSO–C123a, or later revision.

(iii) For rotorcraft required to have a CVR that are manufactured on or after 6 April 2012, must have a CVR installed that also meets the data link recording requirements and independent power supply requirements of GACAR §§ 27.1457(a)(6) and (d)(5) or GACAR §§ 29.1457(a)(6) and (d)(5), as applicable.

(iv) All rotorcraft required to have a CVR that install data link communication equipment on or after 6 December 2010 must record all data link messages as required by the certification rule applicable to the rotorcraft.

(4) *Incorporation by reference.* The standards required in this section are incorporated by reference with the approval of the President.

(c) ***AIR***. [Reserved].

(d) ***Data Link Recorder (DLR)***.

(1) DLR performance requirements are as contained in the EUROCAE ED–112, Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.

(2) The minimum recording duration must be equal to the duration of the CVR.

(3) Data link recording must be able to be correlated to the recorded flightdeck audio.

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

II. Lightweight Flight Recorder.

(a) ***Aircraft Data Recording System.***

Table C–7.

No.	Parameter name	Parameter category: Essential / Recommended	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
1	Heading (Magnetic or True)	R*	±180°	1	±2°	0.5°	* If not available, record rates
2	Pitch attitude	E*	±90°	0.25	±2°	0.5°	* If not available, record rates
3	Roll attitude	E*	±180°	0.25	±2°	0.5°	* If not available, record rates
4	Yaw rate	E*	±300°/s	0.25	±1% + drift of 360°/hr	2°/s	* Essential if no heading available
5	Pitch rate	E*	±300°/s	0.25	±1% + drift of 360°/hr	2°/s	* Essential if no pitch attitude available
6	Roll rate	E*	±300°/s	0.25	±1% + drift of 360°/hr	2°/s	* Essential if no roll attitude available
7	Positioning system: latitude/ longitude	E	Latitude: ±90° Longitude: ±180°	2 (1 if available)	As installed (0.00015° recommended)	0.00005°	

No.	Parameter name	Parameter category: Essential / Recommended	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
8	Positioning system estimated error	E*	Available Range	2 (1 if available)	As installed	As installed	* If available
9	Positioning system: altitude	E	–1 000 ft (–300 m) to maximum certificated altitude of airplane +5 000 ft (+1 500 m)	2 (1 if available)	As installed (±50 ft (±15 m) recommended)	5 ft (1.5 m)	
10	Positioning system: time*	E	24 hours	1	±0.5 second	0.1 second	* UTC time preferred where available.
11	Positioning system: ground speed	E	0–1 000 kt (1 852 km/h)	2 (1 if available)	As installed (±5 kt (9.26 km/h) recommended)	1 kt (1.85 km/h)	
12	Positioning system: channel	E	0–360°	2 (1 if available)	As installed (± 2° recommended)	0.5°	
13	Normal acceleration	E	–3 g to + 6 g	0.25 (0.125 if available)	As installed (±0.09 g excluding a datum error of ±0.45 g recommended)	0.004 g	

No.	Parameter name	Parameter category: Essential / Recommended	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
14	Longitudinal acceleration	E	±1 g	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
15	Lateral acceleration	E	±1 g	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
16	External static pressure (or pressure altitude)	R	34.4 hPa to 310.2 hPa or available sensor range	1	As installed (±1 hPa) ±100 ft (±30 m) to ±700 ft (±210 m) recommended)	0.1 hPa or 5 ft (1.5 m)	
17	Outside air temperature (or total air temperature)	R	–50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
18	Indicated air speed	R	As the installed pilot display measuring system or available sensor range	1	As installed (±3 % recommended)	1 kt (1.85 km/h)(0.5 kt (0.926 km/h) recommended)	
19	Engine RPM	R	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	

No.	Parameter name	Parameter category: Essential / Recommended	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
20	Engine oil pressure	R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
21	Engine oil temperature	R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
22	Fuel flow or pressure	R	Full range	Each engine each second	As installed	2% of full range	
23	Manifold pressure	R	Full range	Each engine each second	As installed	0.2% of full range	
24	Engine thrust/power/ torque parameters required to determine propulsive thrust/power*	R	Full range	Each engine each second	As installed	0.1% of full range	*Sufficient parameters, for example. EPR/N1 or torque/Np as appropriate to the particular engine must be recorded to determine power in both normal and reverse thrust. A margin for possible overspeed should be provided.

No.	Parameter name	Parameter category: Essential / Recommended	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
25	Engine gas generator speed (Ng)	R	0–150%	Each engine each second	As installed	0.2% of full range	
26	Free power turbine speed (Nf)	R	0–150%	Each engine each second	As installed	0.2% of full range	
27	Coolant temperature	R	Full range	1	As installed (±5°C recommended)	1°C	
28	Main voltage	R	Full range	Each engine each second	As installed	1 Volt	
29	Cylinder head temperature	R	Full range	Each cylinder each second	As installed	2% of full range	
30	Flaps position	R	Full range or each discrete position	2	As installed	0.5°	
31	Primary flight control surface position	R	Full range	0.25	As installed	0.2 % of full range	
32	Fuel quantity	R	Full range	4	As installed	1% of full range	
33	EGT	R	Full range	Each engine each second	As installed	2% of full range	
34	Emergency voltage	R	Full range	Each engine each second	As installed	1 Volt	
35	Trim surface position	R	Full range or each discrete position	1	As installed	0.3% of full range	

No.	Parameter name	Parameter category: Essential / Recommended	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
36	Landing gear position	R	Each discrete position*	Each gear every two seconds	As installed		*Where available, record up-and-locked and down-and-locked position
37	Novel/unique aircraft features	R	As required	As required	As required	As required	

(b) ***Cockpit Audio Recording System (CARS)***. Unless otherwise indicated, each CARS must meet, at a minimum, the requirements as contained in the EUROCAE ED–155, MOPS for Lightweight Flight Recording Systems, or equivalent documents.

(c) ***Airborne Image Recording System.*** [Reserved]

(d) ***Data Link Recording System.*** [Reserved]

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

III. Shoulder Harnesses.

All shoulder harnesses (torso restraint systems) must meet the requirements in FAA TSO–C114.

(a) For normal, utility and acrobatic category airplanes manufactured after 18 July 1978, an approved shoulder harness for each front seat. The shoulder harness must be designed to protect the occupant from serious head injury when the occupant experiences the ultimate inertia forces specified in GACAR § 23.561(b)(2). Each shoulder harness installed at a flight crew member station must permit the crew member, when seated and with the safety belt and shoulder harness fastened, to perform all functions necessary for flight operations. For purposes of this paragraph—

(1) The date of manufacture of an airplane is the date the inspection acceptance records reflect that the airplane is complete and meets the approved type design data and

(2) A front seat is a seat located at a flight crew member station or any seat located alongside such a seat.

(b) For normal, utility, and acrobatic category airplanes manufactured after 12 December 1986, a shoulder harness for each seat. The shoulder harness must be designed to protect each occupant from

serious head injury when subjected to the inertia forces prescribed in GACAR § 23.561(b)(2). Each shoulder harness installed at a flight crew member station must allow the crew member, when seated and with his safety belt and shoulder harness fastened, to perform all functions necessary for flight operations.

(c) For commuter and transport category airplanes, a combined safety belt and shoulder harness with a single point release—

(1) At each seat at a flightdeck station that meets the applicable requirements specified in GACAR § 25.785, except that—

(i) Shoulder harnesses and combined safety belt and shoulder harnesses approved and installed before 6 March 1980, may continue to be used and

(ii) Safety belt and shoulder harness restraint systems may be designed to the inertia load factors established under the certification basis of the airplane.

(2) At each required cabin crew member seat in the passenger compartment that meets the applicable requirements specified in GACAR § 25.785, except that—

(i) Shoulder harnesses and combined safety belt and shoulder harnesses that were approved and installed before 6 March 1980, may continue to be used and

(ii) Safety belt and shoulder harness restraint systems may be designed to the inertia load factors established under the certification basis of the airplane.

(d) For rotorcraft manufactured after 16 September 1992, a combined safety belt and shoulder harness with a single point release for—

(1) *The pilots' seats* : The shoulder harness must allow each pilot, when seated with safety belt and shoulder harness fastened, to perform all functions necessary for flight operations. There must be a means to secure belts and harnesses, when not in use, to prevent interference with the operation of the rotorcraft and with rapid egress.

(2) *All seats*: The safety belt and shoulder harness must meet the static and dynamic strength requirements, if applicable, specified by the rotorcraft type certification basis.

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION

STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

IV. Child Restraint Systems.

(a) ***Restraint Systems Requirements*** —

(1) Except as noted in paragraph (b)(3) of this section, each CRS must bear one or more labels as follows:

(i) Seats manufactured to U.S. Federal regulations between 1 January 1981 and 25 February 1985, must bear the label: “This child restraint system conforms to all applicable Federal motor vehicle safety standards.” or

(ii) Seats manufactured to U.S. Federal regulations on or after 26 February 1985, must bear two labels:

(A) “This child restraint system conforms to all applicable Federal motor vehicle safety standards.” and

(B) “THIS RESTRAINT IS CERTIFIED FOR USE IN MOTOR VEHICLES AND AIRCRAFT” in red lettering.

(iii) Seats that do not qualify under paragraph (1) or (2) of this section must bear a label or markings showing—

(A) That the seat was manufactured under the standards of the United Nations;

(B) That the seat or child restraint device furnished by the operator was approved by the FAA or the GACA through type certificate or STC; or

(C) That the seat or child restraint device was approved in accordance with GACAR Part 21 and meeting the standards of FAA TSO–C100b (or a later version) or equivalent standards acceptable to the President.

(2) Except for restraints certificated under this section, booster type CRS (as defined in U.S. Federal Motor Vehicle Safety Standard No. 213), vest and harness type CRS, and lap held child restraints are not approved for use in aircraft.

(b) ***Installation Requirements*** —

(1) The restraint system must be properly secured to an approved forward facing seat or berth,

(2) The child must be properly secured in the restraint system and must not exceed the specified mass limit for the restraint system, and

(3) The restraint system must bear the appropriate label(s).

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

V. Emergency Locator Transmitter.

(a) Each ELT must operate on 406 MHz and 121.500 MHz simultaneously and must meet FAA TSO–C126 (406 MHz) and FAA TSO–C91a (121.500 MHz).

(b) Each aircraft owner must register his ELT with the GACA before installing it on the aircraft. Registration information required includes data on the ELT, aircraft owner, aircraft registration, and emergency contacts.

(c) Each ELT must be attached to the airplane in such a manner that the probability of damage to the transmitter in the event of crash impact is minimized. Fixed and deployable automatic type transmitters must be attached to the airplane as far aft as practicable.

(d) Batteries used in the ELTs must be replaced (or recharged, if the batteries are rechargeable):

(1) When the transmitter has been in use for more than 1 cumulative hour.

(2) When 50 percent of their useful life (or, for rechargeable batteries, 50 percent of their useful life of charge) has expired, as established by the transmitter manufacturer under its approval.

(3) The new expiration date for replacing (or recharging) the battery must be legibly marked on the outside of the transmitter and entered in the aircraft maintenance record. Paragraph (d)(2) of this section does not apply to batteries (such as water activated batteries) that are essentially unaffected during probable storage intervals.

(e) In the absence of instructions for continued airworthiness by the aircraft manufacturer or ELT manufacturer, each ELT must be inspected within 12 months after the last inspection for —

(1) Proper installation,

(2) Battery corrosion,

(3) Operation of the controls and crash sensor, and

(4) The presence of a sufficient signal radiated from its antenna.

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

VI. Third Gyroscopic Pitch and Bank Indicator.

When a third gyroscopic pitch and bank indicator is required, it must—

(a) Be powered from a source independent of the electrical generating system,

(b) Continue reliable operation for a minimum of 30 minutes after total failure of the electrical generating system,

(c) Operate independently of any other attitude indicating system(s),

(d) Be operative without selection after total failure of the electrical generating system,

(e) Be located on the instrument panel in a position acceptable to the President that will make it plainly visible to and usable by each pilot at his station,

(f) Be appropriately lighted during all phases of operation, and

(g) Give clear indication on the instrument panel that the attitude indicator(s) is (are) being operated by emergency power.

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

VII. ADS–B Out.

(a) Definitions. For the purposes of this appendix:

Table C–8.

ADS–B Out	A function of an aircraft's onboard avionics that periodically broadcasts the aircraft's state vector (three-dimensional position and three-dimensional velocity) and other required information as described in this section.
Navigation Accuracy Category for Position (NAC_P)	Specifies the accuracy of a reported aircraft's position, as defined in FAA TSO–C166b and FAA TSO–C154c.
NAC for Velocity (NAC_V)	Specifies the accuracy of a reported aircraft's velocity, as defined in FAA TSO–C166b and FAA TSO–C154c.
Navigation Integrity Category (NIC)	Specifies an integrity containment radius around an aircraft's reported position, as defined in FAA TSO–C166b and FAA TSO–C154c.
Position Source	Refers to the equipment installed on board an aircraft used to process and provide aircraft position (for example, latitude, longitude, and velocity) information.
Source Integrity Level (SIL)	Indicates the probability of the reported horizontal position exceeding the containment radius defined by the NIC on a per sample or per hour basis, as defined in FAA TSO–C166b and FAA TSO–C154c.
System Design Assurance (SDA)	Indicates the probability of an aircraft malfunction causing false or misleading information to be transmitted, as defined in FAA TSO–C166b and FAA TSO–C154c
Total latency	The total time between when the position is measured and when the position is transmitted by the aircraft.
Uncompensated latency	The time for which the aircraft does not compensate for latency.

(b) All Extended Squitter (ES) ADS–B and Traffic Information Service–Broadcast (TIS–B) equipment operating on the radio frequency of 1090 MHz must meet the requirements in FAA TSO–C166b andthe requirements in paragraphs (c) through (f) of this appendix. After 1 January 2021, the equipmentmust also meet FAA TSO–C166b and requirements of paragraphs (c) through (f) of this appendix,

(c) 1 090 MHz ES broadcast links and power requirements:

(1) Aircraft operating in Classes A , B, C, D, or E airspace must have equipment installed that meets the antenna and power output requirements of Class A1, A1S, A2, A3, B1S, or B1 equipment as defined in FAA TSO–C166b, ES ADS–B and TIS–B Equipment Operating on the Radio Frequency of 1 090 MHz

(d) ADS–B Out Performance Requirements for NAC_P, NAC_V, NIC, SDA, and SIL —

(1) For aircraft broadcasting ADS–B Out as required under GACAR §§ 91.239(a) and (b)—

(i) The aircraft's NAC_P must be less than 92.6 m (0.05 NM),

(ii) The aircraft's NAC_V must be less than 10 m/s,

(iii) The aircraft's NIC must be less than 370.4 m (0.2 NM),

(iv) The aircraft's SDA must be 2, and

(v) The aircraft's SIL must be 3.

(2) Changes in NAC_P, NAC_V, SDA, and SIL must be broadcast within 10 seconds.

(3) Changes in NIC must be broadcast within 12 seconds.

(e) **Minimum broadcast message element set for ADS–B Out**. Each aircraft must broadcast the following information, as defined in FAA TSO–C166b. The pilot must enter information for message elements listed in paragraphs (e)(7) through (e)(9) of this section during the appropriate phase of flight.

(1) The length and width of the aircraft;

(2) An indication of the aircraft's latitude and longitude;

(3) An indication of the aircraft's barometric pressure altitude;

(4) An indication of the aircraft's velocity;

(5) An indication of whether TCAS II or ACAS is installed and operating in a mode that can generate resolution advisory (RA) alerts;

(6) If an operable TCAS II or ACAS is installed, an indication if a resolution advisory (RA) is in effect;

(7) An indication of the Mode 3/A transponder code specified by ATC;

(8) An indication if the flight crew has identified an emergency, radio communication failure, or unlawful interference;

(9) An indication of the aircraft's "IDENT" to ATC;

(10) An indication of the aircraft's emitter category;

(11) An indication of whether an ADS–B In capability is installed;

(12) An indication of the aircraft's geometric altitude;

(13) An indication of the Navigation Accuracy Category for Position (NAC_P);

(14) An indication of the Navigation Accuracy Category for Velocity (NAC_V);

(15) An indication of the Navigation Integrity Category (NIC);

(16) An indication of the System Design Assurance (SDA); and

(17) An indication of the Source Integrity Level (SIL).

(f) ADS–B latency requirements.

(1) The aircraft must transmit its geometric position no later than 2.0 seconds from the time of measurement of the position to the time of transmission.

(2) Within the 2.0 second total latency allocation, a maximum of 0.6 seconds can be uncompensated latency. The aircraft must compensate for any latency above 0.6 seconds up to the maximum 2.0 seconds total by extrapolating the geometric position to the time of message transmission.

(3) The aircraft must transmit its position and velocity at least once per second while airborne or while moving on the aerodrome surface.

(4) The aircraft must transmit its position at least once every 5 seconds while stationary on the aerodrome surface.

(g) Equipment with an approved deviation. Operators with equipment installed with an approved deviation under GACAR § 21.293 also are in compliance with this section.

(h) Incorporation by reference. The standards required in this section are incorporated by reference with the approval of the President. All approved materials are available for inspection at the following address:

GACA Headquarters, Jeddah, Kingdom of Saudi Arabia. For more information on the availability of this material at the GACA, call +966 (02) 640 5000 or go to the GACA Web site .

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

VIII. Electronic Navigation Database.

The standards for Electronic Navigation Database Management are:

(a) RTCA DO–200A Preparation, Verification and Distribution of User Selectable Navigation Data Bases; and

(b) EUROCAE ED–76 Standards for Processing Aeronautical Data.

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

IX. Communication Equipment.

(a) ***All aircraft*** —

(1) An aircraft must be provided with radio communication equipment capable of—

(i) Conducting two way communication for aerodrome control purposes;

(ii) Receiving meteorological information at any time during flight except in remote locations and areas of mountainous terrain where geographical constraints make such communication impossible, and

(iii) Conducting two way communication at any time during flight with at least one Air Traffic Service facility and with such other Air Traffic Service facilities and on such frequencies as may be prescribed by the appropriate authority except in remote locations and areas of mountainous terrain where geographical constraints make such communication impossible.

(2) The radio communication equipment must provide for communications on the aeronautical emergency frequency 121.5 MHz.

(3) The communication equipment must be installed so that the failure of any single unit required for communication purposes will not result in the failure of another unit required for communications or navigation purposes.

(b) ***For all transport and commuter category aircraft*** —

(1) In addition to the communication equipment required for all aircraft—

(i) One additional radio communication unit capable of receiving meteorological information at any time during flight.

(ii) Two microphones and two headsets, or one headset and one speaker. A boom or throat microphone must be provided for each flight crew member.

(2) In addition, the failure of any single communication equipment unit must not result in the failure of another unit required for communications purposes.

(c) ***For all rotorcraft in commercial service: In addition to the communication equipment required for all aircraft: A boom or throat microphone must be provided for each flight crew member***.

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

X. Navigation Equipment.

(a) ***All flights*** —

(1) Navigation equipment that will enable the aircraft to proceed in accordance with the flight plan and with the requirements of Air Traffic Service except when navigation for flights under the VFR, if not so precluded by the appropriate authority, is accomplished by visual reference to landmarks.

(2) An operator must not employ electronic navigation data products that have been processed for application in the air and on the ground unless the operator has procedures for ensuring the process applied and the products delivered have met acceptable standards of integrity and the products are compatible with the intended function of the equipment that will use them. An operator must implement procedures to ensure the timely distribution and insertion of current and unaltered electronic navigation data to all aircraft requiring it.

(3) The navigation equipment must be installed so that the failure of any single unit required for navigation purposes will not result in the failure of another unit required for communications or navigation purposes.

(b) ***All IFR flights and all flights of transport and commuter category aircraft***. Sufficient radio navigation equipment to permit the pilot, in the event of the failure at any stage of the flight of any item of that equipment, including any associated flight instrument display—

(1) To proceed to the destination aerodrome or proceed to another aerodrome suitable for landing; and

(2) Where the aircraft is operated in IMC, to complete an instrument approach and, if necessary, conduct a missed approach procedure.

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

XI. ACAS.

(a) *Aircraft with ACAS I.*

(1) TCAS I that meets FAA TSO–C118, as amended; or a later version, or

(2) A collision avoidance system equivalent to FAA TSO–C118, as amended, or a later version.

(b) *Aircraft required to have ACAS II.* Aircraft required to have ACAS II, must have an appropriate class of Mode S transponder that meets FAA TSO–C112, as amended; or a later version, and one of the following approved units:

(1) Until January 1, 2017:

(i) TCAS II that meets FAA TSO–C119b (version 7.0), or a later version;

(ii) TCAS II that meets FAA TSO–C119a, (version 6.04A Enhanced) that was installed in that airplane before 1 May 2003. If that TCAS II (version 6.04A Enhanced) no longer can be repaired to FAA TSO−C119a standards, it must be replaced with a TCAS II that meets FAA TSO–C119b (version 7.0), or a later version; or

(iii) A collision avoidance system equivalent to FAA TSO–C119b (version 7.0), or a later

version, capable of coordinating with units that meet FAA TSO–C119a (version 6.04A Enhanced), or a later version.

(2) After January 1, 2017:

(i) TCAS II that meets FAA TSO–C119c (version 7.1), or a later version.

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

XII. TAWS.

(a) *GACAR Part 121 operations*: TAWS systems for aircraft operating under GACAR Part 121 must meet the requirements for Class A equipment in FAA TSO–C151, as amended. The aircraft must also include an approved terrain situational awareness display.

(b) *All other operations*: TAWS systems for aircraft operating under all other GACAR parts must meet, at a minimum, the requirements for Class B equipment in FAA TSO–C151, as amended.

APPENDIX C TO GACAR PART 91 – PERFORMANCE AND INSTALLATION STANDARDS FOR CERTAIN REQUIRED EQUIPMENT

XIII. PBE.

(a) The certificate holder must furnish approved PBE meeting the equipment, breathing gas, and communication requirements contained in FAA TSO–C116a, as amended or FAA TSO–C99a, as amended, as applicable, and meeting the following requirements:

(1) General. The equipment must protect the flight crew from the effects of smoke, carbon dioxide or other harmful gases or an oxygen deficient environment caused by other than an airplane depressurization while on flightdeck duty and must protect crew members from the above effects while combating fires on board the airplane.

(2) The equipment must be inspected regularly in accordance with inspection guidelines and the inspection periods established by the equipment manufacturer to ensure its condition for continued serviceability and immediate readiness to perform its intended emergency purposes. The inspection periods may be changed upon a showing by the certificate holder that the changes would provide an equivalent level of safety.

(3) That part of the equipment protecting the eyes must not impair the wearer's vision to the extent that a crew member's duties cannot be accomplished and must allow corrective glasses to be worn without impairment of vision or loss of the protection required by paragraph (a)(1) of this section.

(4) The equipment, while in use, must allow the flight crew to communicate using the airplane radio equipment and to communicate by interphone with each other while at their assigned duty stations. The equipment, while in use, must also allow crew member interphone communications between each of two flight crew member stations in the pilot compartment and at least one normal cabin crew member station in each passenger compartment.

(5) The equipment, while in use, must allow any crew member to use the airplane interphone system at any of the cabin crew member stations referred to in paragraph (a)(4) of this section.

(6) The equipment may also be used to meet the supplemental oxygen requirements of this part provided it meets the oxygen equipment standards of GACAR § 91.303.

(7) Protective breathing gas duration and supply system equipment requirements are as follows:

(i) The equipment must supply breathing gas for 15 minutes at a pressure altitude of 8 000 ft (2 450 m) for the following:

(A) Flight crew members while performing flightdeck duties and

(B) Crew members while combating an in flight fire.

(ii) The breathing gas system must be free from hazards in itself, in its method of operation, and in its effect upon other components.

(iii) For breathing gas systems other than chemical oxygen generators, there must be a means to allow the crew to readily determine, during the equipment preflight described in paragraph (c) of this section, that the gas supply is fully charged.

(iv) For each chemical oxygen generator, the supply system equipment must meet the requirements of GACAR §§ 25.1450(b) and (c).

(8) *Smoke and fume protection.* PBE with a fixed or portable breathing gas supply meeting the requirements of this section must be conveniently located on the flightdeck and be easily

accessible for immediate use by each required flight crew member at his assigned duty station.

(9) *Fire combating.* Except for nontransport category airplanes type certificated after 31 December 1964, PBE with a portable breathing gas supply meeting the requirements of this section must be easily accessible and conveniently located for immediate use by crew members in combating fires as follows:

(i) One PBE is required for each hand fire extinguisher located for use in a galley other than a galley located in a passenger, cargo, or crew compartment.

(ii) One on the flightdeck, except that the President may authorize another location for this PBE if special circumstances exist that make compliance impractical and the proposed deviation would provide an equivalent level of safety.

(iii) In each passenger compartment, one for each hand fire extinguisher required by GACAR § 91.303, to be located within 0.9 m of each required hand fire extinguisher, except that the President may authorize a deviation allowing locations of PBE more than 0.9 m from required hand fire extinguisher locations if special circumstances exist that make compliance impractical and if the proposed deviation provides an equivalent level of safety.

APPENDIX D TO GACAR PART 91 – SPECIAL FLIGHT OPERATIONS AUTHORIZATIONS

I. General Requirements for All Authorizations.

(a) *Application for a special flight operations authorization.*

(1) An applicant for the initial issuance of a special flight operations authorization must provide the President with the documentation required in the applicable section of this appendix, together with the following information:

(i) The name (business name for operators certificated under GACAR Part 119), address, and mailing address of the applicant and

(ii) A description of the intended special flight operations.

(2) An applicant for a special flight operations authorization must provide the following evidence to the President:

(i) Compliance with the requirements of the applicable section of this appendix;

(ii) That the aircraft and required equipment fulfill the applicable airworthiness requirements and are approved when required by the relevant section of this appendix;

(iii) That a training program has been established for the crew and, as applicable, other personnel involved in these operations; and

(iv) That operating procedures in accordance with the applicable section of this appendix have been documented.

(3) Operators must retain records relating to the requirements of paragraphs (a)(1) and (2) above for the duration of the operation requiring a special flight operations authorization.

(b) *Privileges of an operator holding a special flight operations authorization.*

The scope of the activity that the operator is approved to conduct must be documented and specified for—

(1) Noncommercial operators certificated in accordance with GACAR Part 119 in the operations specifications to the OC;

(2) Commercial operators certificated in accordance with GACAR Part 119 in the operations specifications to the AOC;

(3) Aerial work operators certificated in accordance with GACAR Part 133 in the operations specifications to the aerial work operator certificate (AWOC); and

(4) All other operators in Certificates of Authorization.

(c) *Changes to operations subject to a special flight operations authorization.*

When the conditions of a special flight operations authorization are affected by changes, operators must provide the relevant documentation to the President and obtain prior authorization for the operation.

(d) *Continued validity of a special flight operations authorization.*

Unless otherwise specified by the President, special flight operations authorizations are issued for an unlimited duration and remain valid subject to the operator remaining in compliance with the requirements associated with the special flight operations authorization.

APPENDIX D TO GACAR PART 91 – SPECIAL FLIGHT OPERATIONS AUTHORIZATIONS

II. Low Visibility Operations (LVO).

(a) *LVO authorization.* To obtain authorization for LVOs, the operator must demonstrate to the President compliance with the applicable requirements of this section of this appendix.

(b) *General operating requirements.*

(1) The operator may only conduct a LVTO operation with airplanes provided the RVR reporting, runway lighting and other equipment and training conditions and limitations prescribed in the LVTO authorization and applicable to the LVTO operation have been complied with.

(2) The operator may only conduct an LVTO with rotorcraft provided the RVR reporting, runway lighting and other equipment and training conditions and limitations prescribed in the LVTO

authorization and applicable to the LVTO operation have been complied with.

(3) The operator may only conduct LTS CAT I operations if—

(i) Each aircraft concerned is certificated for CAT II operations in accordance with GACAR Part 21; and

(ii) The approach is flown—

(A) Auto coupled to an auto land which needs to be approved for CAT IIIA operations; or

(B) Using an approved HUD to at least 150 ft above the threshold.

(4) The operator may only conduct CAT II, OTS CAT II or CAT III operations if—

(i) Each aircraft concerned is certificated for operations with a DH below 200 ft (61 m), or no DH, and equipped in accordance with the applicable airworthiness requirements;

(ii) A system for recording approach and/or automatic landing success and failure is established and maintained to monitor the overall safety of the operation;

(iii) The DH is determined by means of a radio altimeter; and

(iv) The flight crew consists of at least two pilots.

(5) The operator may only conduct approach operations using an EVS if—

(i) The EVS is certificated in accordance with GACAR Part 21;

(ii) Callout heights below 200 ft above the aerodrome threshold are determined by means of a radio altimeter; and

(iii) The flight crew consists of at least two pilots.

(c) *Aerodrome considerations.*

(1) The operator must not use an aerodrome for LVOs unless—

(i) The aerodrome has been approved for such operations by the State of the aerodrome; and

(ii) Low visibility procedures (LVP) have been established.

(2) At aerodromes where the term LVP is not used, the operator must ensure that there are equivalent procedures that adhere to the requirements of LVP at the aerodrome. This situation must be clearly noted in the operations manual or LVO procedures manual including guidance to the flight crew on how to determine that the equivalent LVP are in effect.

(d) *Flight crew training and qualifications.*

The operator must ensure that before conducting an LVO—

(1) Each flight crew member—

(i) Complies with the training and checking requirements prescribed in the operations manual or LVO procedures manual, including flight simulation training device (FSTD) training, in operating to the limiting values of RVR and DH specific to the operation and the aircraft type; and

(ii) Is qualified in accordance with the standards prescribed in GACAR Part 61 or the operations manual;

(2) The training and checking is conducted in accordance with a detailed syllabus approved by the President.

(e) *Operating procedures.*

(1) The operator must establish procedures and instructions to be used for LVOs. Except as provided in paragraph (2) below these procedures must be included in the operations manual and contain the duties of flight crew members during taxiing, takeoff, approach, flare, landing, rollout and missed approach operations, as appropriate.

(2) For operators not certificated under GACAR Part 119 or authorized under GACAR Part 129, the operating procedures specified in paragraph (1) above must be included in an LVO procedures manual.

(3) Before commencing an LVO, the PIC must be satisfied that—

(i) The status of the visual and nonvisual facilities is sufficient;

(ii) Appropriate LVPs are in force at the aerodrome according to information received from Air Traffic Service; and

(iii) Flight crew members are properly qualified.

(f) *Minimum equipment.*

(1) The operator must include the minimum equipment that must be serviceable at the commencement of an LVO in accordance with the AFM or other approved document in the operations manual or LVO procedures manual, as applicable.

(2) The PIC must be satisfied that the status of the aircraft and of the relevant airborne systems is appropriate for the specific operation to be conducted.

(g) *Maintenance program.*

(1) The operator must establish an LVO maintenance program to include the following elements:

(i) A schedule that provides for the performance of inspections under paragraph (g)(1)(iv) of this section.

(ii) A schedule that provides for the performance of required bench checks.

(iii) A schedule that provides for the performance of a test and inspection of each static pressure system in accordance with Appendix D to GACAR Part 43 within 12 months after the date of the previous test and inspection.

(iv) The procedures for the performance of the periodic inspections and functional flight checks to determine the ability of each required instrument and item of equipment to perform as approved for LVO operations including a procedure for recording functional flight checks.

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

(vi) A procedure for assuring that the condition of each listed instrument and item of equipment upon which maintenance is performed is at least equal to its required condition

before it is returned to service for LVO operations.

(vii) A procedure for an entry in the maintenance records that shows the date, aerodrome, and reasons for each discontinued LVO operation because of a malfunction of a listed instrument or item of equipment.

APPENDIX D TO GACAR PART 91 – SPECIAL FLIGHT OPERATIONS AUTHORIZATIONS

III. PBN Operations.

PBN operational authorization. To obtain a PBN operational authorization from the President, the operator must provide evidence that—

(a) The relevant airworthiness authorization of the RNAV system has been obtained;

(b) A training program for the flight crew involved in these operations has been established; and

(c) Operating procedures have been established specifying—

(1) The equipment to be carried, including any relevant procedures and limitations required for inoperable equipment in accordance with the MEL;

(2) Flight crew composition and experience requirements;

(3) Normal procedures;

(4) Contingency procedures;

(5) Monitoring and incident reporting; and

(6) Electronic navigation data management.

APPENDIX D TO GACAR PART 91 – SPECIAL FLIGHT OPERATIONS AUTHORIZATIONS

IV. Operations With MNPS.

MNPS operational authorization. To obtain an MNPS operational authorization from the President, the operator must provide evidence that—

(a) The navigation equipment meets the required performance;

(b) Navigation display, indicators, and controls are visible and operable by either flight crew member seated at his duty station;

(c) A training program for the flight crew involved in these operations has been established; and

(d) Operating procedures have been established specifying—

(1) The equipment to be carried, including any relevant procedures and limitations required for inoperable equipment in accordance with the MEL;

(2) Flight crew composition and experience requirements;

(3) Normal procedures;

(4) Contingency procedures including those specified by the authority responsible for the airspace concerned; and

(5) Monitoring and incident reporting.

APPENDIX D TO GACAR PART 91 – SPECIAL FLIGHT OPERATIONS AUTHORIZATIONS

IX. PBCS Operations.

(a) PBCS operational authorization. To obtain an PBCS operational authorization from the President, the operator must provide evidence that the aircraft is equipped with communication and surveillance equipment that will enable it to operate in accordance with the prescribed PBCS specifications (RCP specification for performance-based communication (PBC) and RSP specification for performance-based surveillance (PBS); and

(b) The operator must have PBCS flight manuals and operation procedures that are authorized by the President.

APPENDIX D TO GACAR PART 91 – SPECIAL FLIGHT OPERATIONS AUTHORIZATIONS

V. Operations in Airspace with RVSM.

(a) *RVSM operational authorization.* To obtain an RVSM operational authorization from the President, the operator must provide evidence that—

(1) The RVSM airworthiness authorization has been obtained;

(2) Procedures for monitoring and reporting height keeping errors have been established;

(3) A training program for the flight crew involved in these operations has been established;

(4) Operating procedures have been established specifying—

(i) The equipment to be carried, including any relevant procedures and limitations required for inoperable equipment in accordance with the MEL;

(ii) Flight crew composition and experience requirements;

(iii) Flight planning;

(iv) Preflight procedures;

(v) Procedures prior to RVSM airspace entry;

(vi) In flight procedures;

(vii) Postflight procedures;

(viii) Incident reporting; and

(ix) Specific regional operating procedures.

(5) An RVSM maintenance program has been established outlining procedures to maintain RVSM aircraft. Each program must contain the following:

(i) Periodic inspections, functional flight tests, and maintenance and inspection procedures, with acceptable maintenance practices, for ensuring continued compliance with the RVSM aircraft requirements;

(ii) A quality assurance program for ensuring continuing accuracy and reliability of test equipment used for testing aircraft to determine compliance with the RVSM aircraft requirements; and

(iii) Procedures for returning noncompliant aircraft to service.

(b) *RVSM equipment requirements.* In addition to the equipment required by other GACAR parts, aircraft used for operations in RVSM airspace must be equipped with—

(1) Two independent altitude measurement systems,

(2) An altitude alerting system,

(3) An automatic altitude control system, and

(4) An SSR transponder with altitude reporting system that can be connected to the altitude measurement system in use for altitude control

(c) *RVSM height keeping errors.*

(1) Operators must report recorded or communicated occurrences of height keeping errors caused by malfunction of aircraft equipment or of operational nature, equal to or greater than—

(i) A total vertical error of ±300 ft (±90 m),

(ii) An altimetry system error of ±245 ft (±75 m), and

(iii) An assigned altitude deviation of ±300 ft (±90 m).

(2) Reports of such occurrences must be sent to the President within 72 hours. Reports must include an initial analysis of causal factors and measures taken to prevent repeat occurrences.

(3) When height keeping errors are recorded or received, the operator must take immediate action to correct the conditions that caused the errors and provide followup reports, if requested by the President

(d) *RVSM height monitoring.*

(1) Each operator must establish and implement a system that ensures that a minimum of two

aircraft of each aircraft type grouping of the operator have their height keeping performance monitored at least once every 2 years or within intervals of 1 000 flight hours per aircraft, whichever period is longer.

(2) If an operator aircraft type grouping consists of a single aircraft, monitoring of that aircraft must be accomplished within the specified intervals noted above.

(3) Height monitoring may be achieved by flying over designated height monitoring units or by conducting flights with GPS based monitoring units.

APPENDIX D TO GACAR PART 91 – SPECIAL FLIGHT OPERATIONS AUTHORIZATIONS

VI. REMS Operations.

(a) *REMS operations.* To obtain a REMS special flight operation authorization from the President, the operator must—

(1) Hold a commercial AOC issued in accordance with GACAR Part 119 and

(2) Demonstrate to the President compliance with the requirements contained in this section of this appendix.

(b) *Equipment requirements for REMS operations.*

(1) The installation of all rotorcraft dedicated medical equipment and any subsequent modifications and, where appropriate, its operation must be approved in accordance with GACAR Part 21.

(2) Maintenance instructions for REMS equipment and systems must be established by the operator in liaison with the manufacturer and must be included in the operator's maintenance program.

(3) Each rotorcraft engaged in REMS operations must be equipped with a helicopter terrain awareness and warning system (HTAWS) that meets the requirements in TSO–C194 and Section 2 of RTCA DO–309.

(4) Each rotorcraft engaged in REMS operations is equipped with an approved flight data monitoring system capable of recording flight performance data. This system must:

(i) Receive electrical power from the bus that provides the maximum reliability for operation without jeopardizing service to essential or emergency loads, and

(ii) Be operated from the application of electrical power before takeoff until the removal of electrical power after termination of flight.

(c) *Communication.* In addition to that required by other GACAR parts, rotorcraft conducting REMS flights must have communication equipment capable of conducting two-way communication with the organization for which the REMS is being conducted and, where possible, to communicate with ground emergency service personnel.

(d) *REMS operating minimums.*

(1) REMS flights operated in Performance Class 1 and Class 2 must comply with the weather minimums in Table D–3 for dispatch and en-route phases of the REMS flight. In the event that during the en-route phase the weather conditions fall below the cloud base or visibility minimums shown, rotorcraft certificated for flights only under VMC must abandon the flight or return to base. Rotorcraft equipped and certificated for IMC operations may abandon the flight, return to base, or convert in all respects to a flight conducted under IFR, provided the flight crew is suitably qualified.

Table D–3. REMS Operating Minimums.

Location	Day		Night		Night using an Approved NVIS or HTAWS	
	Ceiling	Flight Visibility	Ceiling	Flight Visibility	Ceiling	Flight Visibility
Non- mountainous local flying areas	800-ft	2200 M	1000-ft	4800M	800-ft	4800M
Non- mountainous non-local flying areas	800-ft	4800M	1000-ft	8000M	1000-ft	4800M
Mountainous local flying areas	800-ft	4800M	1500-ft	4800M	1000-ft	4800M
Mountainous non-local flying areas	1000-ft	4800M	1500-ft	8000M	1000-ft	8000M

(2) The weather minimums for the dispatch and en-route phase of a REMS flight operated in Performance Class 3 must be a cloud ceiling of 600 ft (180 m) and a visibility of 1 500 m. Visibility may be reduced to 800 m for short periods when in sight of land if the rotorcraft is maneuvered at a speed that will give adequate opportunity to observe any obstacle and avoid a

collision.

(3) A certificate holder may designate local flying areas in a manner acceptable to the President, that must-

a. Not exceed 50 nautical miles in any direction from each designated location;

b. Take into account obstacles and terrain features that are easily identifiable by the pilot in command and from which the pilot in command may visually determine a position; and

c. Take into account the operating environment and capabilities of the certificate holder's helicopters.

d. A pilot must demonstrate a level of familiarity with the local flying area by passing an examination given by the certificate holder within the 12 calendar months prior to using the local flying area.

(e) *Performance requirements for REMS operations.*

(1) Performance Class 3 operations must not be conducted over a hostile environment.

(2) Takeoff and landing—

(i) Rotorcraft conducting operations to/from an aerodrome at a hospital that is located in a hostile environment must be operated in accordance with Performance Class 1, except when the operator holds an authorization in accordance with Subpart G of GACAR Part 121.

(ii) Rotorcraft conducting operations to/from a REMS operating site located in a hostile environment must be operated in accordance with Performance Class 2, and exempt from the authorization required by GACAR § 121.237, provided compliance is shown with GACAR §§ 121.231(a) and (b).

(iii) The REMS operating site must be large enough to provide adequate clearance from all obstructions. For night operations, the site must be illuminated to enable the site and any obstructions to be identified.

(f) *Flight crew member requirements.*

(1) *Selection.* The operator must establish criteria for the selection of flight crew members for the REMS task, taking previous experience into account. No certificate holder may use, nor may any person serve as, a PIC of a REMS operation unless that person holds a helicopter instrument rating or an airline transport pilot certificate with a category and class rating for that aircraft, that is not limited to VFR.

(2) *Experience.* The minimum experience level for the PIC conducting REMS flights must not be less than—

(i) Either—

(A) 1 000 hours as PIC of aircraft of which 500 hours are as PIC on rotorcraft; or

(B) 1 000 hours as second in command (SIC) in REMS operations of which 500 hours are as PIC under supervision and 100 hours as PIC of rotorcraft;

(ii) 500 hours operating experience in rotorcraft, gained in an operational environment similar to the intended operation; and

(iii) For pilots engaged in night operations, 20 hours of VMC at night as PIC.

(3) *Operational training.* Successful completion of operational training in accordance with the REMS procedures contained in the operations manual.

(4) *Recency.* All pilots conducting REMS operations must have completed a minimum of 30 minutes of flight by sole reference to instruments in a rotorcraft or in an FSTD within the last 6 months.

(g) *Crew composition.*

(1) *Day flight.* The minimum crew by day must be—

(i) One pilot and one REMS technical crew member; or

(ii) One pilot, only when—

(A) At a REMS operating site the PIC is required to conduct a flight to acquire

additional medical supplies. In such case the REMS technical crew member may remain at the site to give assistance to ill or injured persons while the PIC undertakes this flight;

(B) After arriving at the REMS operating site, the installation of the stretcher precludes the REMS technical crew member from occupying the front seat; or

(C) The medical personnel requires the assistance of the REMS technical crew member in flight.

(iii) In the cases described in paragraph (g)(1)(ii), the operational minimums must be as defined by the applicable airspace requirements; the REMS operating minimums contained in Table D–3 must not be used.

(iv) Only in the case described in paragraph (g)(1)(ii)(A) may the PIC land at a REMS operating site without the REMS technical crew member assisting from the front seat.

(2) *Night flight.* The minimum crew by night must be—

(i) Two pilots or

(ii) One pilot and one REMS technical crew member in specific geographical areas defined by the operator in the operations manual taking into account the following:

(A) Adequate ground reference;

(B) Flight following system for the duration of the REMS mission;

(C) Reliability of weather reporting facilities;

(D) REMS MEL;

(E) Continuity of a crew concept;

(F) Minimum flight crew qualification;

(G) Crew member initial and recurrent training;

(H) Operating procedures, including crew coordination;

(I) Weather minimums; and

(J) Additional considerations due to specific local conditions.

(h) *Crew training and checking.*

(1) Training and checking must be conducted in accordance with a detailed syllabus approved by the President and included in the operations manual.

(2) *Crew members.*

(i) Crew training programs must—

(A) Improve knowledge of the REMS working environment and equipment;

(B) Improve crew coordination; and

(C) Include measures to minimize the risks associated with en-route transit in low visibility conditions, selection of REMS operating sites, and approach and departure profiles.

(ii) The measures referred to in paragraph (h)(2)(i) above must be assessed during—

(A) VMC day proficiency checks, or VMC night proficiency checks when night REMS operations are undertaken by the operator; and

(B) Line checks.

(i) *Fatigue Management.*

(1) No operator may assign any flight crew member, and no flight crew member may accept a REMS assignment for flight time if that flight crew member's total flight time in all commercial flight will—

(i) Exceed 500 hours in any calendar quarter.

(ii) Exceed 800 hours in any two consecutive calendar quarters.

(iii) Exceed 1 400 hours in any year.

(2) No operator may assign a rotorcraft flight crew member, and no flight crew member may accept an assignment, for REMS operations unless that assignment provides for at least 10 consecutive hours of rest immediately preceding reporting to the hospital for availability for flight time.

(3) No flight crew member may accrue more than 8 hours of flight time during any 24-consecutive-hour period of a REMS assignment, unless an emergency medical evacuation operation is prolonged. Each flight crew member who exceeds the daily 8-hour flight time limitation in this paragraph must be relieved of the REMS assignment immediately upon the completion of that emergency medical evacuation operation and must be given a rest period in compliance with paragraph (i)(8) of this section.

(4) Each flight crew member must receive at least 8 consecutive hours of rest during any 24-consecutive-hour period of a REMS assignment. A flight crew member must be relieved of the REMS assignment if he has not received or cannot receive at least 8 consecutive hours of rest during any 24-consecutive-hour period of a REMS assignment.

(5) A REMS assignment may not exceed 72 consecutive hours at the hospital.

(6) An adequate place of rest must be provided at, or in close proximity to, the hospital at which the REMS assignment is being performed.

(7) No operator may assign any other duties to a flight crew member during a REMS assignment.

(8) Each flight crew member must be given a rest period upon completion of the REMS assignment and before being assigned any further duty with the operator of—

(i) At least 12 consecutive hours for an assignment of less than 48 hours.

(ii) At least 16 consecutive hours for an assignment of more than 48 hours.

(9) The operator must provide each flight crew member at least 13 rest periods of at least 24 consecutive hours each every 3 months.

(j) *REMS medical personnel and other personnel briefing.*

(1) *Medical personnel.*

(i) Except as provided in subparagraph (ii) of this subparagraph (1), prior to each REMS operation, each PIC, or other flight crew member designated by the certificate holder, must ensure that all medical personnel have been briefed on the following—

(A) Passenger briefing requirements in GACAR Part 121 or Part 135 as applicable; and

(B) Physiological aspects of flight;

(C) Patient loading and unloading;

(D) Safety in and around the rotorcraft;

(E) In-flight emergency procedures;

(F) Emergency landing procedures;

(G) Emergency evacuation procedures;

(H) Efficient and safe communications with the pilot; and

(I) Operational differences between day and night operations, if appropriate.

(ii) The briefing required in subparagraphs (1)(i)(A) through (I) of this paragraph may be omitted if all medical personnel on board have satisfactorily completed the certificate holder's approved medical personnel training program within the preceding 24 calendar months. Each training program must include a minimum of 4 hours of ground training, and 4 hours of training in and around a REMS rotorcraft, on the topics set forth in subparagraph (1)(i) of this paragraph.

(iii) Each certificate holder must maintain a record for each person trained under this paragraph that—

(A) Contains the individual's name, the most recent training completion date, and a description, copy, or reference to training materials used to meet the training requirement.

(B) Is maintained for 24 calendar months following the individual's completion of training.

(2) *Ground emergency service personnel.* The operator must take all reasonable measures to ensure that ground emergency service personnel are familiar with the REMS working environment and equipment and the risks associated with ground operations at a REMS operating site.

(k) *Preflight risk assessment, information and documentation.*

(1) Each certificate holder conducting helicopter air ambulance operations must establish, and document in its operations manual, an approved preflight risk analysis methodology that includes at least the following—

(i) Flight considerations, to include obstacles and terrain along the planned route of flight, landing zone conditions, and fuel requirements;

(ii) Human factors, such as crew fatigue, life events, and other stressors;

(iii) Weather, including departure, en-route, destination, and forecasted;

(iv) A procedure for determining whether another REMS operator has refused or rejected a flight request; and

(v) Strategies and procedures for mitigating identified risks, including procedures for obtaining and documenting approval of the certificate holder's management personnel to release a flight when a risk exceeds a level predetermined by the certificate holder.

(2) Each certificate holder must develop a preflight risk analysis worksheet to include, at a minimum, the items in subparagraph (1).

(3) Prior to the first leg of each REMS operation, the PIC must conduct a preflight risk analysis and complete the preflight risk analysis worksheet in accordance with the certificate holder's approved procedures. The PIC must sign the preflight risk analysis worksheet and specify the date and time it was completed.

(4) The certificate holder must retain the original or a copy of each completed preflight risk analysis worksheet at a location specified in its operations manual for at least 90 days from the date of the operation.

(5) The operator must ensure that, as part of its risk analysis and management process, risks

associated with the REMS environment are minimized by specifying the following in the operations manual: selection, composition and training of crews; levels of equipment and dispatch criteria; and operating procedures and minimums, such that normal and likely abnormal operations are described and adequately mitigated.

(6) Relevant extracts from the operations manual and risk analysis methodology must be made available to the organization for which the REMS is being provided.

(l) *REMS operating base facilities.*

(1) If flight crew members are required to be on standby with a reaction time of less than 45 minutes, dedicated suitable accommodation must be provided close to each operating base.

(2) At each operating base the pilots must be provided with facilities for obtaining current and forecast weather information and must be provided with satisfactory communications with the appropriate Air Traffic Service unit. Adequate facilities must be available for the planning of all tasks.

(m) *Fuel supply.*

When the REMS mission is conducted under VFR within a local and defined geographical area, standard fuel planning can be employed provided the operator establishes final reserve fuel to ensure that, on completion of the mission the fuel remaining is not less than an amount of fuel sufficient for—

(1) 30 minutes of flight time at normal cruising conditions or

(2) When operating within an area providing continuous and suitable precautionary landing sites, 20 minutes of flight time at normal cruising conditions.

(n) *Refueling with passengers enplaning, on board, or deplaning.* When the PIC considers refueling with passengers on board to be necessary, it can be undertaken with either rotors stopped or rotors turning provided the following requirements are met:

(1) Door(s) on the refueling side of the rotorcraft must remain closed;

(2) Door(s) on the nonrefueling side of the rotorcraft must remain open, weather permitting;

(3) Firefighting facilities of the appropriate scale must be positioned so as to be immediately

available in the event of a fire; and

(4) Sufficient personnel must be immediately available to move patients clear of the rotorcraft in the event of a fire.

APPENDIX D TO GACAR PART 91 – SPECIAL FLIGHT OPERATIONS AUTHORIZATIONS

VII. RHO.

(a) *RHO.* To obtain RHO special flight operations authorization by the President, the operator must—

(1) Hold a commercial AOC issued in accordance with GACAR Part 119 or an AWOC issued in accordance with GACAR Part 133; and

(2) Demonstrate to the President compliance with the requirements contained in this section of this appendix.

(b) *Equipment requirements for RHO.*

(1) The installation of all rotorcraft hoist equipment, including any required radio equipment, and any subsequent modifications must have an airworthiness approval appropriate to the intended function. Ancillary equipment must be designed and tested to the appropriate standard as required by the President.

(2) Maintenance instructions for RHO equipment and systems must be established by the operator in liaison with the manufacturer and included in the operator's maintenance program.

(c) *RHO communication.* Two way radio communication must be established with the organization for which the RHO is being provided and, where possible, a means of communicating with ground personnel at the RHO operating site for—

(1) Day and night rotorcraft offshore operations and

(2) Night onshore operations, except for RHO at a REMS operating site.

(d) *Performance requirements for RHO.* Except for RHO at a REMS operating site, RHO must be capable of sustaining a critical engine failure with the remaining engine(s) at the appropriate power setting without hazard to the suspended person(s)/cargo, third parties, or property.

(e) *Crew requirements for RHO.*

(1) *Selection.* The operator must establish criteria for the selection of flight crew members for the RHO task, taking previous experience into account.

(2) *Experience.* The minimum experience level for the PIC conducting RHO flights must not be less than—

(i) Offshore—

(A) 1 000 hours as PIC of rotorcraft, or 1 000 hours as SIC in RHO of which 200 hours is as PIC under supervision; and

(B) 50 hoist cycles conducted offshore, of which 20 cycles must be at night if night operations are being conducted, where a hoist cycle means one down and up cycle of the hoist hook.

(ii) Onshore—

(A) 500 hours as PIC of rotorcraft, or 500 hours as SIC in RHO of which 100 hours is as PIC under supervision;

(B) 200 hours of operating experience in rotorcraft gained in an operational environment similar to the intended operation; and

(C) 50 hoist cycles, of which 20 cycles must be at night if night operations are being conducted.

(3) *Operational training and experience.* Successful completion of training in accordance with the RHO procedures contained in the operations manual and relevant experience in the role and environment under which RHO are conducted.

(4) *Recency.* All pilots and RHO crew members conducting RHO must have completed in the last 90 days:

(i) When operating by day: any combination of three day or night hoist cycles, each of which must include a transition to and from the hover; and

(ii) When operating by night: three night hoist cycles, each of which must include a transition to and from the hover.

(f) *Crew composition*. The minimum crew for day or night operations must be as stated in the operations manual. The minimum crew will be dependent on the type of rotorcraft, the weather conditions, the type of task, and, in addition for rotorcraft offshore operations, the RHO site environment, the sea state and the movement of the vessel. In no case must the minimum crew be less than one flight crew member and one RHO crew member.

(g) *Crew training and checking*. Training and checking must be conducted in accordance with a detailed syllabus approved by the President and included in the operations manual.

(1) Crew training programs must improve knowledge of the RHO working environment and equipment; improve crew coordination; and include measures to minimize the risks associated with RHO normal and emergency procedures and static discharge.

(2) The measures referred to in paragraph (g)(1) above must be assessed during VMC day proficiency checks, or VMC night proficiency checks when night RHO are undertaken by the operator.

(h) *RHO passenger briefing*. Prior to any RHO flight, or series of flights, RHO passengers must have been briefed and made aware of the dangers of static electricity discharge and other RHO considerations.

(i) *Information and documentation.*

(1) The operator must ensure that, as part of its risk analysis and management process, risks associated with the RHO environment are minimized by specifying in the operations manual—

(i) Selection, composition and training of crews;

(ii) Levels of equipment and dispatch criteria; and

(iii) Operating procedures and minimums, such that normal and likely abnormal operations are described and adequately mitigated.

(2) Relevant extracts from the operations manual must be available to the organization for which the RHO is being provided.

APPENDIX D TO GACAR PART 91 – SPECIAL FLIGHT OPERATIONS AUTHORIZATIONS

VIII. Rotorcraft Operations With an NVIS.

(a) *NVIS operations*. To obtain special flight operations authorization for NVIS operations from the President, the operator must—

(1) Hold an AOC or an OC issued in accordance with GACAR Part 119 or an AWOC issued in accordance with GACAR Part 133; and

(2) Demonstrate to the President—

(i) Compliance with the applicable requirements contained in this section of this appendix; and

(ii) The successful integration of all elements of the NVIS.

(b) *Equipment requirements for NVIS operations.*

(1) Before conducting NVIS operations each rotorcraft and all associated NVIS equipment must have been issued with the relevant airworthiness approval in accordance with GACAR Part 21.

(2) *Radio altimeter*. The rotorcraft must be equipped with a radio altimeter and a low height warning system giving visual and audio warnings selectable by the pilot and discernible during head up NVIS operation.

(i) The radio altimeter must—

(A) Be of an analog type display presentation that requires minimum interpretation for both an instantaneous impression of absolute height and rate of change of height;

(B) Be positioned to be instantly visible and discernible by each flight crew member;

(C) Have an integral visual low height warning that operates at a height selectable by the pilot; and

(D) Have an integral fail/no track indicator with repeater light to give unambiguous warning of radio altimeter fail or no track conditions.

(ii) The visual warning system must—

(A) Provide clear visual warning at each flightdeck crew station of height below the pilot selectable warning height; and

(B) Have an instrument panel coaming repeater light at each flightdeck crew station to ensure adequate attention getting capability for head up operations.

(iii) The aural warning system must—

(A) Be unambiguous and readily cancelable;

(B) Not extinguish any visual low height warnings when canceled; and

(C) Operate at the same pilot selectable height as the visual warning.

(3) *Aircraft NVIS-compatible lighting.* To mitigate the reduced peripheral vision cues and the need to enhance situational awareness, the following must be provided:

(i) NVIS-compatible instrument panel floodlighting, if installed, that can illuminate all essential flight instruments;

(ii) NVIS-compatible hand held utility lights;

(iii) Portable NVIS compatible flashlight; and

(iv) A means for removing or extinguishing internal NVIS noncompatible lights.

(4) *Additional NVIS equipment.* The following additional NVIS equipment must be provided:

(i) A backup or secondary power source for the night vision goggles (NVG);

(ii) An NVIS adjustment kit or eye lane;

(iii) A helmet with the appropriate NVG attachment.

All required NVG on an NVIS flight must be of the same type, generation, and model.

(5) *Continuing airworthiness.*

(i) Procedures for continuing airworthiness must contain the information necessary for carrying out ongoing maintenance and inspections on NVIS equipment installed in the rotorcraft, and must cover, as a minimum—

(A) Rotorcraft windscreens and transparencies,

(B) NVIS lighting,

(C) NVG, and

(D) Any additional equipment that supports NVIS operations.

(ii) Any subsequent modification or maintenance to the aircraft must be in compliance with the NVIS airworthiness approval.

(c) *NVIS operating minimums.*

(1) Operations must not be conducted below the VFR weather minimums for the type of night operations being conducted.

(2) The operator must establish the minimum transition height from where a change to/from aided flight may be continued.

(d) *Flight crew requirements for NVIS operations.*

(1) *Selection.* The operator must establish criteria for the selection of flight crew members for the NVIS task.

(2) *Experience.* The minimum experience for the PIC must not be less than 20 hours VFR at night as PIC of a rotorcraft before commencing training.

(3) *Operational training.* All pilots must have completed the operational training in accordance with the NVIS procedures contained in the operations manual.

(4) *Recency.* All pilots and NVIS technical crew members conducting NVIS operations must have completed three NVIS flights in the last 90 days. Recency may be reestablished on a training flight in the rotorcraft or an approved full flight simulator, which must include the elements of paragraph (f)(2)(i) below.

(e) *Crew composition*. The minimum crew must be the greater of that specified—

(1) In the AFM,

(2) For the underlying activity, or

(3) In the operational authorization for the NVIS operations.

(f) *Information and documentation*. The operator must ensure that, as part of its risk analysis and management process, risks associated with the NVIS environment are minimized by specifying in the operations manual—

(1) Selection, composition and training of crews;

(2) Levels of equipment and dispatch criteria; and

(3) Operating procedures and minimums, such that normal and likely abnormal operations are described and adequately mitigated.

(g) *Night vision goggle operating experience*.

(1) A person may act as pilot in command in a night vision goggle operation with passengers on board only if, within 2 calendar months preceding the month of the flight, that person performs and logs the following tasks as the sole manipulator of the controls on a flight during a night vision goggle operation—

(i) Three takeoffs and three landings, with each takeoff and landing including a climb out, cruise, descent, and approach phase of flight (only required if the pilot wants to use night vision goggles during the takeoff and landing phases of the flight).

(ii) Three hovering tasks (only required if the pilot wants to use night vision goggles when operating helicopters or powered-lifts during the hovering phase of flight).

(iii) Three area departure and area arrival tasks.

(iv) Three tasks of transitioning from aided night flight (aided night flight means that the pilot uses night vision goggles to maintain visual surface reference) to unaided night flight

(unaided night flight means that the pilot does not use night vision goggles) and back to aided night flight.

(v) Three-night vision goggle operations, or when operating helicopters or powered-lifts, six night vision goggle operations.

(2) A person may act as pilot in command using night vision goggles only if, within the 4 calendar months preceding the month of the flight, that person performs and logs the tasks listed in paragraph (g)(1)(i) through (v) of this section as the sole manipulator of the controls during a night vision goggle operation.

(h) *Night vision goggle proficiency check.*

A person must either meet the night vision goggle experience requirements of paragraphs (g)(1) or (g)(2) of this section or pass a night vision goggle proficiency check to act as pilot in command using night vision goggles. The proficiency check must be performed in the category of aircraft that is appropriate to the night vision goggle operation for which the person is seeking the night vision goggle privilege or in a full flight simulator or flight training device that is representative of that category of aircraft. The check must consist of the tasks listed in paragraph (I) of this section, and the check must be performed by:

(1) An Examiner who is qualified to perform night vision goggle operations in that same aircraft category and class;

(2) A company check pilot who is authorized to perform night vision goggle proficiency checks under parts 121, 125, or 135,133 of this Appendix , provided that both the check pilot and the pilot being tested are employees of that operator;

(3) A GACA authorized flight instructor who is qualified to perform night vision goggle operations in that same aircraft category and class, or

(4) A person approved by the GACA to perform night vision goggle proficiency checks.

(I) *Additional training required for night vision goggle operations.*

(1) Except as provided under paragraph (I)(3) of this section, a person may act as pilot in command of an aircraft using night vision goggles only if that person receives and logs ground training from an authorized instructor and obtains a logbook or training record endorsement

from an authorized instructor who certifies the person completed the ground training. The ground training must include the following subjects:

(a) Applicable portions of this Appendix that relate to night vision goggle limitations and flight operations;

(b) Aeromedical factors related to the use of night vision goggles, including how to protect night vision, how the eyes adapt to night, self-imposed stresses that affect night vision, effects of lighting on night vision, cues used to estimate distance and depth perception at night, and visual illusions;

(c) Normal, abnormal, and emergency operations of night vision goggle equipment;

(d) Night vision goggle performance and scene interpretation; and

(e) Night vision goggle operation flight planning, including night terrain interpretation and factors affecting terrain interpretation

(2) Except as provided under paragraph (I)(3) of this section, a person may act as pilot in command of an aircraft using night vision goggles only if that person receives and logs flight training from an authorized instructor and obtains a logbook or training record endorsement from an authorized instructor who found the person proficient in the use of night vision goggles. The flight training must include the following tasks:

(a) Preflight and use of internal and external aircraft lighting systems for night vision goggle operations;

(b) Preflight preparation of night vision goggles for night vision goggle operations;

(c) Proper piloting techniques when using night vision goggles during the takeoff, climb, enroute, descent, and landing phases of flight; and

(d) Normal, abnormal, and emergency flight operations using night vision goggles.

(3) *Check pilot qualification.* A flight instructor may not conduct training for night vision goggle operations unless the flight instructor:

(a) Has a pilot and flight instructor certificate with the applicable category and class rating

for the training;

(b) If appropriate, has a type rating on his or her pilot certificate for the aircraft;

(c) Is pilot in command qualified for night vision goggle operations, in accordance with paragraph (g)(1)

(d) Has logged 100-night vision goggle operations as the sole manipulator of the controls;

(e) Has logged 20-night vision goggle operations as the sole manipulator of the controls in the category and class, and type of aircraft, if aircraft class and type is appropriate, that the training will be given in;

(f) Is qualified to act as pilot in command in night vision goggle operations under § 61.17 and

(g) Has a logbook endorsement from a GACA Aviation Safety Inspector or a person who is authorized by the GACA to provide that logbook endorsement that states the flight instructor is authorized to perform the night vision goggle pilot in command qualification and recent flight experience requirements under § 61.13 and § 61.17.

APPENDIX E TO GACAR PART 91 – INTERCEPTION SIGNALS

The interception signals referenced in GACAR § 91.259 are as follows:

Table E–1.

Series	INTERCEPTING Aircraft Signals	Meaning	INTERCEPTED Aircraft Responds	Meaning
1	DAY or NIGHT — Rocking aircraft and flashing navigational lights at irregular intervals (and landing lights in the case of a helicopter) from a position slightly above and ahead of, and normally to the left of, the intercepted aircraft (or to the right if the intercepted aircraft is a helicopter) and, after acknowledgement, a slow level turn, normally to the left (or to the right in the case of a helicopter) on the desired heading. *Note 1.*— Meteorological conditions or terrain may require the intercepting aircraft to reverse the positions and direction of turn given above in Series 1. *Note 2.*— If the intercepted aircraft is not able to keep pace with the intercepting aircraft, the latter is expected to fly a series of racetrack patterns and to rock the aircraft each time it passes the intercepted aircraft.	You have been intercepted. Follow me.	DAY or NIGHT — Rocking aircraft, flashing navigational lights at irregular intervals and following.	Understood, will comply.
2	DAY or NIGHT — An abrupt breakaway maneuver from the intercepted aircraft consisting of a climbing turn of 90° or more without crossing the line of flight of the intercepted aircraft.	You may proceed.	DAY or NIGHT — Rocking the aircraft.	Understood, will comply.
3	DAY or NIGHT — Lowering landing gear (if fitted), showing steady landing lights and overflying runway in use or, if the intercepted aircraft is a helicopter, overflying the helicopter landing area. In the case of helicopters, the intercepting helicopter makes a landing approach, coming to hover near the landing area.	Land at this aerodrome.	DAY or NIGHT — Lowering landing gear,(if fitted), showing steady landing lights and following the intercepting aircraft and, if, after overflying the runway in use or helicopter landing area, landing is considered safe, proceeding to land.	Understood, will comply.

Series	INTERCEPTING Aircraft Signals	Meaning	INTERCEPTED Aircraft Responds	Meaning
4	DAY or NIGHT — Raising landing gear (if fitted) and flashing landing lights while passing over runway in use or helicopter landing area at a height exceeding 1 000 ft (300 m) but not exceeding 2 000 ft (600 m) (in the case of a helicopter, at a height exceeding 170 ft (50 m) but not exceeding 330 ft (100 m)) above the aerodrome level, and continuing to circle runway in use or helicopter landing area. If unable to flash landing lights, flash any other lights available.	Aerodrome you have designated is inadequate.	DAY or NIGHT — If it is desired that the intercepted aircraft follow the intercepting aircraft to an alternate aerodrome, the intercepting aircraft raises its landing gear (if fitted) and uses the Series 1 signals prescribed for intercepting aircraft. If it is decided to release the intercepted aircraft, the intercepting aircraft uses the Series 2 signals prescribed for intercepting aircraft.	Understood, follow me. Understood, you may proceed.
5	DAY or NIGHT — Regular switching on and off of all available lights but in such a manner as to be distinct from flashing lights.	Cannot comply.	DAY or NIGHT — Use Series 2 signals prescribed for intercepting aircraft.	Understood.
6	DAY or NIGHT — Irregular flashing of all available lights.	In distress.	DAY or NIGHT — Use Series 2 signals prescribed for intercepting aircraft.	Understood.

APPENDIX F TO GACAR PART 91 – MARSHALING SIGNALS

The marshaling signals referenced in GACAR § 91.29 must be conducted as follows:

(a) The following marshaling signals are designed for use by the signalman, also known as the marshaler, with hands illuminated as necessary to facilitate observation by the pilot, and facing the aircraft in a position—

(1) *For fixed-wing aircraft.* On left side of aircraft, where best seen by the pilot, and

(2) *For rotorcraft.* Where the signalman can best be seen by the pilot.

(b) The meaning of the relevant signal remains the same if the signalman holds bats, illuminated wands, or flashlights.

(c) The aircraft engines are numbered, for the signalman facing the aircraft, from aircraft right to aircraft left, that is, the No. 1 engine is the left outer engine.

(d) The signals below marked with an asterisk (*) apply to hovering rotorcraft.

(e) References to wands may also be read to refer to daylight-fluorescent bats or gloves (daytime only).

1. Wingwalker/guide.

Raise right hand above head level with wand pointing up; move left-hand wand pointing down toward body.

Note—This signal provides an indication by a person positioned at the aircraft wing tip, to the pilot/marshaler/pushback operator, that the aircraft movement on/off a parking position would be unobstructed.

2. Identify gate.

Raise fully extended arms straight above head with wands pointing up.

	**3. Proceed to next signalman or as directed by tower/ground control.** Point both arms upward; move and extend arms outward to sides of body and point with wands to direction of next signalman or taxi area.
	**4. Straight ahead.** Bend extended arms at elbows and move wands up and down from chest height to head.
	**5a. Turn left (from pilot's point of view).** With right arm and wand extended at a 90° angle to body, make "come ahead" signal with left hand. The rate-of-signal motion indicates to pilot the rate-of-aircraft turn.

	**5b. Turn right (from pilot's point of view).** With left arm and wand extended at a 90° angle to body, make "come ahead" signal with right hand. The rate-of-signal motion indicates to pilot the rate-of-aircraft turn.
	**6a. Normal stop.** Fully extend arms and wands at a 90° angle to sides and slowly move to above head until wands cross.
	**6b. Emergency stop.** Abruptly extend arms and wands to top of head, crossing wands.

	**7a. Set brakes.** Raise hand just above shoulder height with open palm. Ensuring eye contact with flight crew, close hand into a fist. Do not move until receipt of "thumbs up" acknowledgement from flight crew.
	**7b. Release brakes.** Raise hand just above shoulder height with hand closed in a fist. Ensuring eye contact with flight crew, open palm. Do not move until receipt of "thumbs up" acknowledgement from flight crew.
	**8a. Chocks inserted.** With arms and wands fully extended above head, move wands inward in a "jabbing" motion until wands touch. Ensure acknowledgement is received from flight crew.

	**8b. Chocks removed.** With arms and wands fully extended above head, move wands outward in a "jabbing" motion. Do not remove chocks until authorized by flight crew.
	**9. Start engine(s).** Raise right arm to head level with wand pointing up and start a circular motion with hand; at the same time, with left arm raised above head level, point to engine to be started. *The aircraft engines are numbered, for the signalman facing the aircraft, from aircraft right to aircraft left, that is, the No. 1 engine is the left outer engine.*
	**10. Cut engines.** Extend arm with wand forward of body at shoulder level; move hand and wand to top of left shoulder and draw wand to top of right shoulder in a slicing motion across throat. *The aircraft engines are numbered, for the signalman facing the aircraft, from aircraft right to aircraft left, that is, the No. 1 engine is the left outer engine.*

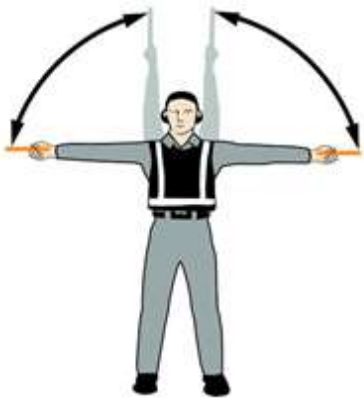
	**11. Slow down.** Move extended arms downwards in a "patting" gesture, moving wands up and down from waist to knees.
	**12. Slow down engine(s) on indicated side.** With arms down and wands toward ground, wave either right or left wand up and down indicating engine(s) on left or right side respectively should be slowed down.
	**13. Move back.** With arms in front of body at waist height, rotate arms in a forward motion. To stop rearward movement, use signal 6a or 6b.

	**14a. Turns while backing (for tail to starboard).** Point left arm with wand down and bring right arm from overhead vertical position to horizontal forward position, repeating right-arm movement.
	**14b. Turns while backing (for tail to port).** Point right arm with wand down and bring left arm from overhead vertical position to horizontal forward position, repeating left-arm movement.
	**15. Affirmative/all clear.** Raise right arm to head level with wand pointing up or display hand with "thumbs up"; left arm remains at side by knee. *Note—This signal is also used as a technical/servicing communication signal.*

***16. Hover.**

Fully extend arms and wands at a 90° angle to sides.

The signals marked with an asterisk (*) apply to hovering rotorcraft.



***17. Move upwards.**

Fully extend arms and wands at a 90° angle to sides and, with palms turned up, move hands upwards. Speed of movement indicates rate of ascent.

The signals marked with an asterisk (*) apply to hovering rotorcraft.

***18. Move downwards.**

Fully extend arms and wands at a 90° angle to sides and, with palms turned down, move hands downwards. Speed of movement indicates rate of descent.

The signals marked with an asterisk (*) apply to hovering rotorcraft.

	***19a. Move horizontally left (from pilot's point of view).** Extend arm horizontally at a 90° angle to right side of body. Move other arm in same direction in a sweeping motion. *The signals marked with an asterisk (*) apply to hovering rotorcraft.*
	***19b. Move horizontally right (from pilot's point of view).** Extend arm horizontally at a 90° angle to left side of body. Move other arm in same direction in a sweeping motion. *The signals marked with an asterisk (*) apply to hovering rotorcraft.*
	***20. Land.** Cross arms with wands downwards and in front of body. *The signals marked with an asterisk (*) apply to hovering rotorcraft.*

	**21. Hold position/stand by.** Fully extend arms and wands downwards at a 45°angle to sides. Hold position until aircraft is clear for next maneuver.
	**22. Dispatch aircraft.** Perform a standard salute with right hand and/or wand to dispatch the aircraft. Maintain eye contact with flight crew until aircraft has begun to taxi.
	**23. Do not touch controls (technical/servicing communication signal).** Extend right arm fully above head and close fist or hold wand in horizontal position; left arm remains at side by knee.

	**24. Connect ground power (technical/servicing communication signal).** Hold arms fully extended above head; open left hand horizontally and move finger tips of right hand into and touch open palm of left hand (forming a "T"). At night, illuminated wands can also be used to form the "T" above head.
	**25. Disconnect power (technical/servicing communication signal).** Hold arms fully extended above head with finger tips of right hand touching open horizontal palm of left hand (forming a "T"); then move right hand away from the left. Do not disconnect power until authorized by flight crew. At night, illuminated wands can also be used to form the "T" above head.
	**26. Negative (technical/servicing communication signal).** Hold right arm straight out at 90° from shoulder and point wand down to ground or display hand with "thumbs down"; left hand remains at side by knee.

27. Establish communication via interphone (technical/servicing communication signal).

Extend both arms at 90° from body and move hands to cup both ears.

28. Open/close stairs (technical/servicing communication signal).

With right arm at side and left arm raised above head at a 45° angle, move right arm in a sweeping motion towards top of left shoulder.

Note—This signal is intended mainly for aircraft with the set of integral stairs at the front.

APPENDIX G TO GACAR PART 91 – LIGHTS TO BE DISPLAYED BY AIRCRAFT ON THE WATER

The lights required for aircraft operating on the water referenced in GACAR § 91.173(a)(3) must be displayed as follows:

I. General.

The lights specified herein are intended to meet the requirements of Annex 2 and the International Regulations for Preventing Collisions at Sea for lights to be displayed by aircraft on the water. The lights required by aircraft in each case are described below.

APPENDIX G TO GACAR PART 91 – LIGHTS TO BE DISPLAYED BY AIRCRAFT ON THE WATER

The lights required for aircraft operating on the water referenced in GACAR § 91.173(a)(3) must be displayed as follows:

II. When Under Way.

As illustrated in Figure G–1, the following appearing as steady unobstructed lights:

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

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

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

(d) A white light projected through angle of coverage F.

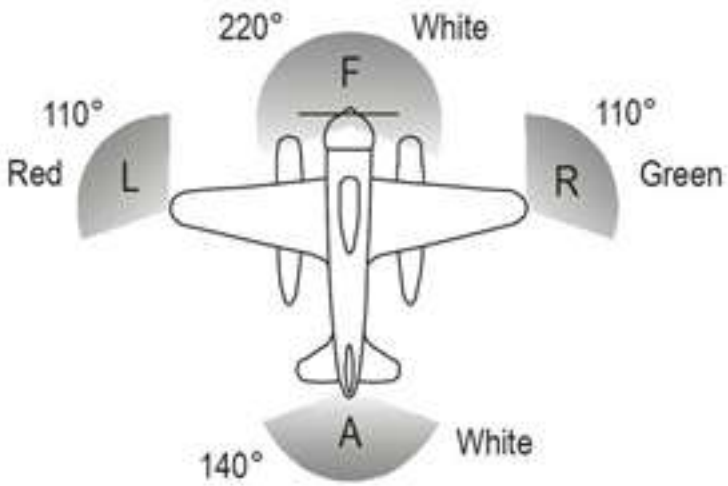


Figure G–1.

The lights described in paragraphs II(a), (b), and (c) of this appendix should be visible at a distance of at least 2 NM. The light described in paragraph II(d) should be visible at a distance of 5 NM when fitted to an aircraft of 20 m or more in length or visible at a distance of 3 NM when fitted to an airplane of less than 20 m in length.

APPENDIX G TO GACAR PART 91 – LIGHTS TO BE DISPLAYED BY AIRCRAFT ON THE WATER

The lights required for aircraft operating on the water referenced in GACAR § 91.173(a)(3) must be displayed as follows:

III. When Towing Another Vessel or Aircraft.

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

(a) The lights described in Section II of this appendix,

(b) A second light having the same characteristics as the light described in paragraph II(d) and mounted in a vertical line at least 2 m above or below it, and

(c) A yellow light having otherwise the same characteristics as the light described in paragraph II(c) of this appendix and mounted in a vertical line at least 2 m above it.

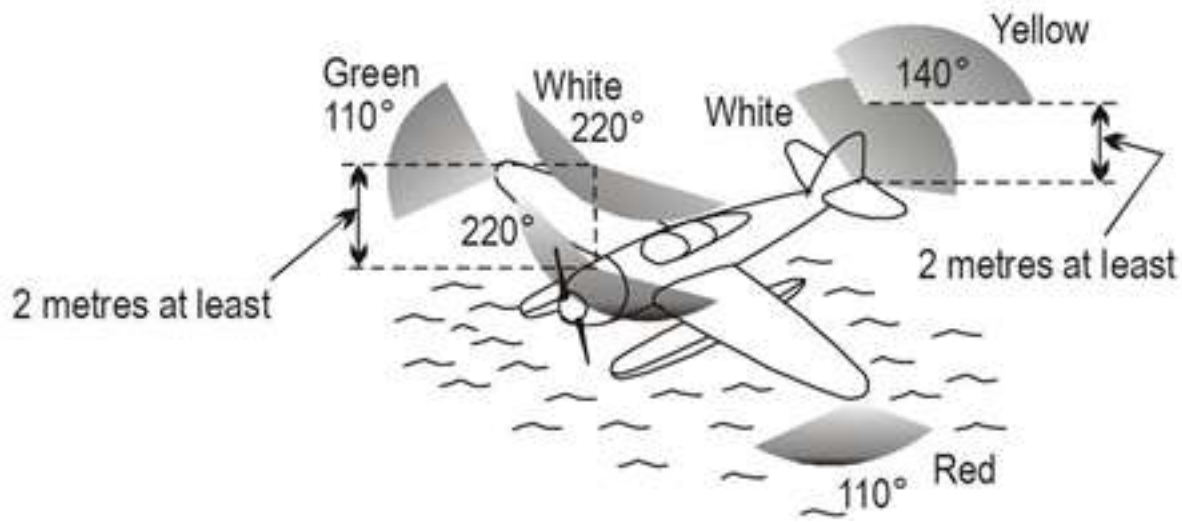


Figure G–2.

APPENDIX G TO GACAR PART 91 – LIGHTS TO BE DISPLAYED BY AIRCRAFT ON THE WATER

The lights required for aircraft operating on the water referenced in GACAR § 91.173(a)(3) must be displayed as follows:

IV. When Being Towed.

The lights described in paragraphs II(a), (b) and (c) appearing as steady, unobstructed lights.

APPENDIX G TO GACAR PART 91 – LIGHTS TO BE DISPLAYED BY AIRCRAFT ON THE WATER

The lights required for aircraft operating on the water referenced in GACAR § 91.173(a)(3) must be displayed as follows:

V. When Not Under Command and Not Making Way.

As illustrated in Figure G–3, 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 2 NM.

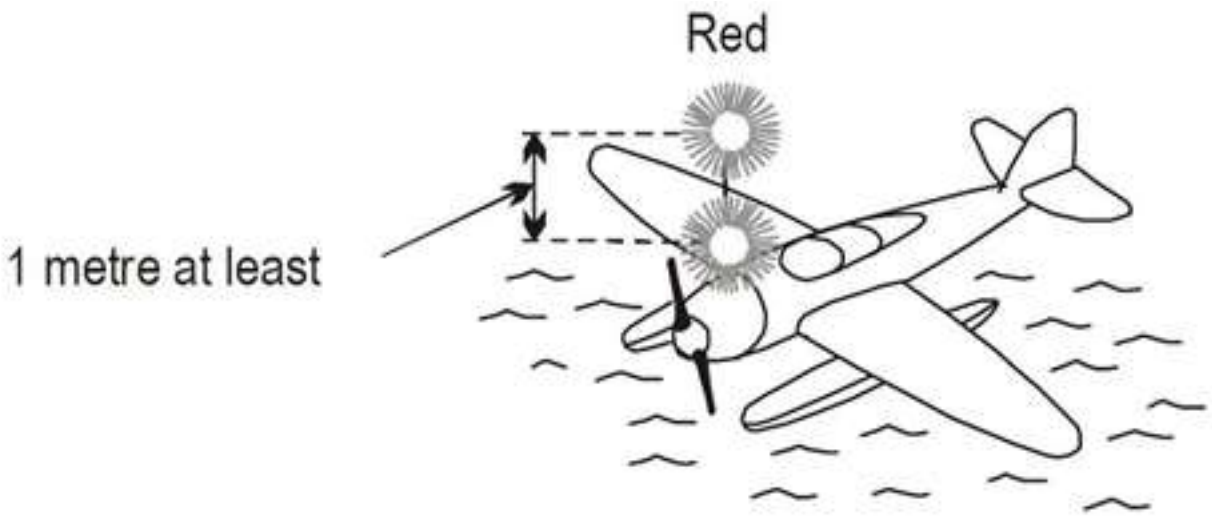


Figure G–3.

APPENDIX G TO GACAR PART 91 – LIGHTS TO BE DISPLAYED BY AIRCRAFT ON THE WATER

The lights required for aircraft operating on the water referenced in GACAR § 91.173(a)(3) must be displayed as follows:

VI. When Making Way but Not Under Command.

As illustrated in Figure G–4, the lights described in Section V of this appendix plus the lights described in paragraphs II(a), (b) and (c).

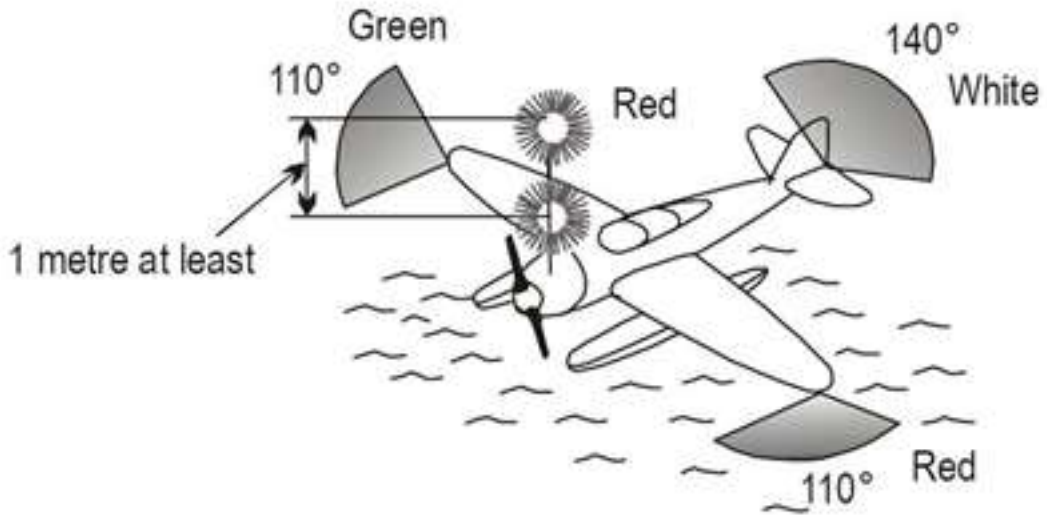


Figure G–4.

The display of lights prescribed in Sections V and VI of this appendix is to be taken by other aircraft as signals that the aircraft showing them is not under command and cannot get out of the way. These lights are not signals of aircraft in distress and requiring assistance.

APPENDIX G TO GACAR PART 91 – LIGHTS TO BE DISPLAYED BY AIRCRAFT ON THE WATER

The lights required for aircraft operating on the water referenced in GACAR § 91.173(a)(3) must be displayed as follows:

VII. When at Anchor.

(a) If less than 50 m in length, where it can best be seen, a steady white light (Figure G–5), visible all around the horizon at a distance of at least 2 NM.

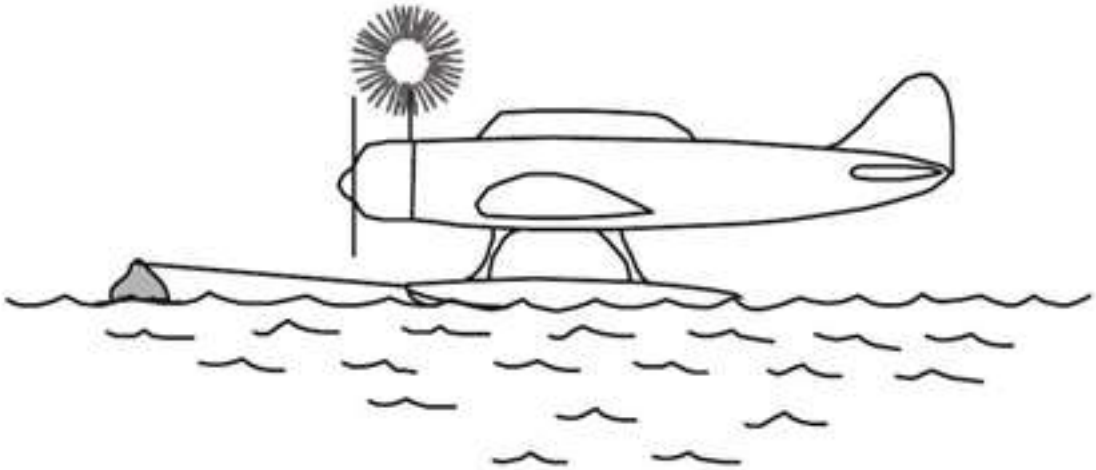


Figure G–5.

(b) If 50 m or more in length, where they can best be seen, a steady white forward light and a steady white rear light (Figure G–6) both visible all around the horizon at a distance of at least 3 NM.

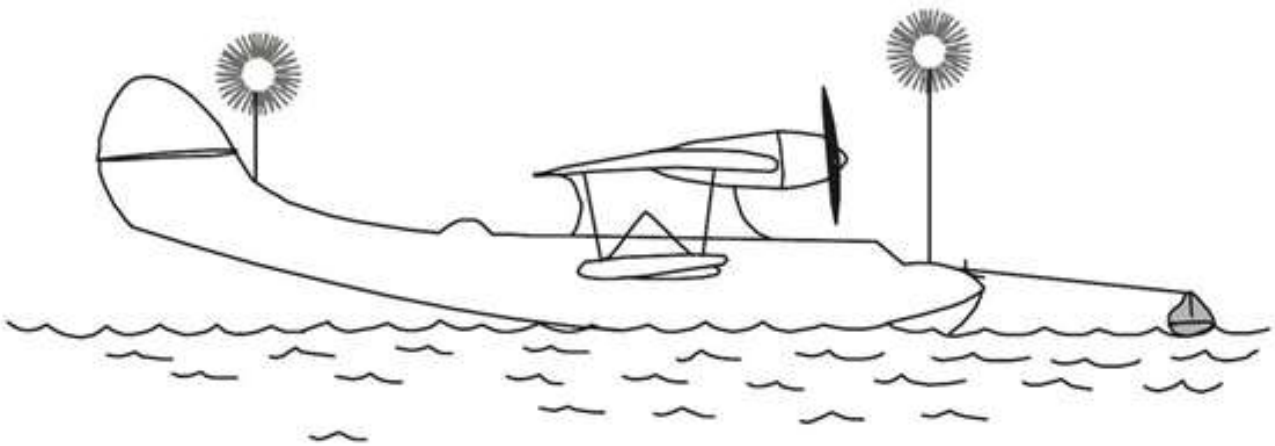
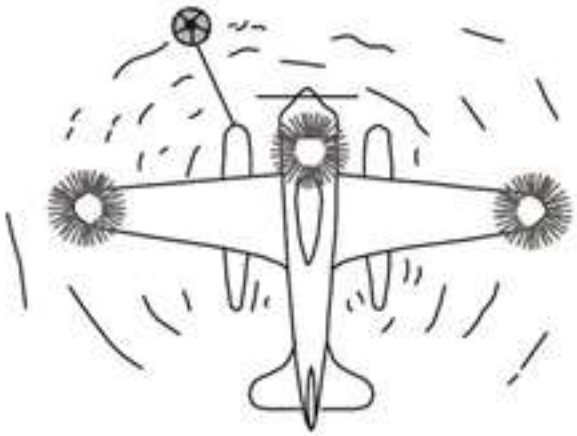


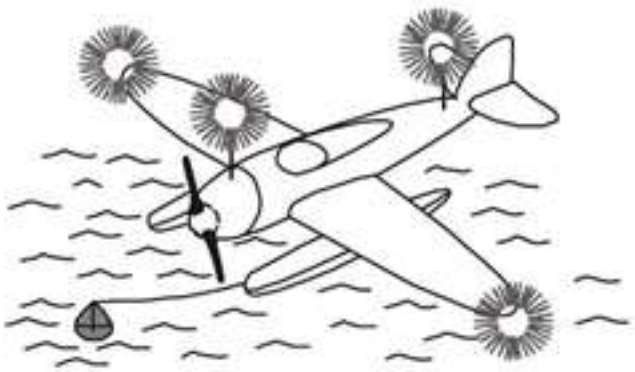
Figure G–6.

(c) If 50 m or more in span a steady white light on each side (Figures G–7 and G–8) to indicate the maximum span and visible, so far as practicable, all around the horizon at a distance of at least 1 NM.



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

Figure G–7.



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

Figure G–8.

APPENDIX G TO GACAR PART 91 – LIGHTS TO BE DISPLAYED BY AIRCRAFT ON THE WATER

The lights required for aircraft operating on the water referenced in GACAR § 91.173(a)(3) must be displayed as follows:

VIII. When Aground.

The lights prescribed in Section VII of this appendix 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.

APPENDIX H TO GACAR PART 91 – HOLDING PROCEDURES

The holding procedures referenced in GACAR § 91.203 must be conducted as follows:

(a) Holding patterns must be entered and flown at or below the airspeeds given in Tables H-1 and H-2.

Table H–1. Maximum Holding Speeds—Categories A through E.

Levels[1]	Normal conditions	Turbulence conditions
Up to 14 000 ft (4 250 m) inclusive	230 kt (425 km/h)[2] 170 kt (315 km/h)[4]	280 kt (520 km/h)[3] 170 kt (315 km/h)[4]
Above 14 000 ft (4 250 m) to 20 000 ft (6 100 m) inclusive Above 20 000 ft (6 100 m) to 34 000 ft (10 350 m) inclusive	240 kt (445 km/h)[5] 265 kt (490 km/h)[5]	280 kt (520 km/h) or 0.8 mach, whichever is less[3]
Above 34 000 ft (10 350 m)	0.83 mach	0.83 mach

1 The levels shown represent altitudes or corresponding flight levels depending upon the altimeter setting in use.
2 When the holding procedure is followed by the initial segment of an instrument approach procedure promulgated at a speed higher than 230 kt (425 km/h), the holding should also be promulgated at this higher speed wherever possible.
3 The speed of 280 kt (520 km/h) (0.8 mach) reserved for turbulence conditions may be used for holding only after prior clearance from ATC, unless the relevant publications indicate that the holding area can accommodate aircraft flight at these high holding speeds.
4 For holdings limited to CAT A and B aircraft only.
5 Wherever possible, 280 kt (520 km/h) should be used for holding procedures associated with airway route structures.

Table H–2. Maximum Holding Speeds—for Rotorcraft Procedures.

Maximum speed up to 6 000 ft (1 850 m)	100 kt (185 km/h)
Maximum speed above 6 000 ft (1 850 m)	170 kt (315 km/h)

(b) All turns must be made at a bank angle of 25° or at a rate of 3° per second, whichever requires a lesser bank.

(c) The entry procedure for entry into a holding pattern must be according to heading in relation to the three entry sectors shown in Figure H–1, recognizing a zone of flexibility of 5° on either side of the sector boundaries.

(d) When RNAV equipment is used for non RNAV holding procedures, the PIC must verify positional accuracy at the holding fix on each passage of the fix.

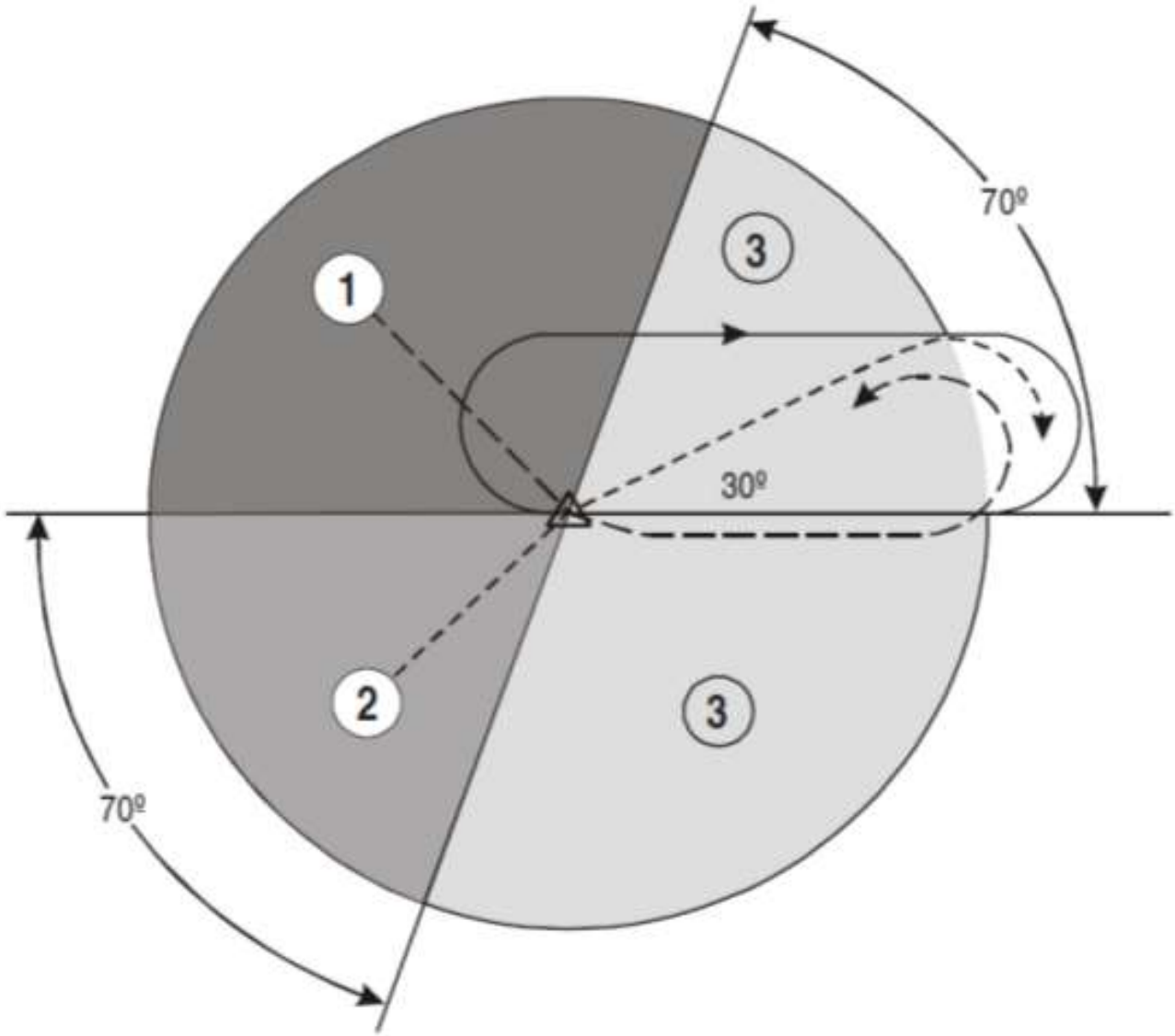


Figure H–1. Hold Entry Sectors

APPENDIX I TO GACAR PART 91 - SEARCH AND RESCUE SIGNALS

I. Signals with Surface Craft.

(a) The following maneuvers performed in sequence by an aircraft mean that the aircraft wishes to direct a surface craft towards an aircraft or a surface craft in distress:

(1) Circling the surface craft at least once;

(2) Crossing the projected course of the surface craft close ahead at low altitude and:

(i) Rocking the wings; or

(ii) Opening and closing the throttle; or

(iii) Changing the propeller pitch.

NOTE — Due to high noise level on board surface craft, the sound signals in (ii) and (iii) may be less effective than the visual signal in (i) and are regarded as alternative means of attracting attention.

(3) Heading in the direction in which the surface craft is to be directed. Repetition of such maneuvers has the same meaning.

(b) The following maneuvers by an aircraft means that the assistance of the surface craft to which the signal is directed is no longer required:

(1) Crossing the wake of the surface craft close astern at a low altitude and:

(i) Rocking the wings; or

(ii) Opening and closing the throttle; or

(iii) Changing the propeller pitch.

NOTE — The following replies may be made by surface craft to the signal in (a) for acknowledging receipt of signals:

• *The hoisting of the "code pennant" (vertical red and white stripes) close up (meaning*

understood);

• *The flashing of a succession of "T's" by signal lamp in the Morse code*;

• *The changing of heading to follow the aircraft.*

Note.— The following replies may be made by surface craft to the signal in (a) for indicating inability to comply:

• *The hoisting of the international flag "N" (a blue and white checkered square)*;

• *The flashing of a succession of "N's" in the Morse code.*

APPENDIX I TO GACAR PART 91 - SEARCH AND RESCUE SIGNALS

II. Ground-Air Visual Signal Code.

(a) Ground-air visual signal code for use by survivors.

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

(b) Ground-air visual signal code for use by rescue units.

No.	Message	Code symbol
1	Operation completed	LLL
2	We have found all personnel	LL
3	We have found only some personnel	++
4	We are not able to continue. Returning to base	XX
5	Have divided into two groups. Each proceeding in direction indicated	
6	Information received that aircraft is in this direction	→ →
7	Nothing found. Will continue to search	NN

(c) Symbols must be at least 2.5 meters long and must be made as conspicuous as possible.

Note 1.— Symbols may be formed by any means such as strips of fabric, parachute material, pieces of wood, stones or such like material; marking the surface by tramping, or staining with oil.

Note 2.— Attention to the above signals may be attracted by other means such as radio, flares smoke and reflected light.

APPENDIX I TO GACAR PART 91 - SEARCH AND RESCUE SIGNALS

III. Air-to-Ground Signals.

(a) The following signals by aircraft mean that the ground signals have been understood:

(1) During the hours of daylight— by rocking the aircraft's wings;

(2) During the hours of darkness — by flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights.

(b) Lack of the above signal indicates that the ground signal is not understood.