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Title 14—Aeronautics and Space
Chapter I—Federal Aviation Administration
Department of Transportation
Subchapter F—Air Traffic and General Operating Rules
Part 91—General Operating and Flight Rules

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Part 91—General Operating and Flight Rules

Subpart A—General

§ 91.1 Applicability.

(a) Except as provided in paragraph (b) of this section, this Part prescribes rules governing the operation of aircraft (other than moored balloons, kites, unmanned rockets, and unmanned free balloons) within the United States.

(b) Each person operating a civil aircraft of U.S. registry outside of the United States shall—

(1) When over the high seas, comply with Annex 2 (Rules of the Air) to the Convention on International Civil Aviation;

(2) When within a foreign country, comply with the regulations relating to the flight and maneuver of aircraft there in force; and

(3) Except for §§ 91.15(b), 91.17, 91.38, and 91.43, comply with Subparts A and C of this Part so far as they are not inconsistent with applicable regulations of the foreign country where the aircraft is operated or Annex 2 to the Convention on International Civil Aviation.

§ 91.3 Responsibility and authority of the pilot in command.

(a) The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.

(b) In an emergency requiring immediate action, the pilot in command may deviate from any rule of this subpart or of Subpart B to the extent required to meet that emergency.

(c) Each pilot in command who deviates from a rule under paragraph (b) of this section shall, upon the request of the Administrator, send a written report of that deviation to the Administrator.

§ 91.5 Preflight action.

Each pilot in command shall, before beginning a flight, familiarize himself with all available information concerning that flight. This information must include, for a flight under IFR or a flight not in the vicinity of an airport, available weather reports and forecasts, fuel requirements, alternatives available if the planned flight cannot be completed, and any known traffic delays of which he has been advised by ATC.

§ 91.6 Category II operation: general operating rules.

(a) No person may operate a civil aircraft in a Category II operation unless—

(1) The pilot flight crew of the aircraft consists of a pilot in command and a second in command who hold the appropriate authorizations and ratings prescribed in § 61.3 of this chapter; and

(2) Each flight crewmember has adequate knowledge of and familiarity with, the aircraft and the procedures to be used by him.

[(3) The instrument panel in front of the pilot who is controlling the aircraft has appropriate instrumentation for the type of flight control guidance system that is being used.]

(b) Unless otherwise authorized by the Administrator, no person may operate a civil aircraft in a Category II operation unless each ground component required for that operation and the related airborne equipment is installed and operating. The ground components are localizer, glide slope, outer marker, middle marker, inner marker, approach lights, high intensity runway lights, touchdown zone lights, centerline lighting and marking, and a runway visual range system for the touchdown zone. In addition, when the runway visual range for the touchdown zone is reported as less than 1600 feet, a rollout zone runway visual range system must be installed and operating. A compass locator or precision radar may be substituted for fixing the outer or middle

marker. The inner marker is not required if the decision height to be used is 150 feet or greater or if the airplane has an approved radio altimeter as provided in Appendix A to this Part.

(c) No person may operate an aircraft in a Category II operation below the authorized decision height unless—

(1) The aircraft is in a position from which a normal approach to the runway of intended landing can be made; and

(2) The approach threshold of that runway, or the approach lights or other markings identifiable with the approach end of that runway are clearly visible to the pilot.

If upon arrival at the authorized decision height, or at any time thereafter, any of the above requirements are not met, the pilot shall immediately execute the appropriate missed approach procedure. For the purposes of this paragraph, the authorized decision height is the decision height prescribed for the approach, authorized for the pilot in command, or for which the aircraft is equipped, whichever is higher.

(d) Paragraphs (a), (b), and (c) of this section do not apply to operations conducted by the holder of a certificate issued under Part 121 of this chapter. No person may operate a civil aircraft in a Category II operation conducted by the holder of a certificate issued under Part 121 of this chapter unless the operation is conducted in accordance with that certificate holder's operations specifications.

§ 91.7 Flight crewmembers at stations.

During takeoff and landing, and while en route, each required flight crewmember shall—

(a) Be at his station unless his absence is necessary in the performance of his duties in connection with the operation of the aircraft or in connection with his physiological needs; and

(b) Keep his seat belt fastened while at his station.

§ 91.8 Prohibition against interference with crewmembers.

(a) No person may assault, threaten, intimidate, or interfere with a crewmember in the performance of his duties aboard an aircraft being operated in air commerce.

(b) No person may attempt to cause or cause the flight crew of an aircraft being operated in air commerce to divert its flight from its intended course or destination.

§ 91.9 Careless or reckless operation.

No person may operate an aircraft in a careless or reckless manner so as to endanger the life or property of another.

§ 91.10 Careless or reckless operation 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 airport used by aircraft for air commerce (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.

§ 91.11 Liquor and drugs.

(a) No person may act as a crewmember of a civil aircraft while—

(1) Under the influence of intoxicating liquor; or

(2) Using any drug that affects his faculties in any way contrary to safety.

(b) Except in an emergency, no pilot of a civil aircraft may allow a person who is obviously under the influence of intoxicating liquors or drugs (except a medical patient under proper care) to be carried in that aircraft.

§ 91.13 Dropping objects.

No pilot in command 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.

§ 91.15 Parachutes and parachuting.

(a) No pilot of a civil aircraft may allow a parachute that is available for emergency use to be carried in that aircraft unless it is an approved type and—

(1) If a chair type (canopy in back), it has been packed by an appropriately rated parachute rigger within the preceding 120 days; or

(2) If any other type, it has been packed by an appropriately rated parachute rigger within the preceding 60 days.

(b) Except in an emergency, no pilot in command may allow, and no person may make, a parachute jump from an aircraft within the United States except in accordance with Part 105.

§ 91.17. Towing: gliders.

(a) Except when authrized under § 91.18, no person may operate a civil aircraft towing

a glider unless the following conditions are met:

(1) The pilot in command of the towing aircraft is qualified under § 61.38 of this chapter.

(2) The towing aircraft is equipped with a towhitch of a kind, and installed in a manner, approved by the Administrator.

(3) The towline used has a breaking strength not less than 80 percent of the maximum certificated operating weight of the glider, and not more than twice this operating weight. However, the towline used may have a breaking strength more than twice the maximum certificated operating weight of the glider if—

(i) A safety link is installed at the point of attachment of the towline to the glider, with a breaking strength not less than 80 percent of the maximum certificated operating weight of the glider, and not greater than twice this operating weight; and

(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 end of the towline, and not greater than twice the maximum certificated operating weight of the glider.

(4) Before conducting any towing operations within a control zone, or before making each towing flight within a control zone if required by ATC, the pilot in command notifies the control tower if one is in operation in that control zone. If such a control tower is not in operation, he must notify the FAA flight service station serving the control zone before conducting any towing operations in that control zone.

(5) The pilots of the towing aircraft and the glider 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, in a manner so as to endanger the life or property of another.

(c) Each certificate of waiver issued before May 17, 1967, for towing a glider terminates upon May 16, 1967.

§ 91.18 Towing: other than under § 91.17.

(a) No pilot of a civil aircraft may tow anything with that aircraft (other than under § 91.17) except in accordance with the terms of a certificate of waiver issued by the Administrator. However, a certificate of waiver is not issued to tow a glider unless the pilot in command of the towing aircraft is qualified under § 61.38 of this chapter.

(b) An application for a certificate of waiver under this section is made on a form and in a manner prescribed by the Administrator and must be submitted to the nearest Flight Standards District Office.

§ 91.19 Portable electronic devices.

(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any of the following U.S. registered civil aircraft:

(1) Aircraft operated by an air carrier or commercial operator; or

(2) Any other aircraft while it is operated under 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 an air carrier or commercial operator, the determination required by paragaph (b)(5) of this section shall be made by the air carrier or commercial operator of the aircraft on which the particular device is to be used. In the case of other aircraft, the determination may be made by the pilot in command or other operator of the aircraft.

§ 91.21 Flight instruction; simulated instrument flight and certain flight tests.

(a) No person may operate a civil aircraft that is being used for flight instruction unless that aircraft has fully functioning dual controls.

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

(1) An appropriately rated pilot occupies the other control seat as safety pilot;

(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 a lighter-than-air aircraft, that aircraft is equipped with functioning dual controls.

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

§ 91.23 Fuel requirements for flight in IFR conditions.

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

(a) Complete the flight to the first airport of intended landing;

(b) Fly from that airport to the alternate airport; and

(c) Fly thereafter for 45 minutes at normal cruising speed.

However, the requirement for fuel to fly from the first airport of intended landing to the alternate airport does not apply if Part 97 of this subchapter prescribes a standard instrument approach procedure for the first airport of intended landing and the weather conditions at that airport are forecast to be, from two hours before to two hours after the estimated time of arrival, a ceiling of at least 1,000 feet above the lowest MEA, MOCA, or altitude prescribed for the initial approach segment of the instrument approach procedure for the airport and visibility at least three miles, or two miles more than the lowest authorized landing minimum visibility, whichever is greater.

§ 91.25 VOR equipment check for IFR operations.

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

(1) Is maintained, checked, and inspected under an approved procedure; or

(2) Has been operationally checked within the preceding ten hours of flight time and within ten days before flight, 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 subparagraph (a)(2) of this section, shall—

[(1) Use, at the airport of intended departure, an FAA operated or approved test signal or, outside the United States, a test signal operated or approved by appropriate authority, to check the VOR equipment (the maximum permissible indicated bearing error is plus or minus 4 degrees);

[(2) If a test signal is not available at the airport of intended departure, use a point on an airport surface designated as a VOR system checkpoint by the Administrator or, outside the United States, by appropriate authority (the maximum permissible bearing error is plus or minus 4 degrees);

[(3) If neither a test signal nor a designated checkpoint on the surface is available, use an airborne checkpoint designated by the Administrator or, outside the United States, by appropriate authority (the maximum permissible bearing error is plus or minus 6 degrees); 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 miles 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 degrees).

(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. He shall tune both systems 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 degrees.

(d) Each person making the VOR operational check as specified in paragraph (b) or (c) of this section shall enter the date, place, bearing error, and his signature in the aircraft log or other permanent record.

§ 91.27 Civil aircraft: certifications required.

(a) Except as provided in § 91.28, no person may operate a civil aircraft unless it has within it—

[(1) An appropriate and current airworthiness certificate (including a special flight permit, a copy of the applicable operations specifications issued under § 21.197 (c) or appropriate sections of the air carrier manual required by Part 121 and 127 of this chapter containing that portion of the operations specifications issued under § 21.197 (c), or an authorization under § 91.45); and]

(2) A registration certificate issued to its owner.

(b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under § 91.28 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

§ 91.28 Special flight authorizations for foreign civil aircraft.

(a) Foreign civil aircraft may be operated without the airworthiness certificate required under § 91.27 if a special flight authorization for that operation is issued under this section. Application for a special flight authorization must be made to the Regional Director of the FAA Region in which the applicant is located.

(b) The FAA Regional Director may issue a special flight authorization for a foreign civil aircraft, subject to any conditions and limitations that he considers necessary for safe operation, for any of the following purposes:

(1) The flight of an aircraft to a place where repairs or alterations are to be made, if the country of registry determines that the aircraft has been damaged to the extent that the airworthiness certificate is invalid.

(2) The flight of an aircraft to a new country of registry, if the airworthiness certificate has been invalidated by the country of registry due to change in nationality.

(3) The flight of an aircraft of U.S. manufacture for flight testing or giving training in the operation of the aircraft to the buyer or his employees or designees, or for the purpose of ferrying the aircraft to make an export delivery outside of the United States whenever title to the aircraft has passed to a foreign buyer and there is no airworthiness certificate for it.

(4) The flight of an aircraft for any purpose stated in subparagraph (3) of this paragraph, in the case of a foreign civil aircraft brought to the United States for alterations which invalidate its airworthiness certificate.

(5) The flight of a foreign civil aircraft brought to the United States for the purpose of demonstration in connection with market sales or surveys or for testing the whole or any part thereof.

(c) An aircraft of U.S. manufacture may be operated for the purposes stated in paragraph (b)(3) of this section even though no registration certificate has been issued by the country of the foreign buyer, if the aircraft bears identification markings issued by the country of registry or intended registry.

§ 91.29 Civil aircraft airworthiness.

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

(b) The pilot in command of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight. He shall discontinue the flight when unairworthy mechanical or structural conditions occur.

§ 91.31 Civil aircraft operating limitations and marking requirements.

(a) Each person operating a civil aircraft shall comply with the operating limitations for that aircraft prescribed by the certificating authority of the country of registry.

(b) No person may operate a U.S. registered civil aircraft unless there is available in the aircraft a current FAA approved Aircraft Flight Manual for that aircraft, placards, listings, instrument markings, or any combination thereof, containing each operating limitation prescribed for that aircraft by the Administrator, including the following:

(1) Powerplant (e.g., r.p.m., manifold pressure, gas temperature, etc.).

(2) Airspeeds (e.g., normal operating speed, flaps extended speed, etc.).

(3) Aircraft weight, center of gravity, and weight distribution, including the composition of the useful load in those combinations and ranges intended to insure that the weight and center of gravity position will remain within approved limits (e.g., combinations and ranges of crew, oil, fuel, and baggage).

(4) Minimum flight crew.

(5) Kinds of operation.

(6) Maximum operating altitude.

(7) Manuevering flight load factors.

(8) Rotor speed (for rotorcraft).

(9) Limiting height-speed envelope (for rotorcraft).

(c) No person may operate a U.S. registered civil aircraft unless that aircraft is identified in accordance with Part 45 of this chapter.

§ 91.33 Powered civil aircraft with standard category U.S. airworthiness certificates; instrument and equipment requirements.

(a) *General.* Except as provided in paragraphs (c)(3) and (e) of this section, no person may operate a powered civil aircraft with a standard category U.S. airworthiness certificate in any operation described in paragraphs (b) through (f) of this section unless that aircraft contains the instruments and equipment specified in those paragraphs (or FAA approved equivalents) for that type of operation, and those instruments and items of equipment are in operable condition.

(b) *Visual flight rules (day).* For VFR flight during the day the following instruments and equipment are required:

(1) Airspeed indicator.

(2) Altimeter.

(3) Magnetic direction indicator.

(4) Tachometer for each engine.

(5) Oil pressure gauge for each engine using pressure system.

(6) Temperature gauge for each liquid-cooled engine.

(7) Oil temperature gauge for each air-cooled engine.

(8) Manifold pressure gauge for each altitude engine.

(9) Fuel gauge indicating the quantity of fuel in each tank.

(10) Landing gear position indicator, if the aircraft has a retractable landing gear.

(11) If the aircraft is operated for hire over water and beyond power-off gliding distance from shore, a Very pistol, and approved flotation gear readily available to each occupant.

(12) Approved safety belts for all occupants. The rated strength of each safety belt shall not be less than that corresponding with the ultimate load factors specified in the current applicable aircraft airworthiness requirements considering the dimensional characteristics of the safety belt installation for the specific seat or berth arrangement. The webbing of each safety belt shall be replaced as required by the Administrator.

(c) *Visual flight rules (night).* For VFR flight at night the following instruments and equipment are required:

(1) Instruments and equipment specified in paragraph (b) of this section.

(2) Approved position lights.

(3) On large aircraft or when required by the aircraft's airworthiness certificate, an approved anti-collision light system. In the event of failure of any light of the anti-collision light system, operations with the aircraft may be continued to a stop where repairs or replacement can be made without undue delay.

(4) If the aircraft is operated for hire, one electric landing light.

(5) An adequate source of electrical energy for all installed electrical and radio equipment.

(6) One spare set of fuses, or three spare fuses of each kind required.

(d) *Instrument flight rules.* For IFR flight the following instruments and equipment are required:

(1) Instruments and equipment specified in paragraph (b) of this section and for night flight, instruments and equipment specified in paragraph (c) of this section.

(2) Two-way radio communications system and navigational equipment appropriate to the ground facilities to be used.

(3) Gyroscopic rate-of-turn indicator.

(4) Bank indicator.

(5) Sensitive altimeter adjustable for barometric pressure.

(6) Clock with sweep-second hand.

(7) Generator of adequate capacity.

(8) Gyroscopic bank and pitch indicator (artificial horizon).

(9) Gyroscopic direction indicator (directional gyro or equivalent).

(e) *Flight at and above 24,000 feet MSL.* If VOR navigational equipment is required under subparagraph (d)(2) of this section, no person may operate a U.S. registered civil aircraft in the State of Alaska after March 31, 1968, in the State of Hawaii after April 30, 1967 or, in the 48 Contiguous States or in the District of Columbia, at and above 24,000 feet MSL, unless that aircraft is equipped with an approved distance measuring equipment (DME). When DME required by this paragraph fails at and above 24,000 feet MSL, each pilot shall notify ATC immediately, and may then continue operations at and above 24,000 feet MSL to the next airport of intended landing at which repairs or replacement of the equipment can be made.

(f) *Category II operations.* For Category II operations the instruments and equipment specified in paragraph (d) of this section and Appendix A to this Part are required. This paragraph does not apply to operations conducted by the holder of a certificate issued under Part 121 of this chapter.

§ 91.34 Category II manual.

(a) No person may operate a civil aircraft of United States registry in a Category II operation unless—

(1) There is available in the aircraft a current approved Category II manual for that aircraft;

(2) The operation is conducted in accordance with the procedures, instructions, and limitations in that manual; and

(3) The instruments and equipment listed in the manual that are required for a particular Category II operation have been inspected and maintained in accordance with the maintenance program contained in that manual.

(b) Each operator shall keep a current copy of the approved manual at its principal base of operations and shall make it available for inspection upon request of the Administrator.

(c) This [section] does not apply to operations conducted by the holder of a certificate issued under Part 121 of this chapter.

§ 91.35 Flight recorders and cockpit voice recorders.

No holder of an air carrier or commercial operator certificate may conduct any operation

under this Part with an airplane listed in his operations specifications or current list of airplanes used in air transportation unless that airplane complies with any applicable flight recorder and cockpit voice recorder requirements of the Part under which its certificate is issued; except that it may—

(a) Ferry an airplane with an inoperative flight recorder or cockpit voice recorder from a place where repair or replacement cannot be made to a place where they can be made;

(b) Continue a flight as originally planned, if the flight recorder or cockpit voice recorder becomes inoperative after the airplane has taken off;

(c) Conduct an airworthiness flight test, during which the flight recorder or cockpit voice recorder is turned off to test it or to test any communications or electrical equipment installed in the airplane; or

(d) Ferry a newly acquired airplane from the place where possession of it was taken to a place where the flight recorder or cockpit voice recorder is to be installed.

[§ 91.36 Data correspondence between automatically reported pressure altitude data and the pilot's altitude reference.

[No person may operate any automatic pressure altitude reporting equipment associated with a radar beacon transponder—

[(a) When deactivation of that equipment is directed by ATC; or

[(b) Unless, as installed, that equipment was tested and calibrated to transmit altitude data corresponding within 125 feet (on a 95 percent probability basis) of the indicated or calibrated datum of the altimeter normally used to maintain flight altitude, with that altimeter referenced to 29.92 inches of mercury.]

§ 91.37 Transport category civil airplane weight limitations.

(a) No person may take off any transport category airplane (other than a turbine engine powered airplane certificated after September 30, 1958) unless—

(1) The takeoff weight does not exceed the authorized maximum takeoff weight for the elevation of the airport of takeoff;

(2) The elevation of the airport of takeoff is within the altitude range for which maximum takeoff weights have been determined;

(3) Normal consumption of fuel and oil in flight to the airport of intended landing will leave a weight on arrival not in excess of the authorized maximum landing weight for the elevation of that airport; and

(4) The elevations of the airport of intended landing and of all specified alternate airports are within the altitude range for which maximum landing weights have been determined.

(b) No person may operate a turbine engine powered transport category airplane certificated after September 30, 1958 contrary to the Airplane Flight Manual, nor takeoff that airplane unless—

(1) The takeoff weight does not exceed the takeoff weight specified in the Airplane Flight Manual for the elevation of the airport and for the ambient temperature existing at the time of takeoff;

(2) Normal consumption of fuel and oil in flight to the airport of intended landing and to the alternate airports will leave a weight on arrival not in excess of the landing weight specified in the Airplane Flight Manual for the elevation of each of the airports involved and for the ambient tempertures expected at the time of landing;

(3) The takeoff weight does not exceed the weight shown in the Airplane Flight Manual to correspond with the minimum distances required for takeoff considering the elevation of the airport, the runway to be used, the effective runway gradient, and the ambient temperature and wind component existing at the time of takeoff; and

(4) Where the takeoff distance includes a clearway, the clearway distance is not greater than one-half of—

(i) The takeoff run, in the case of airplanes certificated after September 30, 1958 and before August 30, 1959; or

(ii) The runway length, in the case of airplanes certificated after August 29, 1959.

(c) No person may take off a turbine engine powered transport category airplane certificated after August 29, 1959 unless, in addition to the requirements of paragraph (b) of this section—

(1) The accelerate-stop distance is no greater than the length of the runway plus the length of the stopway (if present);

(2) The takeoff distance is no greater than the length of the runway plus the length of the clearway (if present); and

(3) The takeoff run is no greater than the length of the runway.

91.38 Increased maximum certificated weights for certain airplanes operated in Alaska.

(a) Notwithstanding any other provision of the Federal Aviation Regulations, the Administrator will, as provided in this section, approve an increase in the maximum certificated weight of an airplane type certificated under Aeronautics Bulletin No. 7-A of the U.S. Department of Commerce dated January 1, 1931, as amended, or under the normal category of Part 4a of the former Civil Air Regulations, (14 CFR 4a, 1964 ed.) if that airplane is operated in the State of Alaska by—

(1) An air taxi operator or other air carrier; or

(2) The U.S. Department of Interior in conducting its game and fish law enforcement activities or its management, fire detection, and fire suppression activities concerning public lands.

(b) The maximum certificated weight approved under this section may not exceed—

(1) 12,500 pounds;

(2) 115 percent of the maximum weight listed in the FAA Aircraft Specifications;

(3) The weight at which the airplane meets the positive maneuvering load factor requirement for the normal category specified in § 23.337 of this chapter; or

(4) The weight at which the airplane meets the climb performance requirements under which it was type certificated.

(c) In determining the maximum certificated weight the Administrator considers the structural soundness of the airplane and the terrain to be traversed.

(d) The maximum certificated weight determined under this section is added to the airplane's operation limitations and is identified as the maximum weight authorized for operations within the State of Alaska.

§ 91.39 Restricted category civil aircraft; operating limitations.

(a) No person may operate a restricted category civil aircraft—

(1) For other than the special purpose for which it is certificated; or

(2) In an operation other than one necessary for the accomplishment of the work activity directly associated with that special purpose.

[For the purposes of this paragraph, the operation of a restricted category civil aircraft to provide flight crewmember training in a special purpose operation for which the aircraft is certificated is considered to be an operation for that special purpose.]

(b) No person may operate a restricted category civil aircraft carrying persons or property for compensation or hire. [For the purposes of this paragraph, a special purpose operation involving the carriage of persons or materials necessary for the accomplishment of that operation such as crop dusting, seeding, spraying, and banner towing (including the carrying of required persons or materials to the location of that operation), and an operation for the purpose of providing flight crewmember training in a special purpose operation, are not considered to be the carrying of persons or property for compensation or hire.]

(c) No person may be carried on a restricted category civil aircraft unless—

(1) He is a flight crewmember;

(2) He is a flight crewmember trainee;

(3) He performs an essential function in connection with a special purpose operation for which the aircraft is certificated; or

(4) He is necessary for the accomplishment of the work activity directly associated with that special purpose.

(d) Except when operating in accordance

with the terms and conditions of a certificate of waiver or special operating limitations issued by the Administrator, no person may operate a restricted category civil aircraft within the United States—

(1) Over densely populated area;

(2) In a congested airway; or

(3) Near a busy airport where passenger transport operations are conducted.

(e) An application for a certificate of waiver under paragraph (d) of this section is made on a form and in a manner prescribed by the Administrator and must be submitted to the Flight Standards District Office having jurisdiction over the area in which the applicant is located.

§ 91.40 Limited category civil aircraft; operating limitations.

No person may operate a limited category civil aircraft carrying persons or property for compensation or hire.

§ 91.41 Provisionally certificated civil aircraft; operating limitations.

(a) No person may operate a provisionally certificated civil aircraft unless he is eligible for a provisional airworthiness certificate under § 21.213 of this chapter.

(b) No person may operate a provisionally certificated civil aircraft outside the United States unless he has specific authority to do so from the Administrator and each foreign country involved.

(c) Unless otherwise authorized by the Director, Flight Standards Service, no person may operate a provisionally certificated civil aircraft in air transportation.

(d) Unless otherwise authorized by the Administrator, no person may operate a provisionally certificated civil aircraft except—

(1) In direct conjunction with the type or supplemental type certification of that aircraft;

(2) For training flight crews, including simulated air carrier operations;

(3) Demonstration flights by the manufacturer for prospective purchasers;

(4) Market surveys by the manufacturer;

(5) Flight checking of instruments, accessories, and equipment, that do not affect the basic airworthiness of the aircraft; or

(6) Service testing of the aircraft.

(e) Each person operating a provisionally certificated civil aircraft shall operate within the prescribed limitations displayed in the aircraft or set forth in the provisional aircraft flight manual or other appropriate document. However, when operating in direct conjunction with the type or supplemental type certification of the aircraft, he shall operate under the experimental aircraft limitations of § 21.191 of this chapter and when flight

testing, shall operate under the requirements of § 91.93 of this chapter.

(f) Each person operating a provisionally certificated civil aircraft shall establish approved procedures for—

(1) The use and guidance of flight and ground personnel in operating under this section; and

(2) Operating in and out of airports where takeoffs or approaches over populated areas are necessary.

No person may operate that aircraft except in compliance with the approved procedures.

(g) Each person operating a provisionally certificated civil aircraft shall ensure that each flight crewmember is properly certificated and has adequate knowledge of, and familiarity with, the aircraft and procedures to be used by that crewmember.

(h) Each person operating a provisionally certificated civil aircraft shall maintain it as required by applicable regulations and as may be specially prescribed by the Administrator.

(i) Whenever the manufacturer, or the Administrator, determines that a change in design, construction or operation is necessary to ensure safe operation, no person may operate a provisionally certificated civil aircraft until that change has been made and approved. Section 21.99 of this chapter applies to operations under this section.

(j) Each person operating a provisionally certificated civil aircraft—

(1) May carry in that aircraft only persons who have a proper interest in the operations allowed by this section or who are specifically authorized by both the manufacturer and the Administrator; and

(2) Shall advise each person carried that the aircraft is provisionally certificated.

(k) The Administrator may prescribe additional limitations or procedures that he considers necessary, including limitations on the number of persons who may be carried in the aircraft.

§ 91.42 Aircraft having experimental certificates; operating limitations.

(a) 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 Administrator 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) Except for takeoffs and landings conducted in accordance with the terms and conditions of special operating limitations issued by the Administrator, no person may operate an aircraft that has an experimental certificate over a densely populated area or in a congested airway.

(d) Each person operating an aircraft that has an experimental certificate shall—

(1) Advise each person carried of the experimental nature of the aircraft;

(2) Operate under VFR, day only, unless otherwise specifically authorized by the Administrator; and

(3) Notify the control tower of the experimental nature of the aircraft when operating the aircraft into or out of airports with operating control towers.

(e) The Administrator may prescribe additional limitations that he considers necessary, including limitations on the persons that may be carried in the aircraft.

§ 91.43 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 United States shall comply with this section.

(b) Revoked.

(c) *IFR.* No person may operate a foreign civil aircraft under IFR unless—

(1) That aircraft is equipped with—

(i) Radio equipment allowing two-way radio communication with ATC when it is operated in a control zone or control area; and

(ii) Radio navigational equipment ap-

propriate to the navigational facilities to be used;

(2) Each person piloting the aircraft—

(i) Holds a current United States instrument rating or is authorized by his foreign airman certificate to pilot under IFR; and

(ii) Is thoroughly familiar with the United States en route, holding, and letdown procedures; and

(3) At least one crewmember of that aircraft is able to conduct two-way radiotelephone communications in the English language and that crewmember is on duty while the aircraft is approaching, operating within, or leaving the United States.

(d) *Overwater.* Each person operating a foreign civil aircraft over water off the shores of the United States shall give flight notification or file a flight plan, in accordance with the Supplementary Procedures for the ICAO region concerned.

(e) *Flight at and above 24,000 feet MSL.* If VOR navigation equipment is required under paragraph (c)(1)(ii) of this section, no person may operate a foreign civil aircraft, in the State of Alaska after March 31, 1968, in the State of Hawaii after April 30, 1967, or in the 48 contiguous States or in the District of Columbia after December 31, 1966, at and above 24,000 feet MSL, unless the aircraft is equipped with distance measuring equipment (DME) capable of receiving and indicating distance information from the VORTAC facilities to be used. When DME required by this paragraph fails at and above 24,000 feet MSL, the pilot in command of the aircraft shall notify ATC immediately, and may then continue operations at and above 24,000 feet MSL to the next airport of intended landing at which repairs or replacement of the equipment can be made.

[However, paragraph (e) does not apply to foreign civil aircraft that are not equipped with DME when operated for the following purposes, and if ATC is notified prior to each takeoff:

[(1) Ferry flights to and from a place in the United States where repairs or alterations are to be made.

[(2) Ferry flights to a new country of registry.

[(3) Flight of a new aircraft of U.S. manufacture for the purpose of—

[(i) flight testing the aircraft;

[(ii) training foreign flight crews in the operation of the aircraft; or

[(iii) ferrying the aircraft for export delivery outside the United States.

[(4) Ferry, demonstration, and test flights of an aircraft brought to the United States for the purpose of demonstration or testing the whole or any part thereof.].

§ 91.45 Authorization for ferry flight with one engine inoperative by air carriers and commercial operators of large aircraft.

(a) *General.* An air carrier or commercial operator of large aircraft may conduct a ferry flight of a four-engine airplane or a turbine engine powered airplane equipped with three engines, with one engine inoperative, to a base for the purpose of repairing that engine subject to the following:

(1) The airplane model has been test flown and found satisfactory for safe flight in accordance with paragraph (b) or (c) of this section, as appropriate. However, each operator who before November 19, 1966, has shown that a model of airplane with an engine inoperative is satisfactory for safe flight by a test flight conducted in accordance with performance data contained in the applicable Airplane Flight Manual under § 91.45(a)(2) need not repeat the test flight for that model.

(2) The approved Airplane Flight Manual contains the following performance data and the flight is conducted in accordance with that data:

(i) Maximum weight.

(ii) Center of gravity limits.

(iii) Configuration of the inoperative propeller (if applicable).

(iv) Runway length for takeoff (including, after February 20, 1967, temperature accountability).

(v) Altitude range.

(vi) Certificate limitations.

(vii) Ranges of operational limits.

(viii) Performance information.

(ix) Operating procedures.

(3) The operator's manual contains operating procedures for the safe operation of the airplane, including specific requirements for—

(i) A limitation that the operating weight on any ferry flight must be the minimum necessary therefor with the necessary reserve fuel load;

(ii) After February 20, 1967, a limitation that takeoffs must be made from dry runways unless, based on a showing of actual operating takeoff techniques on wet runways with one engine inoperative, takeoffs with full controllability from wet runways have been approved for the specific model aircraft and included in the Airplane Flight Manual;

(iii) Operations from airports where the runways may require a takeoff or approach over populated areas; and

(iv) Inspection procedures for determining the operating condition of the operative engines.

(4) No person may take off an airplane under this section if—

(i) The initial climb is over thickly populated areas; or

(ii) Weather conditions at the takeoff or destination airport are less than those required for VFR flight.

(5) No air carrier or commercial operator of large aircraft may carry any persons other than required flight crewmembers on board the airplane during the flight.

(6) No air carrier or commercial operator of large aircraft may use a flight crewmember unless he is thoroughly familiar with the operating procedures for one-engine inoperative ferry flights listed in its manual and the limitations and performance information listed in the Airplane Flight Manual.

(b) *Flight tests: reciprocating engine powered airplanes.* The airplane performance of a reciprocating engine powered airplane with one engine inoperative must be determined by flight test as follows:

(1) A speed not less than $1.3Vs_1$ must be chosen at which the airplane may be controlled satisfactorily in a climb with the critical engine inoperative (with its propeller removed or in a configuration desired by the operator) and with all other engines operating at the maximum power determined in subparagraph (3) of this paragraph.

(2) The distance required to accelerate to the speed listed in subparagraph (1) of this paragraph and to climb to 50 feet must be determined with—

(i) The landing gear extended;

(ii) The critical engine inoperative and its propeller removed or in a configuration desired by the operator; and

(iii) The other engines operating at not more than the maximum power established under subparagraph (3) of this paragraph.

(3) The takeoff, flight, and landing procedures such as the approximate trim settings, method of power application, maximum power, and speed must be established.

(4) The performance must be determined at a maximum weight not greater than the weight that allows a rate of climb of at least 400 feet a minute in the en route configuration set forth in § 25.67(d) of this chapter at an altitude of 5,000 feet.

(5) The performance must be determined using temperature accountability for the takeoff field length, computed in accordance with § 25.61 of this chapter.

(c) *Flight tests: turbine engine powered airplanes.* The airplane performance of a turbine engine powered airplane with one engine inoperative must be determined in accordance with the following, by flight tests including at least three takeoff tests:

(1) Takeoff speeds V_R and V_2, not less than the corresponding speeds under which the airplane was type certificated under § 25.107 of this chapter, must be chosen at which the airplane may be controlled satisfactorily with the critical engine inoperative (with its propeller removed or in a configuration desired by the operator, if applicable) and with all other engines operating at not more than the power selected for

type certification, as set forth in § 25.101 of this chapter.

(2) The minimum takeoff field length must be the horizontal distance required to accelerate, and climb to the 35-foot height at V_2 speed (including any additional speed increment obtained in the tests), multiplied by 115 percent, and determined with—

(i) The landing gear extended:

(ii) The critical engine inoperative and its propeller removed or in a configuration desired by the operator (if applicable); and

(iii) The other engines operating at not more than the power selected for type certification, as set forth in § 25.101 of this chapter.

(3) The takeoff, flight, and landing procedures such as the approximate trim settings, method of power application, maximum power, and speed, must be established. The airplane must be satisfactorily controllable during the entire takeoff run when operated according to these procedures.

(4) The performance must be determined at a maximum weight not greater than the weight determined under § 25.121(c) of this chapter, but with—

(i) The actual steady gradient of the final takeoff climb requirement not less than 1.2 percent at the end of the takeoff path with two critical engines inoperative; and

(ii) The climb speed not less than the two-engine inoperative trim speed for the actual steady gradient of the final takeoff climb prescribed by subdivision (i) of this subparagrah.

(5) The airplane must be satisfactorily controllable in a climb with two critical engines inoperative. Climb performance may be shown by calculations based on, and equal in accuracy to, the results of testing.

(6) The performance must be determined using temperature accountability for takeoff distance and final takeoff climb, computed in accordance with § 25.101 of this chapter.

For the purposes of subparagraphs (4) and (5), "two critical engines" means two adjacent engines on one side of an airplane with four engines, and the center engine and one outboard engine on an airplane with three engines.

§ 91.47 Emergency exits for airplanes carrying passengers for hire.

(a) Notwithstanding any other provision of this chapter, no person may operate a large airplane (type certificated under the Civil Air Regulations effective before April 9, 1957) in passenger-carrying operations for hire, with more than the number of occupants—

(1) Allowed under Civil Air Regulation § 4b.362(a), (b), and (c), as in effect on December 20, 1951; or

(2) Approved under Special Civil Air Regulations SR-387, SR-389, SR-389A, or SR-389B, or under this section as in effect.

However, an airplane type listed in the following table may be operated with up to the listed number of occupants (including crewmembers) and the corresponding number of exits (including emergency exits and doors) approved for the emergency exit of passengers or with an occupant-exit configuration approved under paragraph (b) or (c) of this section:

Airplane Type	*Maximum number of occupants including all crewmembers*	*Corresponding number of exits authorized for passenger use*
B-307	61	4
B-377	96	9
C-46	67	4
CV-240	53	6
CV-340 and CV-440	53	6
DC-3	35	4
DC-3(Super)	39	5
DC-4	86	5
DC-6	87	7
DC-6B	112	11
L-18	17	3
L-049, L-649, L-749	87	7
L-1049 series	96	9
M-202	53	6
M-404	53	7
Viscount 700 series	53	7

(b) Occupants in addition to those authorized under paragraph (a) of this section may be carried as follows:

(1) For each additional floor-level exit at least 24 inches wide by 48 inches high, with an unobstructed 20-inch wide access aisleway between the exit and the main passenger aisle: Twelve additional occupants.

(2) For each additional window exit located over a wing that meets the requirements of the airworthiness standards under which the airplane was type certificated or that is large enough to inscribe an ellipse 19 x 26 inches: Eight additional occupants.

(3) For each additional window exit that is not located over a wing but that otherwise complies with subparagraph (2) of this paragraph: Five additional occupants.

(4) For each airplane having a ratio (as computed from the table in paragraph (a) of this section) of maximum number of occupants to number of exits greater than 14:1, and for each airplane that does not have at least one full-size door-type exit in the side of the fuselage in the rear part of the cabin, the first additional exit must be a floor-level exit that complies with subparagraph (1) of this paragraph and must be located in the rear part of the cabin on the opposite side of the fuselage from the main entrance door.

However, no person may operate an airplane under this section carrying more than 115 occupants unless there is such an exit on each side of the fuselage in the rear part of the cabin.

(c) No person may elimate any approved exit except in accordance with the following:

(1) The previously authorized maximum number of occupants must be reduced by the same number of additional occupants authorized for that exit under this section.

(2) Exits must be eliminated in accordance with the following priority schedule: First, non-over-wing window exits; second, over-wing-window exits; third, floor-level exits located in the forward part of the cabin; fourth, floor-level exits located in the rear of the cabin.

(3) At least one exit must be retained on each side of the fuselage regardless of the number of occupants.

(4) No person may remove any exit that would result in a ratio of maximum number of occupants to approved exits greater than 14:1.

(d) This section does not relieve any person operating under Part 121 of this chapter from complying with § 121.291.

§ 91.49 Aural speed warning device.

No person may operate a transport category airplane in air commerce unless that airplane is equipped with an aural speed warning device that complies with § 25.1303(a)(11) and (b).

[§ 91.51 Altitude alerting system or device; turbojet powered civil airplanes.

[(a) No person may operate a turbojet powered U.S. registered civil airplane after February 28, 1971, unless that airplane is equipped with an approved altitude alerting system or device that is in operable condition and meets the requirements of paragraph (b) of this section.

[(b) Each altitude alerting system or device required by paragraph (a) of this section must be able to—

[(1) Alert the pilot, upon approaching a preselected altitude in either ascent or descent, by a sequence of both aural and visual signals in sufficient time to establish level flight at that preselected altitude;

[(2) Provide the required signals from sea level to the highest operating altitude approved for the airplane in which it is installed;

[(3) Preselect altitudes in increments that are commensurate with the altitudes at which the aircraft is operated;

[(4) Be tested without special equipment to determine proper operation of the alerting signals; and

[(5) Accept necessary barometric pressure settings if the system or device operates on barometric pressure.

However, for operations below 3000 feet AGL, the system or device need only provide one

signal, either visual or aural, to comply with this paragraph.

[(c) Each operator to which this section applies must establish and assign procedures for the use of the altitude alerting system or device and each flight crewmember must comply with those procedures assigned to him.

[(d) Notwithstanding any other provision of this section to the contrary, a person may—

[(1) Ferry 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) Continue a flight as planned to a place where repair or replacement can be made in the event that the altitude alerting system or device malfunctions or becomes inoperative;

[(3) Ferry an airplane with an inoperative altitude alerting system or device from a place where repair or replacement cannot be made to a place where they can be made; or

[(4) Conduct an airworthiness flight test, during which the altitude alerting system or device is turned off, to test it or to test an altimeter or other equipment in the airplane.]

Subpart B—Flight Rules

GENERAL

§ 91.61 Applicability.

This subpart prescribes flight rules governing the operation of aircraft within the United States.

§ 91.63 Waivers.

(a) The Administrator may issue a certificate of waiver authorizing the operation of aircraft in deviation of any rule of 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 section is made on a form and in a manner prescribed by the Administrator and may be submitted to any FAA office.

(c) A certificate of waiver is effective as specified in that certificate.

§ 91.65 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 pilot in command of each aircraft in the formation.

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

(d) Unless otherwise authorized by ATC, no person operating an aircraft may operate his aircraft in accordance with any clearance or instruction that has been issued to the pilot of another aircraft for radar Air Traffic Control purposes.

§ 91.67 Right-of-way rules; except water operations.

(a) *General.* When weather conditions permit, regardless of whether an operation is conducted under Instrument Flight Rules or Visual Flight Rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft in compliance with this section. When a rule of this section gives another aircraft the right of way, he shall give way to that aircraft and may not pass over, under, or ahead of it, unless well clear.

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

(c) *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, airplane or rotorcraft; and

(3) An airship has the right of way over an airplane or rotorcraft.

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

(d) *Approaching head-on.* When aircraft are approaching each other head-on, or nearly

so, each pilot of each aircraft shall alter course to the right.

(e) *Overtaking.* Each aircraft that is being overtaken has the right of way and each pilot of an overtaking aircraft shall alter course to the right to pass well clear.

(f) *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. When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right of way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land, or to overtake that aircraft.

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

§ 91.69 Right-of-way rules; water operations.

(a) *General.* Each person operating an aircraft on the water shall, insofar as possible, keep clear of all vessels and avoid impeding their navigation, and shall 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 shall alter its course to the right to keep well clear.

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

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

§ 91.70 Aircraft speed.

(a) Unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 m.p.h.).

(b) Unless otherwise authorized or required by ATC, no person may operate an aircraft within an airport traffic area at an indicated airspeed of more than—

(1) In the case of a reciprocating engine aircraft, 156 knots (180 m.p.h.); or

(2) In the case of a turbine-powered aircraft, 200 knots (230 m.p.h.).

However, 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.

§ 91.71 Acrobatic flight.

(a) No person may operate an aircraft in acrobatic flight—

(1) Over any congested area of a city, town, or settlement;

(2) Over an open air assembly of persons;

(3) Within a control zone or Federal airway;

(4) Below an altitude of 1,500 feet above the surface; or

(5) When flight visibility is less than three miles.

For the purposes of this paragraph, acrobatic flight means an intentional maneuver involving an abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight.

(b) Unless each occupant of the aircraft is wearing an approved parachute, no pilot of a civil aircraft, carrying any person (other than a crewmember) may execute any intentional maneuver that exceeds—

(1) A bank of 60 degrees relative to the horizon; or

(2) A nose up or nose down attitude of 30 degrees relative to the horizon.

(c) Paragraph (b) 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—

(i) A certificated flight instructor: or

(ii) An airline transport pilot instructing in accordance with § 61.163.

§ 91.73 Aircraft lights.

No person may, during the period from sunset to sunrise (or, in Alaska, during the period a prominent unlighted object cannot be seen from a distance of three statute miles or the sun is more than six degrees below the horizon)—

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

(b) Park or move an aircraft in, or in dangerous proximity to, a night flight operations area of an airport unless the aircraft—

(1) Is clearly illuminated;

(2) Has lighted position lights; or

(3) Is in an area which is marked by obstruction lights; or

(c) Anchor an aircraft unless the aircraft—

(1) Has lighted anchor lights; or

(2) Is in an area where anchor lights are not required on vessels.

§ 91.75 Compliance with ATC clearances and instructions.

(a) When an ATC clearance has been obtained, no pilot in command may deviate from that clearance, except in an emergency, unless he obtains an amended clearance. However, except in positive controlled airspace, this paragraph does not prohibit him from cancelling an IFR flight plan if he is operating in VFR weather conditions.

(b) Except in an emergency, no person may, in an area in which air traffic control is exercised, operate an aircraft contrary to an ATC instruction.

(c) Each pilot in command who deviates, in an emergency, from an ATC clearance or instruction shall notify ATC of that deviation as soon as possible.

[(d) Each pilot in command who (though not deviating from a rule of this subpart) is given priority by ATC in an emergency, shall, if requested by ATC, submit a detailed report of that emergency within 48 hours to the chief of that ATC facility.]

§ 91.77 ATC light signals.

ATC light signals have the meaning shown in the following table.

Color and type of signal	Meaning with respect to aircraft on the surface	Meaning with respect to aircraft in flight
Steady green	Cleared for takeoff	Cleared to land.
Flashing green	Cleared to taxi	Return for landing (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.	Airport unsafe—do not land.
Flashing white	Return to starting point on airport.	Not applicable.
Alternating red and green.	Exercise extreme caution.	Exercise extreme caution.

§ 91.79 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 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

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

(d) *Helicopters.* Helicopters 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 helicopter shall comply with routes or altitudes specifically prescribed for helicopters by the Administrator.

§ 91.81 Altimeter settings.

(a) Each person operating an aircraft shall maintain [the cruising altitude or flight level of that aircraft,] as the case may be, by reference to an altimeter that is set, when operating—

[(1) Below 18,000 feet MSL, to—]

(i) The current reported altimeter setting of a station along the route and within 100 nautical miles of the aircraft;

(ii) If there is no station within the area prescribed in subdivision (i) of this subparagraph, the current reported altimeter setting of an appropriate available station; or

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

[(2) At or above 18,000 feet MSL, to 29.92" Hg.]

(b) The lowest usable flight level is determined by the atmospheric pressure in the area of operation, as shown in the following table:

[*Current altimeter setting*	*Lowest usable flight level*
29.92 (or higher)	180
29.91 thru 29.42	185
29.41 thru 28.92	190
28.91 thru 28.42	195
28.41 thru 27.92	200
27.91 thru 27.42	205
27.41 thru 26.92	210

[(c) To convert minimum altitude prescribed under §§ 91.79 and 91.119 to the minimum flight level, the pilot shall take the flight-level equivalent of the minimum altitude in feet and add the appropriate number of feet specified below, according to the current reported altimeter setting:

[*Current altimeter setting*	*Adjustment factor*
29.92 (or higher)	None
29.91 thru 29.42	500 feet
29.41 thru 28.92	1000 feet
28.91 thru 28.42	1500 feet
28.41 thru 27.92	2000 feet
27.91 thru 27.42	2500 feet
27.41 thru 26.92	3000 feet]

§ 91.83 Flight plan; information required.

(a) Unless otherwise authorized by ATC, each person filing an IFR or VFR flight plan shall include in it the following information:

(1) The aircraft identification number and, if necessary, its radio call sign.

(2) 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.

(3) The full name and address of the pilot in command or, in the case of a formation flight, the formation commander.

(4) The point and proposed time of departure.

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

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

(7) The radio frequencies to be used.

(8) The amount of fuel on board (in hours).

(9) In the case of an IFR flight plan, an alternate airport, except as provided in paragraph (b) of this section.

(10) In the case of an international flight, the number of persons in the aircraft.

(11) Any other information the pilot in command or ATC believes is necessary for ATC purposes.

When a flight plan has been filed, the pilot in command, upon cancelling or completing the flight under the flight plan, shall notify the nearest FAA Flight Service Station or ATC facility.

(b) Paragraph (a)(9) of this section does not apply if Part 97 of this subchapter prescribes a standard instrument approach procedure for the first airport of intended landing and the weather conditions at that airport are forecast to be, from two hours before to two hours after the estimated time of arrival, a ceiling of at least 1,000 feet above the lowest MEA, MOCA, or altitude prescribed for the initial approach segment of the instrument approach procedure for the airport and visibility at least three miles, or two miles more than the lowest authorized landing minimum visibility, whichever is greater.

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

(1) If an instrument approach procedure has been published in Part 97 for that airport, the alternate airport minimums specified in that procedure or, if none are so specified, the following minimums:

(i) Precision approach procedure: ceiling 600 feet and visibility 2 statute miles.

(ii) Non-precision approach procedure: ceiling 800 feet and visibility 2 statute miles.

(2) If no instrument approach procedure has been published in Part 97 for that airport, the ceiling and visibility minimums are those allowing descent from the MEA, approach, and landing, under basic VFR.

[§ 91.85 Operating on or in the vicinity of an airport; general rules.

(a) Unless otherwise required by Part 93 of this chapter, each person operating an aircraft on or in the vicinity of an airport shall comply with the requirements of this section and of §§ 91.87 and 91.89.

(b) Unless otherwise authorized or required by ATC, no person may operate an aircraft within an airport traffic area except for the purpose of landing at, or taking off from, an airport within that area. ATC authorizations may be given as individual approval of specific operations or may be contained in written agreements between airport users and the tower concerned.]

§ 91.87 Operation at airports with operating control towers.

(a) *General.* Unless otherwise authorized or required by ATC, each person operating an aircraft to, from, or on an airport with an operating control tower shall comply with the applicable provisions of this section.

(b) *Communications with control towers operated by the United States.* No person may, within an airport traffic area, operate an aircraft to, from, or on an airport having a control tower operated by the United States unless two-way radio communications are maintained between that aircraft and the control tower. However, if the aircraft radio fails in flight, he may operate that aircraft and land if weather conditions are at or above basic VFR weather minimums, he maintains visual contact with the tower, and he receives a clearance to land. If the aircraft radio fails while in flight under IFR, he must comply with § 91.127.

(c) *Communications with other control towers.* No person may, within an airport traffic area, operate an aircraft to, from, or on an airport having a control tower that is operated by any person other than the United States unless—

(1) If that aircraft's radio equipment so allows, two-way radio communications are maintained between the aircraft and the tower; or

(2) If that aircraft's radio equipment allows only reception from the tower, the pilot has the tower's frequency monitored.

[(d) *Minimum altitudes.* When operating to an airport with an operating control tower, each pilot of—

[(1) A turbine-powered airplane or a large airplane shall, unless otherwise required by the applicable distance from cloud criteria, enter the airport traffic area at an altitude of at least 1,500 feet above the surface of the airport and maintain at least 1,500 feet within the airport traffic area, including the traffic pattern, until further descent is required for a safe landing;

[(2) A turbine-powered airplane or a large airplane approaching to land on a runway being served by an ILS, shall, if the airplane is ILS equipped, fly that airplane at an altitude at or above the glide slope between the outer marker (or the point of interception with the glide slope, if compliance with the applicable distance from clouds criteria requires interception closer in) and the middle marker; and,

[(3) An airplane approaching to land on a runway served by a visual approach slope indicator, shall maintain an altitude at or above the glide slope until a lower altitude is necessary for a safe landing.

[However, subparagraphs (2) and (3) of this paragraph do not prohibit normal bracketing maneuvers above or below the glide slope that are conducted for the purpose of remaining on the glipe slope.]

(e) *Approaches.* When approaching to land at an airport with an operating control tower, each pilot of—

(1) An airplane, shall circle the airport to the left; and

(2) A helicopter, shall avoid the flow of fixed-wing aircraft.

(f) *Departures.* No person may operate an aircraft taking off from an airport with an operating control tower except in compliance with the following:

(1) Each pilot shall comply with any departure procedures established for that airport by the FAA.

[(2) Unless otherwise required by the departure procedure or the applicable distance from clouds criteria, each pilot of a turbine-powered airplane and each pilot of a large airplane shall climb to an altitude of 1,500 feet above the surface as rapidly as practicable.

[(g) *Noise abatement runway system.* When landing or taking off from an airport with an operating control tower, and for which a formal runway use program has been established by the FAA, each pilot of a turbine-powered airplane and each pilot of a large airplane, assigned a noise abatement runway by ATC, shall use that runway. However, each pilot has final authority and responsibility for the safe operation of his airplane and if he determines in the interest of safety that another runway should be used, ATC will assign that runway (air traffic and other conditions permitting).]

(h) *Clearances required.* No pilot may, at an airport with an operating control tower, taxi an aircraft on a runway, or take off or land an aircraft, unless he has received an appropriate clearance from ATC. A clearance to "taxi to" the runway is a clearance to cross all intersecting runways but is not a clearance to "taxi on" the assigned runway.

§ 91.89 Operation at airports without control towers.

Each person operating an aircraft to or from an airport without an operating control tower shall—

(a) In the case of an airplane approaching to land, make all turns of that airplane to the left unless the airport displays approved light signals or visual markings indicating that turns should be made to the right, in which case the pilot shall make all turns to the right;

(b) In the case of a helicopter approach-

ing to land, avoid the flow of fixed-wing aircraft; and

(c) In the case of an aircraft departing the airport, comply with any FAA traffic pattern for that airport.

§ 91.91 Avoidance of disaster areas.

(a) Designated disaster areas consist of that airspace below 2,000 feet above the surface within five statute miles of an aircraft or train accident, forest fire, earthquake, flood, or other disaster of substantial magnitude. The designation of a disaster area is made in a Notice to Airmen.

(b) No person may operate an aircraft within a designated disaster area unless—

(1) That aircraft is participating in airborne relief activities under the direction of the Agency responsible for relief activities;

(2) That aircraft is being operated to or from an airport within the area, if that operation does not hamper or endanger relief activities;

(3) Flight around or above the area is impractical due to weather, terrain, or other considerations, if that en route operation through the area does not hamper or endanger relief activities and prior notice is given to the Air Traffic Service facility specified in the Notice to Airmen;

(4) It is specifically authorized under an IFR ATC clearance; or

(5) That aircraft is carrying properly accredited news representatives or persons on official business concerning the disaster, is operated in accordance with § 91.79 and, unless otherwise authorized by the Agency responsible for relief activities, it is operated above altitudes used by relief aircraft and the operator has filed with the Air Traffic Service facility specified in the Notice to Airmen a flight plan that includes the following information:

(i) Aircraft identification, type, and color.

(ii) Radio communications frequencies to be used.

(iii) Proposed times of entry and exit of the disaster area.

(iv) Name of news media or purpose of flight.

(v) Any other information deemed necessary by ATC.

§ 91.93 Flight test areas.

No person may flight test an aircraft except over open water, or sparsely populated areas, having light air traffic.

§ 91.95 Restricted and prohibited areas.

(a) No person may operate an aircraft within a restricted area (designated in Part 73) contrary to the restrictions imposed, or within a prohibited area, unless he has the permission of the using or controlling agency, as appropriate.

(b) Each person conducting, within a restricted area, an aircraft operation (approved by the using agency) 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 his operation of the aircraft.

§ 91.97 Positive control areas and route segments.

(a) Except as provided in paragraph (b) of this section, no person may operate an aircraft within a positive control area or positive control route segment, designated in Part 71 of this chapter, unless that aircraft is—

(1) Operated under IFR at a specific flight level assigned by ATC;

(2) Equipped with instruments and equipment required for IFR operations;

(3) Flown by a pilot rated for instrument flight; and

(4) Equipped, when in a positive control area, with—

(i) A coded radar beacon transponder, having at least a Mode A (Military Mode 3) 64 code capability, replying to Mode A/3 interrogation with the code specified by ATC; and

(ii) A radio providing direct pilot/controller communication on the frequency specified by ATC for the area concerned.

(b) ATC may authorize deviations from the requirements of paragraph (a) of this section. In the case of an inoperative transponder, ATC may immediately approve an operation within a positive control area allowing flight to continue, if desired, to the airport of ultimate destination, including any intermediate stops, or to proceed to a place where suitable repairs can be made, or both. A request for authorization to deviate from a requirement of paragraph (a) of this section, other than for operation with an inoperative transponder as outlined above, must be submitted at least four days before the proposed operation, in writing, to the ATC center having jurisdiction over the positive control area concerned. ATC may authorize a deviation on a continuing basis or for an individual flight, as appropriate.

§ 91.99 Jet advisory areas.

(a) No person may operate an aircraft within a radar jet advisory area designated in Part 75 of this chapter unless—

(1) That aircraft is operated under IFR at a specific altitude assigned by ATC; or

(2) If the aircraft is not so operated and—

(i) That aircraft is equipped with a functioning coded radar beacon transponder having a Mode A (military Mode 3) 64 code capability, that transponder is operated to reply to Mode 3/A interrogation with the code specified by ATC;

(ii) If that aircraft is not so equipped, it is operated under specific authorization from ATC; or

(iii) If radio failure prevents the receiving of that authorization, he maintains an appropriate VFR cruising flight level.

(b) No person may pilot an aircraft within a nonradar jet advisory area designated in Part 75 of this chapter unless that aircraft is operated under—

(1) IFR at a specific altitude assigned by ATC; or

(2) Specific authorization from ATC.

§ 91.101 Operations to, or over, Cuba.

No person may operate a civil aircraft from the United States to, or over, Cuba unless—

(a) Departure is from an international airport of entry designated in § 6.13 of the Air Commerce Regulations of the Bureau of Customs (19 CFR 6.13); and

(b) In the case of departure from any of the 48 contiguous States or the District of Columbia, the pilot in command of the aircraft has filed—

(1) A DVFR or IFR flight plan as prescribed in § 99.11 or 99.13 of this chapter; and

(2) A written statement, within one hour before departure, with the office of Immigration and Naturalization Service at the airport of departure, containing—

(i) All information in the flight plan;

(ii) The name of each occupant of the aircraft;

(iii) The number of occupants of the aircraft; and

(iv) A description of the cargo, if any.

This section does not apply to the operation of aircraft by a scheduled air carrier over routes authorized in operations specifications issued by the Administrator.

[§ 91.102 Flight limitation in the proximity of space flight recovery operations.

[No person may operate any aircraft of United States registry, or pilot any aircraft under the authority of an airman certificate issued by the Federal Aviation Administration within areas designated in a Notice to Airmen (NOTAM) for space flight recovery operations except when authorized by ATC, or operated under the control of the Department of Defense Manager for Manned Space Flight Support Operations.]

§ 91.103 Operation of civil aircraft of Cuban registry.

No person may operate a civil aircraft of Cuban registry except in controlled airspace and in accordance with air traffic clearances or air traffic control instructions that may require use of specific airways or routes and landings at specific airports.

§ 91.104 Flight limitations in proximity of the Presidential Party.

No person may operate an aircraft, over and in the vicinity of areas to be visited or traveled by the President, contrary to the limitations specified in a Notice to Airmen (NOTAM).

VISUAL FLIGHT RULES

[§ 91.105 Basic VFR weather minimums.

[(a) Except as provided in § 91.107, 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 in the following table:

Altitude	Flight visibility	Distance from clouds
1,200 feet or less above the surface (regardless of MSL altitude)—		
Within controlled airspace	3 statute miles	500 feet below. 1,000 feet above. 2,000 feet horizontal.
Outside controlled airspace	1 statute mile except as provided in § 91.105(b).	Clear of clouds.
More than 1,200 feet above the surface but less than 10,000 feet MSL—		
Within controlled airspace	3 statute miles	500 feet below. 1,000 feet above. 2,000 feet horizontal.
Outside controlled airspace	1 statue mile	500 feet below. 1,000 feet above. 2,000 feet horizontal.
More than 1,200 feet above the surface and at or above 10,000 feet MSL.	5 statute miles	1,000 feet below. 1,000 feet above. 1 mile horizontal.

[(b) When the visibility is less than one mile, a helicopter may be operated outside controlled airspace at 1,200 feet or less above the surface if operated at a speed that allows the pilot adequate opportunity to see any air traffic or other obstruction in time to avoid a collision.

[(c) Except as provided in § 91.107, no person may operate an aircraft, under VFR, within a control zone beneath the ceiling when the ceiling is less than 1,000 feet.

[(d) Except as provided in § 91.107, no person may take off or land an aircraft, or enter the traffic pattern of an airport, under VFR, within a control zone—

[(1) Unless ground visibility at that airport is at least three statute miles; or

[(2) If ground visibility is not reported at that airport, unless flight visibility during landing or take off, or while operating in the traffic pattern, is at least three statue miles.

[(e) For the purposes of this section, an aircraft operating at the base altitude of a transition area or control area is considered to be within the airspace directly below that area.][1]

§ 91.107 Special VFR weather minimums.

[(a) Except as provided in § 93.113, when a person has received an appropriate ATC clearance, the special weather minimums of this section instead of those contained in § 91.105 apply to the operation of an aircraft by that person in a control zone under VFR.][2]

(b) No person may operate an aircraft in a control zone under VFR except clear of clouds.

(c) No person may operate an aircraft (other than a helicopter) in a control zone under VFR unless flight visibility is at least one statute mile.

(d) No person may take off or land an aircraft (other than a helicopter) at any airport in a control zone under VFR —

(1) Unless ground visibility at that airport is at least one statute mile; or

(2) If ground visibility is not reported at that airport, unless flight visibility during landing or takeoff is at least one statute mile.

§ 91.109 VFR cruising altitude or flight level.

Except while holding in a holding pattern of two minutes or less, or while turning, each person operating an aircraft under VFR in level cruising flight, at or above 3,000 feet above the surface, shall maintain the appropriate altitude prescribed below:

(a) When operating below 18,000 feet MSL and—

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

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

(b) When operating above 18,000 feet MSL to flight level 290 (inclusive), and—

(1) On a magnetic course of zero degrees through 179 degrees, any odd flight level +500 feet (such as 195, 215, or 235); or

(2) On a magnetic course of 180 degrees through 359 degrees, any even flight level +500 feet (such as 185, 205, or 225).

(c) When operating above flight level 290 and—

(1) On a magnetic course of zero degrees through 179 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 300 (such as flight level 300, 340, or 380); or

(2) On a magnetic course of 180 degrees through 359 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 320 (such as flight level 320, 360, or 400).

INSTRUMENT FLIGHT RULES

§ 91.115 ATC clearance and flight plan required.

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

(a) He has filed an IFR flight plan; and

(b) He has received an appropriate ATC clearance.

§ 91.116 Takeoff and landing under IFR: general.

(a) *Instrument approaches to civil airports.* Unless otherwise authorized by the Administrator (including ATC), each person operating an aircraft shall, when an instrument letdown to an airport is necessary, use a standard instrument approach procedure prescribed for that airport in Part 97 of this chapter.

(b) *Landing minimums.* Unless otherwise authorized by the Administrator, no person operating an aircraft (except a military aircraft of the United States) may land that aircraft using a standard instrument approach procedure prescribed in Part 97 of this chapter unless the visibility is at or above the landing minimum prescribed in that Part for the procedure used. If the landing minimum in a standard instrument approach procedure prescribed in Part 97 is stated in terms of ceiling and visibility, the visibility minimum applies. However, the ceiling minimum shall be added to the field elevation and that value observed as the MDA or DH, as appropriate to the procedure being executed.

(c) *Civil airport takeoff minimums.* Unless otherwise authorized by the Administrator, no person operating an aircraft under Part 121, [123,] 129, or 135 of this chapter may take off from a civil airport under IFR unless weather conditions are at or above the weather minimums for IFR takeoff prescribed for that airport in Part 97 of this chapter. If takeoff minimums are not prescribed in Part 97 of this chapter, for a particular airport, the following minimums apply to takeoffs under IFR for aircraft operating under those parts:

(1) Aircraft having two engines or less: 1 statute mile visibility.

(2) Aircraft having more than two engines: ½ statute mile visibility.

(d) *Military airports.* Unless otherwise prescribed by the Administrator, each person operating a civil aircraft under IFR into, or out of, a military airport shall comply with

the instrument approach procedures and the takeoff and landing minimums prescribed by the military authority having jurisdiction on that airport.

(e) *Comparable values of RVR and ground visibility.*

(1) 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 shall be converted to ground visibility in accordance with the table in subparagraph (2) of this paragraph and observed as the applicable visibility minimum for takeoff or landing on that runway.

[(2) *RVR*	*Visibility (statute miles).*
1600 feet	¼ mile
2400 feet	½ mile
3200 feet	⅝ mile
4000 feet	¾ mile
4500 feet	⅞ mile
5000 feet	1 mile
6000 feet	1¼ mile

[(f) *Use of radar in instrument approach procedures.* When radar is approved at certain locations for ATC purposes, it may be used not only for surveillance and precision radar approaches, as applicable, but also may be used in conjunction with instrument approach procedures predicated on other types of radio navigational aids. Radar vectors may be authorized to provide course guidance through the segments of an approach procedure to the final approach fix or position. Upon reaching the final approach fix or position, the pilot will either complete his instrument approach in accordance with the procedure approved for the facility, or will continue a surveillance or precision radar approach to a landing.

[(g) *Use of low or medium frequency simultaneous radio ranges for ADF procedures.* Low frequency or medium frequency simultaneous radio ranges may be used as an ADF instrument approach aid if an ADF procedure for the airport concerned is prescribed by the Administrator, or if an approach is conducted using the same courses and altitudes for the ADF approach as those specified in the approved range procedure.

[(h) *Limitations on procedure turns.* In the case of a radar initial approach to a final approach fix or position, or a timed approach from a holding fix, or where the procedure specifies "NOPT" or "FINAL", no pilot may make a procedure turn unless, when he receives his final approach clearance, he so advises ATC.]

[§ 91.117 Limitations on use of instrument approach procedures (other than Category II).

[(a) *General.* Unless otherwise authorized by the Administrator, each person operating an aircraft using an instrument approach procedure prescribed in Part 97 of this chapter shall comply with the requirements of this section. This section does not apply to the use of Category II approach procedures.

[(b) *Descent below MDA or DH.* No person may operate an aircraft below the prescribed minimum descent altitude or continue an approach below the decision height unless—

[(1) The aircraft is in a position from which a normal approach to the runway of intended landing can be made; and

[(2) The approach threshold of that runway, or approach lights or other markings identifiable with the approach end of that runway, are clearly visible to the pilot.

[If, upon arrival at the missed approach point or decision height, or at any time thereafter, any of the above requirements are not met, the pilot shall immediately execute the appropriate missed approach procedure.

[(c) *Inoperative or unusable components and visual aids.* The basic ground components of an ILS are the localizer, glide slope, outer marker, and middle marker. The approach lights are visual aids normally associated with the ILS. In addition, if an ILS approach procedure in Part 97 of this chapter prescribes a visibility minimum of 1800 feet or 2000 feet RVR, high intensity runway lights, touchdown zone lights, centerline lighting and marking and RVR are aids associated with the ILS for those minimums. Compass locator or precision radar may be substituted for the outer or middle marker. Surveillance radar may be substituted for the outer marker. Unless otherwise specified by the Administrator, if a ground component, visual aid, or RVR is inoperative, or unusable, or not utilized, the straight-in minimums prescribed in any approach procedure in Part 97 are raised in accordance with the following tables. If the related airborne equipment for a ground component is inoperative or not utilized, the increased minimums applicable to the related ground component shall be used. If more than one component or aid is inoperative, or unusable, or not utilized, each minimum is raised to the highest minimum required by any one of the components or aids which is inoperative, or unusable, or not utilized.

[(1) *ILS and PAR.*

Component or aid	Increase decision height	Increase visibility (statute miles)	Approach category
LOC [1]	ILS approach not authorized.		All.
GS	As specified in the procedure.		All.
OM,[1] MM [1]	50 feet	None	ABC.
OM,[1] MM [1]	50 feet	¼	D.
ALS	50 feet	¼	All.
SALS	50 feet	¼	ABC.

[1] Not applicable to PAR.

[(2) *ILS with visibility minimum of 1,800 or 2,000 feet RVR.*

Component or aid	Increase decision height	Increase visibility (statute miles)	Approach category
LOC	ILS approach not authorized.		All.
GS	As specified in the procedure.		All.
OM, MM	50 feet	To ½ mile	ABC.
OM, MM	50 feet	To ¾ mile	D.
ALS	50 feet	To ¾ mile	All.
HIRL, TDZL, RCLS.	None	To ½ mile	All.
RCLM	As specified in the procedure.		All.
RVR	None	To ½ mile	All.

[(3) *VOR, LOC, LDA, and ASR.*

Component or aid	Increase MDA	Increase visibility (statute miles)	Approach category
ALS, SALS	None	½ mile	ABC.
HIRL, MALS, REILS.	None	¼ mile	ABC.

[(4) *NDB(ADF) and LFR.*

Component or aid	Increase MDA	Increase visibility (statute miles)	Approach category
ALS	None	¼ mile	ABC.]

§ 91.119 Minimum altitudes for IFR operations.

(a) Except when necessary for takeoff or landing, or unless otherwise authorized by the Administrator, no person may operate an aircraft under IFR below—

(1) The applicable minimum altitudes prescribed in Parts 95 and 97 of this chapter; or

(2) If no applicable minimum altitude is prescribed in those Parts—

(i) In the case of operations over an area designated as a mountainous area in Part 95, an altitude of 2,000 feet above the highest obstacle within a horizontal distance of five statute miles from the course to be flown; or

(ii) In any other case, an altitude of 1,000 feet above the highest obstacle within a horizontal distance of five statute miles from the course to be flown.

However, if both a MEA and a MOCA are prescribed for a particular route or route segment, a person may operate an aircraft below the MEA down to, but not below, the MOCA, when within 25 statute miles of the VOR concerned (based on the pilot's reasonable estimate of that distance).

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

§ 91.121 IFR cruising altitude or flight level.

(a) *In controlled airspace.* Each person operating an aircraft under IFR in level cruising flight in controlled airspace shall maintain the altitude or flight level assigned that aircraft by ATC. However, if the ATC clearance assigns "VFR conditions-on-top," he shall maintain an altitude or flight level as prescribed by § 91.109.

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

(1) When operating below 18,000 feet MSL and—

(i) On a magnetic course of zero degrees through 179 degrees, any odd thousand foot MSL altitude (such as 3,000, 5,000, or 7,000); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any even thousand foot MSL altitude (such as 2,000, 4,000, or 6,000).

(2) When operating at or above 18,000 feet MSL but below flight level 290, and—

(i) On a magnetic course of zero degrees through 179 degrees, any odd flight level (such as 190, 210, or 230); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any even flight level (such as 180, 200, or 220).

(3) When operating at flight level 290 and above, and—

(i) On a magnetic course of zero degrees through 179 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 290 (such as flight level 290, 330, or 370); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 310 (such as flight level 310, 350, or 390).

§ 91.123 Course to be flown.

Unless otherwise authorized by ATC, no person may operate an aircraft within controlled airspace, under IFR, except as follows:

(a) On a Federal airway, along the centerline of that airway.

(b) On any other route, along the direct course between the navigational aids or fixes defining that route.

However, this section does not prohibit maneuvering the aircraft to pass well clear of other air traffic or the maneuvering of the aircraft, in VFR conditions, to clear the intended flight path both before and during climb or descent.

§ 91.125 IFR, radio communications.

The pilot in command of each aircraft operated under IFR in controlled airspace shall have a continuous watch maintained on the appropriate frequency and shall report by radio as soon as possible—

(a) The time and altitude of passing each designated reporting point, or the reporting points specified by ATC, except that while the aircraft is under radar control, only the passing of those reporting points specifically requested by ATC need be reported;

(b) Any unforecast weather conditions encountered; and

(c) Any other information relating to the safety of flight.

§ 91.127 IFR operations; two-way radio communications failure.

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

(b) *VFR conditions.* If the failure occurs in VFR conditions, or if VFR conditions are encountered after the failure, each pilot shall continue the flight under VFR and land as soon as practicable.

(c) *IFR conditions.* If the failure occurs in IFR conditions, or if paragraph (b) of this section cannot be complied with, each pilot shall continue the flight [according to the following:

[(1) *Route.*

[(i) By the route assigned in the last ATC clearance received;

[(ii) If being radar vectored, by the direct route from the point of radio failure to the fix, route, or airway specified in the vector clearance;

[(iii) In the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance; or

[(iv) In the absence of an assigned route or a route that ATC has advised may be expected in a further clearance, by the route filed in the flight plan.

[(2) *Altitude.* At the highest of the following altitudes or flight levels:

[(i) The altitude or flight level assigned in the last ATC clearance received;

[(ii) The minimum altitude (converted, if appropriate, to minimum flight level as prescribed in § 91.81(c)) for IFR operations; or

[(iii) The altitude or flight level ATC has advised may be expected in a further clearance.

[(3) *Climb.* When it is necessary to climb in order to comply with subparagraph (2) of this paragraph, the following applies:

[(i) Climb to the assigned altitude or flight level in accordance with the last ATC clearance received;

[(ii) Climb to the minimum altitude for IFR operation at the time or place necessary to comply with that minimum; or

[(iii) Climb to the altitude or flight level ATC has advised may be expected in a further clearance at the time or place included in the expect-further-clearance.

[(4) *Leave holding fix.* If holding instructions have been received, leave the holding fix at the expect-further-clearance time received, or, if an expected approach clearance time has been received, leave the holding fix in order to arrive over the fix from which the approach begins as close as possible to the expected approach clearance time.

[(5) *Descent.* Begin descent from the en route altitude or flight level upon reaching the fix from which the approach begins, but not before—

[(i) The expect-approach-clearance time (if received); or

[(ii) If no expect-approach-clearance time has been received, at the estimated time of arrival, shown on the flight plan, as amended with ATC.]

§ 91.129 Operation under IFR in controlled airspace; malfunction reports.

(a) The pilot in command of each aircraft operated in controlled airspace under IFR, shall report immediately to ATC any of the following malfunctions of equipment occurring in flight:

(1) Loss of VOR, TACAN, ADF, or low frequency navigation receiver capability.

(2) Complete or partial loss of ILS receiver capability.

(3) Impairment of air/ground communications capability.

(b) In each report required by paragraph (a) of this section, the pilot in command shall include the—

(1) Aircraft identification;

(2) Equipment affected;

(3) Degree to which the capability of the pilot to operate under IFR in the ATC system is impaired; and

(4) Nature and extent of assistance he desires from ATC.

Subpart C—Maintenance, Preventive Maintenance, and Alterations

§ 91.161 Applicability.

(a) This subpart prescribes rules governing the maintenance, preventive maintenance, and alteration of U.S. registered civil aircraft operating within or without the United States.

(b) Section 91.165, 91.169, 91.170, 91.171, and 91.173 of this subpart do not apply to an aircraft maintained in accordance with a continuous airworthiness program under Part 121 or 127 of this chapter.

§ 91.163 General.

(a) The owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an airworthy condition, including compliance with Part 39 of this chapter.

(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 Part 43.

(c) No person may operate a rotorcraft for which a Rotorcraft Maintenance Manual containing an "Airworthiness Limitations" section has been issued, unless the replacement times, inspection intervals, and related procedures specified in that section of the manual are complied with.

§ 91.165 Maintenance required.

Each owner or operator of an aircraft shall have that aircraft inspected as prescribed in § 91.169 and § 91.170 of this chapter and shall, between required inspections, have defects repaired as prescribed in Part 43 of this chapter. In addition he shall ensure that maintenance personnel make appropriate entries in the aircraft and maintenance records indicating the aircraft has been released to service.

§ 91.167 Carrying persons other than crewmembers after repairs or alterations.

(a) No person may carry any person (other than crewmembers) in an aircraft that has been repaired or altered in a manner that may have appreciably changed its flight characteristics, or substantially affected its operation in flight, until it has been approved for return to service in accordance with Part 43 and an appropriately rated pilot, with at least a private pilot's certificate, flies the aircraft, makes an operational check of the repaired or altered part, and logs the flight in the aircraft's records.

(b) Paragraph (a) of this section does not require that the aircraft be flown if ground tests or inspections, or both, show conclusively that the repair or alteration has not appreciably changed the flight characteristics, or substantially affected the flight operation of the aircraft.

§ 91.169 Inspections.

(a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—

(1) An annual inspection in accordance with Part 43 of this chapter and has been approved for return to service by a person authorized by § 43.7 of this chapter; or

(2) An inspection for the issue of an airworthiness certificate.

No inspection performed under paragraph (b) of the 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 crewmember) for hire or to give flight instruction for hire unless, within the preceding 100 hours of time in service, it has been inspected and approved for return to service in accordance with Part 43 of this chapter. The 100 hour limitation may be exceeded by not more than 10 hours if necessary to reach a place at which the inspection can be done. The excess time, however, is included in computing the next 100 hours of time in service.]

(c) Paragraphs (a) and (b) of this section do not apply to—

(1) Any aircraft for which its registered owner or operator complies with the progres-

sive inspection requirements of § 91.171 and Part 43 of this chapter;

[(2) An aircraft that carries a special flight permit or a current experimental or provisional certificate; or

[(3) Any airplane operated by an air travel club that is inspected in accordance with Part 123 of this chapter and the operator's manual and operations specifications.]

§ 91.170 Altimeter system tests and inspections.

(a) No person may operate an airplane in controlled airspace under IFR unless, within the preceding 24 calendar months, each static pressure system and each altimeter instrument has been tested and inspected and found to comply with Appendix E of Part 43. The static pressure system and altimeter instrument tests and inspections may be conducted by—

(1) The manufacturer of the airplane on which the tests and inspections are to be performed;

(2) A certificated repair station properly equipped to perform these functions and holding—

(i) An instrument rating, Class I;

(ii) A limited instrument rating appropriate to the make and model altimeter to be tested;

(iii) A limited rating appropriate to the test to be performed;

(iv) An airframe rating appropriate to the airplane to be tested; or

(v) A limited rating for a manufacturer issued for the altimeter in accordance with § 145.101(b)(4) of this chapter; or

(3) A certificated mechanic with an airframe rating (static pressure system tests and inspections only).

(b) The first test and inspection required by this section for airplanes under annual inspection is not required to be made until the first annual inspection after July 31, 1967.

(c) No person may operate an airplane in controlled airspace under IFR at an altitude above the maximum altitude to which an altimeter of that airplane has been tested.

§ 91.171 Progressive inspection.

(a) Each registered owner or operator of an aircraft desiring to use the progressive inspection must submit a written request to the Flight Standards District Office having jurisdiction over the area in which the applicant is located, and shall 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.

(b) The frequency and detail of the progressive inspection shall provide for the complete inspection of the aircraft within each 12 calendar 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 insure that the aircraft at all times will be airworthy and will conform to all applicable FAA aircraft specifications, type certificate data sheets, airworthiness directives, and other approved data.

(c) If the progressive inspection is discontinued, the owner or operator shall immediately notify the local General Aviation District Office, in writing, of the discontinuance. After the discontinuance, the first annual inspection under § 91.169(a) is due within 12 calendar months after the last complete inspection of the aircraft under the progressive inspection. The 100-hour inspection under § 91.169(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, will require a detailed inspection of the aircraft and all its components in accordance with the progressive inspection. A routine inspection of the aircraft and a detailed inspection of several components is not considered to be a complete inspection.

§ 91.173 Maintenance records.

(a) Each registered owner or operator of an aircraft shall keep a separate, current, and permanent maintenance record for the aircraft and each engine and shall identify each record as to make, model, serial number, and, if applicable, registration number of the aircraft or engine concerned.

(b) Each registered owner or operator shall use a record of sufficient size and shall include in it the following information:

(1) The kind and extent of maintenance and alteration, and the time in service and date when the work is done. However, major repairs or major alterations may be logged by making reference to the FAA Form ACA-337 by date, or to the work order (by number) and the approving agency.

(2) A chronological listing of compliance with mandatory service bulletins, Airworthiness Directives, and the method of compliance.

(3) The current empty weight, empty center of gravity, and useful load.

(4) The addition or removal of optional equipment.

(5) The addition or removal of required equipment in exchange for optional equipment.

(6) The total time in service and history of each engine overhauled, repaired, or reassembled to standards other than those for rebuilt engines as defined in §91.175.

(7) The total time in service of the aircraft.

(c) Each registered owner or operator shall—

(1) Present the maintenance record for required entries each time inspection or maintenance is done on the aircraft or engine;

(2) Upon disposing of the aircraft or engine, give the maintenance record to the new registered owner or operator; and

(3) Make the maintenance record available for inspection by the Administrator or any authorized representative of the [National Transportation Safety Board].

§ 91.175 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 shall enter, in the new record—

(1) A signed statement of the date the engine was rebuilt;

(2) Each change made as required by Airworthiness Directives; 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.

Part 91—Distribution Table

Former Section	*Revised Section*
1.68 (less last sentence)	91.39
8.31	91.39
8.31–1	Not a rule
8.32	91.39
8.33	91.39
43.1	91.1
43.10 (less (a), (b), and (d))	Surplusage
43.10 (a)	91.27
43.10 (less (a))	91.31
43.11	91.37
43.20 (1st sentence)	91.29
43.20 (less 1st sentence)	91.163
43.20–1(a) (1st sentence)	91.163
43.20–1(a) (2d and last sentences)	91.165
43.20–1(a) (less 1st, 2d and last sentences)	Not a rule
43.20–1(b) (1st sentence)	91.29
43.20–1(b) (less 1st sentence)	Not a rule
43.21	91.167
43.21–1(a)	91.167
43.22	91.169
43.22–2	91.171
43.23	91.173
43.23–1	91.173
43.23–2	91.173
43.24	91.175
43.24–1	91.175
43.24–2	91.175
43.30	91.33
43.31	91.25
43.32	91.35
43.33	91.33
43.45	91.11
43.46	91.17
43.46–1	91.17
43.46–2	Not a rule
43.46–3	Not a rule
43.47 (less (b))	91.13
43.47(b)	91.15
43.48	91.71
43.48–1	91.71
43.49	91.15
43.50	Trfd. to Part 105 [New]
43.51	91.23
43.64(a)	91.21
43.67	91.21
43.70	Trfd. to Part 1 [New] or executed
60.1 (introductory paragraph)	91.1
60.1(a)	In § 307(f) of the Federal Aviation Act of 1958
60.1 (less (a) and introductory paragraph)	91.63
60.1–1	Not a rule
60.1–2	Not a rule
60.1–3	Not a rule
60.1a	91.1
60.2 (last sentence)	91.75
60.2 (less last sentence)	91.3
60.2–1	91.3
60.10	Surplusage
60.11	91.5
60.12	91.9
60.13	91.95
60.14	91.67
60.15	91.65
60.16	91.71
60.16–1	Not a rule
60.17 (less (d))	91.79
60.17 (d)	91.119

Part 91—Distribution Table—*Continued*

Former Section	*Revised Section*
60.17–1	91.75
60.18(a)	91.85 (less (c)(1))
60.18(b)	91.87
60.18(c)	91.89
60.18–2	Not a rule
60.18–3	91.77
60.18–5	Trfd. to Part 93
60.18–6	Trfd. to Part 93
60.19	91.75
60.20	91.83
60.21	91.75
60.21–1	Not a rule
60.21–2	Not a rule
60.22	91.69
60.23	91.78
60.23–1	91.65
60.23–2	Not a rule
60.24	91.93
60.24–1	91.93
60.24–2	91.93
60.24–3	91.93
60.24–4	91.93
60.24–5	91.93
60.25	91.81
60.26	91.7
60.27	91.85(c)(1)
60.28	91.91
60.30	91.105
60.30–1	91.107
60.31	91.107
60.32	91.109
60.33	91.88
60.33–1	Not a rule
60.40	Surplusage
60.41 (1st sentence)	91.115
60.41 (less 1st sentence)	91.83
60.42	91.83
60.43	91.115
60.44	91.121
60.45	91.123
60.46	91.117
60.46–1	91.117
60.46–2	Not a rule
60.47	91.125
60.47–1	Not a rule
60.49	91.127
60.60	Trfd. to Part 1 or executed
[SR 389B	91.47]
SR 422A (43T.11)	91.37
SR 422B (43T.11)	91.37
SR 424C	91.97
SR 425C (13)	91.41
SR 437	91.101
SR 444	91.99
SR 445	91.129
SR 446B	91.19
[SR 448A (less paragraph (2))	91.8]
[SR 456	91.103]
Part 190	91.43
610.6	91.119
609.2	91.117
609.4(d)(2), (e), and (g)	91.117
609.5(b)	91.117

Current Distribution of Former Sections of Part 43

Former Section	*Revised Section*
43.40	61.3
43.41 (less 1st sentence)	61.43
43.41 (1st sentence)	61.3
43.41–1	61.43
43.42	61.45
43.52	61.73
43.55	61.73
43.56	61.78
43.60	61.101
43.61	61.131
43.62	61.165
43.63 (as applicable to private pilots)	61.101
43.63 (as applicable to commercial pilots)	61.131
43.64(b), (c), and (d)	61.177
43.65	61.3
43.68(c)	61.179
43.68 (less (c))	61.47

APPENDIX A

Category II Operations: Manual, Instruments, Equipment and Maintenance

1. Category II Manual.

(a) *Application for approval.* An applicant for approval of a Category II manual or an amendment to an approved Category II manual must submit the proposed manual or amendment to the General Aviation District Office having jurisdiction of the area in which the applicant is located. If the application requests an evaluation program, it must include the following—

(1) The location of the airplane and the place where the demonstrations are to be conducted; and

(2) The date the demonstrations are to commence (at least 10 days after filing the application.)

(b) *Contents.* Each Category II manual must contain—

(1) The registration number, make, and model of the airplane to which it applies;

(2) A maintenance program as specified in § 4 of this Appendix; and

(3) The procedures and instructions related to recognition of decision height, use of runway visual range information, approach monitoring, the decision region (the region between the middle marker and the decision height), the maximum permissible deviations of the basic ILS indicator within the decision region, a missed approach, use of airborne low approach equipment, minimum altitude for the use of the autopilot, instrument and equipment failure warning systems, instrument failure, and other procedures, instructions, and limitations that may be found necessary by the Administrator.

2. Required Instruments and Equipment.

The instruments and equipment listed in this section must be installed in each airplane operated in a Category II operation. This section does not require duplication of instruments and equipment required by § 91.33 or any other provisions of this chapter.

(a) *Group I.*

[(1) Two localizer and glide slope receiving systems. Each system must provide a basic ILS display and each side of the instrument panel must have a basic ILS display. However, a single localizer antenna and a single glide slope antenna may be used.]

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

(3) A marker beacon receiver that provides distinctive aural and visual indications of the outer and the middle marker.

(4) Two gyroscopic pitch and bank indicating systems.

(5) Two gyroscopic direction indicating systems.

(6) Two airspeed indicators.

(7) Two sensitive altimeters adjustable for barometric pressure, each having a placarded correction for altimeter scale error and for the wheel height of the airplane.

(8) Two vertical speed indicators.

[(9) A flight control guidance system that consists of either an automatic approach coupler or a flight director system. A flight director system must display computed information as steering command in relation to an ILS localizer and, on the same instrument, either computed information as pitch command in relation to an ILS glide slope or basic ILS glide slope information. An automatic approach coupler must provide,

at least automatic steering in relation to an ILS localizer. The flight control guidance system may be operated from one of the receiving systems required by subparagraph (1) of this paragraph.]

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

(b) *Group II.*

(1) Warning systems for immediate detection by the pilot of system faults in items (1), (4), (5), and (9) of Group I and, if installed, for use in Category II operations, the radio altimeter and auto throttle system.

(2) Dual controls.

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

(4) A windshield wiper or equivalent means of providing adequate cockpit visibility for a safe visual transition by either pilot to touch down and roll out.

(5) A heat source for each airspeed system pitot tube installed or an equivalent means of preventing malfunctioning due to icing of the pitot system.

3. Instruments and Equipment Approval.

(a) *General.* The instruments and equipment required by § 2 of this Appendix must be approved as provided in this section before being used in Category II operations. Before presenting an airplane for approval of the instruments and equipment, it must be shown that, since the beginning of the 12th calendar month before the date of submission—

(1) The ILS localizer and glide slope equipment were bench checked according to the manufacturer's instructions and found to meet those standards specified in RTCA Paper 23-63/DO-117, dated March 14, 1963, "Standard Adjustment Criteria for Airborne Localizer and Glide Slope Receivers", which may be obtained from the RTCA Secretariat, 2000 K St., N.W., Washington, D.C. 20006, at cost of 50 cents per copy, payment in cash or by check or money order payable to the RADIO TECHNICAL COMMISSION FOR AERONAUTICS;

(2) The altimeters and the static pressure systems were tested and inspected in accordance with Appendix E to Part 43 of this chapter; and

(3) All other instruments and items of equipment specified in § 2(a) of this Appendix that are listed in the proposed maintenance program were bench checked and found to meet the manufacturer's specifications.

(b) *Flight Control Guidance System.* All components of the flight control guidance system must be approved as installed by the evaluation program specified in paragraph (e) of this section if they have not been approved for Category II operations under applicable type or supplemental type certification procedures. In addition, subsequent changes to make, model or design of these components must be approved under this paragraph. Related systems or devices such as the auto throttle and computed missed approach guidance system must be approved in the same manner if they are to be used for Category II operations.

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

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

(2) It must display wheel height above the terrain to an accuracy of plus or minus five feet or five percent, whichever is greater, under the following conditions:

(i) Pitch angles of zero to plus or minus five degrees about the mean approach attitude.

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

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

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

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

(4) With the airplane at an altitude of 200 feet or less, any abrupt change in terrain

representing no more than 10 percent of the airplane's altitude must not cause the altimeter to unlock, and indicator response to such changes must not exceed 0.1 seconds, and in addition, if the system unlocks for greater changes, it must reacquire the signal in less than 1 second.

(5) Systems that contain a push-to-test feature must test the entire system (with or without an antenna) at a simulated altitude of less than 500 feet.

(6) The system must provide to the flight crew a positive failure warning display any time there is a loss of power or an absence of ground return signals within the designed range of operating altitudes.

(d) *Other Instruments and Equipment.* All other instruments and items of equipment required by § 2 of this Appendix must be capable of performing as necessary for Category II operations. Approval is also required after each subsequent alteration to these instruments and items of equipment.

(e) *Evaluation program.*

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

(2) *Demonstrations.* Unless otherwise authorized by the Administrator, the evaluation program for each airplane requires the demonstrations specified in this subparagraph. At least 50 ILS approaches must be flown with at least five approaches on each of three different ILS facilities and no more than one half of the total approaches on any one ILS facility. All approaches shall be flown under simulated instrument conditions to a 100 foot decision height and ninety per cent of the total approaches made must be successful. A successful approach is one in which—

(i) At the 100 foot decision height, the indicated airspeed and heading are satisfactory for a normal flare and landing (speed must be plus or minus five knots of programmed airspeed but may not be less than computed threshold speed, if auto throttles are used);

(ii) The airplane, at the 100 foot decision height, is positioned so that the cockpit is within, and tracking so as to remain within, the lateral confines of the runway extended;

(iii) Deviation from glide slope after leaving the outer marker does not exceed 50 percent of full scale deflection as displayed on the ILS indicator;

(iv) No unusual roughness or excessive attitude changes occur after leaving the middle marker; and

(v) In the case of an airplane equipped with an approach coupler, the airplane is sufficiently in trim when the approach coupler is disconnected at the decision height to allow for the continuation of a normal approach and landing.

(3) *Records.* During the evaluation program the following information must be maintained by the applicant for the airplane with respect to each approach and made available to the Administrator upon request:

(i) Each deficiency in airborne instruments and equipment that prevented the initiation of an approach.

(ii) The reasons for discontinuing an approach including the altitude above the runway at which it was discontinued.

(iii) Speed control at the 100 foot decision height if auto throttles are used.

(iv) Trim condition of the airplane upon disconnecting the auto coupler with respect to continuation to flare and landing.

(v) Position of the airplane at the middle marker and at the decision height indicated both on a diagram of the basic ILS display and a diagram of the runway extended to the middle marker. Estimated touch down point must be indicated on the runway diagram.

(vi) Compatibility of flight director with the auto coupler, if applicable.

(vii) Quality of overall system performance.

(4) *Evaluation.* A final evaluation of the flight control guidance system is made upon successful completion of the demonstrations. If no hazardous tendencies have been displayed or are otherwise known to exist, the system is approved as installed.

4. Maintenance program.

(a) Each maintenance program must contain the following:

(1) A list of each instrument and item of equipment specified in § 2 of this Appendix that is installed in the airplane and approved for Category II operations, including the make and model of those specified in § 2(a).

(2) A schedule that provides for the performance of inspections under subparagraph (5) of this paragraph within 3 calendar months after the date of the previous inspection. The inspection must be performed by a person authorized by Part 43 of this chapter, except that each alternate inspection may be replaced by a functional flight check. This functional flight check must be performed by a pilot holding a Category II pilot authorization for the type airplane checked.

(3) A schedule that provides for the performance of bench checks for each listed instrument and item of equipment that is specified in § 2(a) within 12 calendar months after the date of the previous bench check.

(4) A schedule that provides for the performance of a test and inspection of each static pressure system in accordance with Appendix E to Part 43 of this chapter within 12 calendar months after the date of the previous test and inspection.

(5) The procedures for the performance of the periodic inspections and functional flight checks to determine the ability of each listed instrument and item of equipment specified in § 2(a) of this Appendix to perform as approved for Category II operations including a procedure for recording functional flight checks.

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

(7) A procedure for assuring that the condition of each listed instrument and item of equipment upon which maintenance is performed is at least equal to its Category II approval condition before it is returned to service for Category II operations.

(8) A procedure for an entry in the maintenance records required by § 43.9 of this chapter that shows the date, airport, and reasons for each discontinued Category II operation because of a malfunction of a listed instrument or item of equipment.

(b) *Bench Check.* A bench check required by this section must comply with this paragraph.

(1) It must be performed by a certificated repair station holding one of the following ratings as appropriate to the equipment checked:

(i) An instrument rating.

(ii) A radio rating.

(iii) A rating issued under Subpart D of Part 145.

(2) It must consist of removal of an instrument or item of equipment and performance of the following:

(i) A visual inspection for cleanliness, impending failure, and the need for lubrication, repair, or replacement of parts;

(ii) Correction of items found by that visual inspection; and

(iii) Calibration to at least the manufacturer's specifications unless otherwise specified in the approved Category II manual for the airplane in which the instrument or item of equipment is installed.

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