UNITED STATES OF AMERICA
CIVIL AERONAUTICS BOARD
WASHINGTON, D.C.

Civil Air Regulations Amendment 3-7
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PART 3—AIRPLANE AIRWORTHINESS; NORMAL, UTILITY, AND ACROBATIC CATEGORIES
MISCELLANEOUS AMENDMENTS

Adopted by the Civil Aeronautics Board at its office in Washington, D.C., on the 28th day of January 1952.

These amendments to Part 3 include a complete revision of the administrative provisions contained in Subpart A and several substantive changes to other sections. The revisions to Subpart A make those sections consistent with other airworthiness parts of the Civil Air Regulations.

A substantive change has been made with respect to the spin requirements for the acrobatic category to permit normal use of the controls for recovery in lieu of the free-control provision. The Board considers the new spin requirement to be based on more practical considerations which will result in equally safe spin characteristics for an airplane. Provisions for simplified structural design criteria and demonstration of structural integrity by means of flight tests have also been included.

New water load criteria have been established based upon more recent experience. Similar water load criteria are being established in Part 4b of the Civil Air Regulation for transport category airplanes. Since such provisions are used relatively infrequently in the design of airplanes, the requirement in Part 3 (3.265(a)) does not repeat the material contained in Part 4b but simply refers to it. This should not be interpreted to mean that the Board expects water load criteria to remain the same for airplanes certificated under Part 3 as for airplanes certificated under Part 4b. Any changes to Part 3 in this respect which may be found necessary in the future will, of course, be made.

Several minor changes have also been made, the most notable ones pertaining to the approval of equipment under the Technical Standard Order system and to the power supply for gyroscopic indicators.

Interested persons have been afforded an opportunity to participate in the making of this amendment, and due consideration has been given to all relevant matter presented.

In consideration of the foregoing the Civil Aeronautics Board hereby amends Part 3 of the Civil Air Regulations (14 CFR Part 3, as amended) effective March 5, 1952.

1. By amending Subpart A to read as follows:

SUBPART A—GENERAL

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AIRPLANE CATEGORIES

3.20 Airplane categories.

AUTHORITY: §§ 3.0 to 3.20 issued under sec. 205, 52 Stat. 984; 49 U.S.C. 425. Interpret or apply secs. 601, 603, 52 Stat. 1007, 1009; 49 U.S.C. 551, 553.

SUBPART A—GENERAL

APPLICABILITY AND DEFINITIONS

§ 3.0 *Applicability of this part.* This part establishes standards with which compliance shall be demonstrated for the issuance of type certificates for normal, utility, and acrobatic category airplanes. This part, until superseded or rescinded, shall apply to all normal, utility, and acrobatic category airplanes for which applications for type certification are made after the effective date of this part.

§ 3.1 *Definitions.* As used in this part terms are defined as follows:

(a) *Administration*—(1) *Administrator.* The Administrator is the Administrator of Civil Aeronautics.

(2) *Applicant.* An applicant is a person or persons applying for approval of an airplane or any part thereof.

(3) *Approved.* Approved, when used alone or as modifying terms such as means, devices, specifications, etc., shall mean approved by the Administrator.

(b) *General design*—(1) *Standard atmosphere.* The standard atmosphere is an atmosphere defined as follows:

(i) The air is a dry, perfect gas,

(ii) The temperature at sea level is 59°F.,

(iii) The pressure at sea level is 29.92 inches Hg,

(iv) The temperature gradient from sea level to the altitude at which the temperature equals -67°F. is -0.003566°F./ft. and zero there above.

(v) The density ρ_o at sea level under the above conditions is 0.002378 lb/ft^4 sec^2.

(2) *Maximum anticipated air temperature.* The maximum anticipated air temperature is a temperature specified for the purpose of compliance with the powerplant cooling standards. (See § 3.83.)

(3) *Airplane configuration.* Airplane configuration is a term referring to the position of the various elements affecting the aerodynamic characteristics of the airplane (e.g. wing flaps, landing gear).

(4) *Aerodynamic coefficients.* Aerodynamic coefficients are nondimensional coefficients for forces and moments. They correspond with those adopted by the U.S. National Advisory Committee for Aeronautics.

(5) *Critical engine(s).* The critical engine(s) is that engine(s) the failure of which gives the most adverse effect on the airplane flight characteristics relative to the case under consideration.

(c) *Weights*—(1) *Maximum weight.* The maximum weight of the airplane is that maximum at which compliance with the requirements of this part of the Civil Air Regulations is demonstrated. (See § 3.74.)

(2) *Minimum weight.* The minimum weight of the airplane is that minimum at which compliance with the requirements of this part of the Civil Air Regulations is demonstrated. (See § 3.75.)

(3) *Empty weight*. The empty weight of the airplane is a readily reproducible weight which is used in the determination of the operating weights. (See § 3.73.)

(4) *Design maximum weight.* The design maximum weight is the maximum weight of the airplane at which compliance is shown with the structural loading conditions. (See § 3.181.)

(5) *Design minimum weight.* The design minimum weight is the minimum weight of the airplane at which compliance is shown with the structural loading conditions. (See § 3.181.)

(6) *Design landing weight.* The design landing weight is the maximum airplane weight used in structural design for landing conditions at the maximum velocity of descent. (See § 3.242.)

(7) *Design unit weight.* The design unit weight is a representative weight used to show compliance with the structural design requirements:

(i) Gasoline 6 pounds per U.S. gallon.

(ii) Lubricating oil 7.5 pounds per U.S. gallon.

(iii) Crew and passengers 170 pounds per person.

(d) *Speeds*—(1) *IAS*. Indicated air speed is equal to the pitot static airspeed indicator reading as installed in the airplane without correction for airspeed indicator system errors but including the sea level standard adiabatic compressible flow correction. (This latter correction is included in the calibration of the air-speed instrument dials.)

(2) *CAS*. Calibrated air speed is equal to the air-speed indicator reading corrected for position and instrument error. (As a result of the sea level adiabatic compressible flow correction to the air-speed instrument dial, CAS is equal to the true air speed TAS in standard atmosphere at sea level.)

(3) *EAS*. Equivalent air speed is equal to the air-speed indicator reading corrected for position error, instruments error, and for adiabatic compressible flow for the particular altitude. (EAS is equal to CAS at sea level in standard atmosphere.)

(4) *TAS*. True air speed of the airplane relative to undisturbed air. (TAS=EAS(ρ_0/ρ)$^{1/2}$).

(5) V*c*. The design cruising speed. (See § 3.184.)

(6) V*d*. The design diving speed. (See § 3.184.)

(7) V*f*. The design flap speed for flight loading conditions with wing flaps in the landing position. (See § 3.190.)

(8) V*fe*. The flap extended speed is a maximum speed with wing flaps in a prescribed extended position. (See § 3.742.)

(9) V*h*. The maximum speed obtainable in level flight with rated rpm and power.

(10) V*mc*. The minimum control speed with the critical engine inoperative. (See § 3.111.)

(11) V*ne*. The never-exceed speed. (See § 3.739.)

(12) V*no*. The maximum structural cruising speed. (See § 3.740.)

(13) V*p*. The design maneuvering speed. (See § 3.184.)

(14) V*sf*. The stalling speed computed at the design landing weight with the flaps fully extended. (See § 3.190.)

(15) V*s0*. The stalling speed or the minimum steady flight speed with wing flaps in the landing position. (See § 3.82.)

(16) V*s1*. The stalling speed or the minimum steady flight speed obtained in a specified configuration. (See § 3.82.)

(17) V*x*. The speed for best angle of climb.

(18) V*y* =The speed for best rate of climb.

(e) *Structural*—(1) *Limit load*. A limit load is the maximum load anticipated in normal conditions of operation. (See § 3.171.)

(2) *Ultimate load*. An ultimate load is a limit load multiplied by the appropriate factor of safety. (See § 3.173.)

(3) *Factor of safety*. The factor of safety is a design factor used to provide for the possibility of loads greater than those anticipated in normal conditions of operation and for uncertainties in design. (See § 3.172.)

(4) *Load factor.* The load factor is the ratio of a specified load to the total weight of the airplane; the specified load may be expressed in terms of any of the following: aerodynamic forces, inertia forces, or ground or water reactions.

(5) *Limit load factor*. The limit load factor is the load factor corresponding with limit loads.

(6) *Ultimate load factor*. The ultimate load factor is the load factor corresponding with ultimate loads.

(7) *Design wing area.* The design wing area is the area enclosed by the wing outline (including wing flaps in the retracted position and ailerons, but excluding fillets or fairings) on a surface containing the wing chords. The outline is assumed to be extended through the nacelles and fuselage to the plane of symmetry in any reasonable manner.

(8) *Balancing tail load.* A balancing tail load is that load necessary to place the airplane in equilibrium with zero pitch acceleration.

(9) *Fitting*. A fitting is a part or terminal used to join one structural member to another. (See § 3.306.)

(f) *Power installation*[1]—(1) *Brake horsepower*. Brake horsepower is the power delivered at the propeller shaft of the engine.

(2) *Take-off power*. Take-off power is the brake horsepower developed under standard sea level conditions, under the maximum conditions of crankshaft rotational speed and engine manifold pressure approved for use in the normal take-off, and limited in use to a maximum continuous period as indicated in the approved engine specifications.

[1]For engine airworthiness requirements see Part 13 of the Civil Air Regulations. For propeller airworthiness requirements see Part 14 of the Civil Air Regulations.

(3) *Maximum continuous power*. Maximum continuous power is the brake horsepower developed in standard atmosphere at a specified altitude under the maximum conditions of crankshaft rotational speed and engine manifold pressure approved for use during periods of unrestricted duration.

(4) *Manifold pressure.* Manifold pressure is the absolute pressure measured at the appropriate point in the induction system, usually in inches of mercury.

(5) *Critical altitude*. The critical altitude is the maximum altitude at which in standard atmosphere it is possible to maintain, at a specified rotational speed, a specified power or a specified manifold pressure. Unless otherwise stated, the critical altitude is the maximum altitude at which it is possible to maintain, at the maximum continuous rotational speed, one of the following:

(i) The maximum continuous power, in the case of engines for which this power rating is the same at sea level and at the rated altitude.

(ii) The maximum continuous rated manifold pressure, in the case of engines the maximum continuous power of which is governed by a constant manifold pressure.

(6) *Pitch setting*. Pitch setting is the propeller blade setting determined by the blade angle measured in a manner, and at a radius, specified in the instruction manual for the propeller.

(7) *Feathered pitch*. Feathered pitch is the pitch setting, which in flight, with the engines stopped, gives approximately the minimum drag and corresponds with a windmilling torque of approximately zero.

(8) *Reverse pitch*. Reverse pitch is the propeller pitch setting for any blade angle used beyond zero pitch (e.g., the negative angle used for reverse thrust).

(g) *Fire protection*—(1) *Fireproof.* Fireproof material means material which will withstand heat at least as well as steel in dimensions appropriate for the purpose for which it is to be used. When applied to material and parts used to confine fires in designated fire zones, fireproof means that the material or part will perform this function under the most severe conditions of fire and duration likely to occur in such zones.

(2) *Fire-resistant*. When applied to sheet or structural members, fire-resistant material means a material which will withstand heat at least as well as aluminum alloy in dimensions appropriate for the purpose for which it is to be used. When applied to fluid-carrying lines, other flammable fluid system components, wiring, air ducts, fittings, and powerplant controls, this term refers to a line and fitting assembly, component, wiring, or duct, or controls which will perform the intended functions under the heat and other conditions likely to occur at the particular location.

(3) *Flame-resistant.* Flame-resistant material means material which will not support combustion to the point of propagating, beyond safe limits, a flame after the removal of the ignition source.

(4) *Flash-resistant.* Flash-resistant material means material which will not burn violently when ignited.

(5) *Flammable*. Flammable pertains to those fluids or gases which will ignite readily or explode.

CERTIFICATION

§ 3.10 *Eligibility for type certificate*. An airplane shall be eligible for type certification under the provisions of this part if it complies with the airworthiness provisions hereinafter established or if the Administrator finds that the provision or provisions not complied with are compensated for by factors which provide an equivalent level of safety: *Provided*, That the Administrator finds no feature or characteristic of the airplane which renders it unsafe for the category in which it is certificated.

§ 3.11 *Designation of applicable regulations.* (a) The provisions of this part, together with all amendments thereto effective on the date of application for type certificate, shall be considered as incorporated in the type certificate as though set forth in full.

(b) Except as otherwise provided by the Board, or pursuant to § 1.24 of this chapter by the Administrator, any change to the type design may be accomplished, at the option of the holder of the type certificate, either in accordance with the provisions incorporated by reference in the certificate pursuant to paragraph (a) of this section, or in accordance with the provisions in effect at the time the application for change is filed.

(c) The Administrator, upon approval of a change to a type design, shall designate and keep a record of the provisions of the Civil Air Regulations with which compliance was demonstrated.

§ 3.12 *Amendment of part.* Unless otherwise established by the Board, an amendment to this part shall be effective with respect to airplanes for which application for type certificates are filed after the effective date of the amendment.

§ 3.13 *Type certificate.* (a) An applicant shall be issued a type certificate when he demonstrates the eligibility of the airplane by complying with the requirements of this part in addition to the applicable requirements in Part 1 of the Civil Air Regulations.

(b) The type certificate shall be deemed to include the type design (see § 3.14 (b)), the operating limitations for the airplane (see § 3.737), and any other conditions or limitations prescribed by the Civil Air Regulations. (See also § 3.11 (a).)

§ 3.14 *Data required.* (a) The applicant for a type certificate shall submit to the Administrator such descriptive data, test reports, and computations as are necessary to demonstrate that the airplane complies with the requirements of this part.

(b) The descriptive data required in paragraph (a) of this section shall be known as the type design and shall consist of such drawings and specifications as are necessary to disclose the configuration of the airplane and all the design features covered in the requirements of this part, such information on dimensions, materials, and processing as is necessary to define the structural strength of the airplane, and such other data as are necessary to permit by comparison the determination of the airworthiness of subsequent airplanes of the same type.

§ 3.15 *Inspections and tests.* Inspections and tests shall include all those found necessary by the Administrator to insure that the airplane complies with the applicable airworthiness requirements and conforms to the following:

(a) All materials and products are in accordance with the specifications in the type design,

(b) All parts of the airplane are constructed in accordance with the drawings in the type design,

(c) All manufacturing processes, construction, and assembly are such that the design strength and safety contemplated by the type design will be realized in service.

§ 3.16 *Flight tests.* After proof of compliance with the structural requirements contained in this part, and upon completion of all necessary inspections and testing on the ground, and proof of the conformity of the airplane with the type design, and upon receipt from the applicant of a report of flight tests performed by him, the following shall be conducted:

(a) Such official flight tests as the Administrator finds necessary to determine compliance with the requirements of this part.

(b) After the conclusion of flight tests specified in paragraph (a) of this section, such additional flight tests, on airplanes having a maximum certificated take-off weight of more than 6,000 pounds, as the Administrator finds necessary to ascertain whether there is reasonable assurance that the airplane, its components, and equipment are reliable and function properly. The extent of such additional flight tests shall depend upon the complexity of the airplane, the number and nature of new design features, and the record of previous tests and experience for the particular airplane type, its components, and equipment. If practicable, these flight tests shall be conducted on the same airplane used in the flight tests specified in paragraph (a) of this section.

§ 3.17 *Airworthiness experimental, and production certificates.* (For requirements with regard to these certificates see Part 1 of this chapter.)

§ 3.18 *Approval of materials, parts, processes, and appliances.* (a) Materials, parts, processes, and appliances shall be approved upon a basis and in a manner found necessary by the Administrator to implement the pertinent provisions of the Civil Air Regulations. The Administrator may adopt and publish such specifications as he finds necessary to administer this regulation, and shall incorporate therein such portions of the aviation industry, Federal, and military specifications respecting such materials, parts, processes, and appliances as he finds appropriate.

NOTE: The provisions of this paragraph are intended to allow approval of materials, parts, processes, and appliances under the system of Technical Standard Orders, or in conjunction with type certification procedures for an airplane, or by any other form of approval by the Administrator.

(b) Any material, part, process, or appliance shall be deemed to have met the requirements for approval when it meets the pertinent specifications adopted by the Administrator, and the manufacturer so certifies in a manner prescribed by the Administrator.

§ 3.19 *Changes in type design.* (For requirements with regard to changes in type design see Part 1 of this chapter.)

AIRPLANE CATEGORIES

§ 3.20 *Airplane categories.* (a) For the purpose of certification under this part, airplanes are divided upon the basis of their intended operation into the following categories:

(1) *Normal suffix N.* Airplanes in this category are intended for nonacrobatic, nonscheduled passenger, and nonscheduled cargo operation.

(2) *Utility suffix U.* Airplanes in this category are intended for normal operations and limited acrobatic maneuvers. These airplanes are not suited for use in snap or inverted maneuvers.

NOTE: The following interpretation of paragraph (a) (2) was issued May 15, 1947, 12 F.R. 3434: The phrase "limited acrobatic maneuvers" as used in § 3.6 (now § 3.20) is interpreted to include steep turns, spins, stalls (except whip stalls), lazy eights, and chandelles.

(3) *Acrobatic suffix A.* Airplanes in this category will have no specific restrictions as to type of maneuver permitted unless the necessity therefor is disclosed by the required flight tests.

(b) An airplane may be certificated under the requirements of a particular category, or in more than one category, provided that all of the requirements of each such category are met. Sections of this part which apply to only one or more, but not all, categories are identified in this part by the appropriate suffixes added to the section number, as indicated in paragraph (a) of this section. All sections not identified by a suffix are applicable to all categories except as otherwise specified.

2. By amending § 3.109 (a)(2) to read as follows:

§ 3.109 *Longitudinal control.* * * *

(a) * * *

(2) Power off, airplanes of more than 6,000 pounds maximum weight trimmed at $1.4V_{s1}$, and airplanes of 6,000 pounds or less maximum weight trimmed at $1.5V_{s1}$.

3. By amending § 3.109 (b)(1), (2), (4), and (6) by deleting the words "trimmed at $1.4V_{s1}$" and inserting in lieu thereof the words "trimmed as prescribed in paragraph (a) (2) of this section."

4. By amending § 3.115 (a) (5) to read as follows:

§ 3.115 *Specific conditions.* * * *

(a) *Landing.* * * *

(5) Airplanes of more than 6,000 pounds maximum weight trimmed at $1.4V_{s1}$, and airplanes of 6,000 pounds or less maximum weight trimmed at $1.5V_{s1}$.

5. By amending § 3.120(a)(2) to read as follows:

§ 3.120 *Stalling demonstration.* (a) * * *

(2) With a power setting of not less than that required to show compliance with the provisions of § 3.85 (a) for airplanes of more than 6,000 pounds maximum weight, or with 90 percent of maximum continuous power for airplanes of 6,000 pounds or less maximum weight.

6. By amending § 3.120 (g) (1) to read as follows:

§ 3.120 *Stalling demonstration.* * * *

(g) * * *

(1) With trim controls adjusted for straight flight at a speed approximately 1.4 V_{s1} for airplanes of more than 6,000 pounds maximum weight, or approximately 1.5 V_{s1} for airplanes of 6,000 pounds or less maximum weight, the speed shall be reduced by means of the elevator control until the speed is slightly above the stalling speed; then

7. By amending § 3.124 (c) to read as follows:

§ 3.124 *Spinning.* * * *

(c) *Category A.* All airplanes in this category shall be capable of spinning and shall comply with the following:

(1) At any permissible combination of weight and center of gravity position obtainable with all or part of the design useful load, the airplane shall recover from a six-turn spin, or from any point in a six-turn spin, in not more than 1½ additional turns after the application of the controls in the manner normally used for recovery.

(2) It shall be possible to recover from the maneuver prescribed in subparagraph (1) of this paragraph without exceeding either the limiting air speed or the limit positive maneuvering load factor of the airplane.

(3) It shall not be possible to obtain uncontrollable spins by means of any possible use of the controls.

(4) A placard shall be placed in the cockpit of the airplane setting forth the use of the controls required for recovery from spinning maneuvers.

8. By amending § 3.171 by adding a new paragraph (c) to read as follows:

§ 3.171 *Loads.* * * *

(c) Simplified structural design criteria shall be acceptable if the Administrator finds that they result in design loads not less than those prescribed in §§ 3.181 through 3.265.

9. By amending § 3.174 by adding a new sentence following the third sentence of this section to read as follows: "Dynamic tests including structural flight tests shall be acceptable, provided that it is demonstrated that the design load conditions have been simulated."

10. By rescinding §§ 3.265 through 3.282 and figure 3-13 and by adding in lieu thereof a new § 3.265 to read as follows:

§ 3.265 *Water load conditions.* The structure of boat and float type seaplanes shall be designed for water loads developed during take-off and landing with the seaplane in any attitude likely to occur in normal operation at appropriate forward and sinking velocities under the most severe sea conditions likely to be encountered. Unless a more rational analysis of the water loads is performed, the requirements of §§ 4b.251 through 4b.258 of this chapter shall apply.

11. By amending § 3.361 to read as follows:

§ 3.361 *Wheels.* Main wheels and nose wheels shall be of an approved type. The maximum static load rating of each main wheel and nose wheel shall not be less than the corresponding static ground reaction under the design maximum weight of the airplane and the critical center of gravity position. The maximum limit load rating of each main wheel and nose wheel shall not be less than the maximum radial limit load determined in accordance with the applicable ground load requirements of this part. (See §§ 3.341 through 3.256.)

12. By amending § 3.362 (a) to read as follows:

§ 3.362 *Tires.* * * *

(a) Load on each main wheel tire equal to the corresponding static ground reaction under the design maximum weight of the airplane and the critical center of gravity position.

13. By amending § 3.362 (b) by inserting the words "most critical" in the first sentence preceding the words "center of gravity".

14. By amending § 3.362 by deleting the note at the end of the section.

15. By amending § 3.364 to read as follows:

§ 3.364 *Skis*. Skis shall be of an approved type. The maximum limit load rating of each ski shall not be less than the maximum limit load determined in accordance with the applicable ground load requirements of this part. (See §§ 3.241 through 3.257.)

16. By rescinding §§ 3.365 and 3.366.

17. By amending § 3.371 to read as follows:

§ 3.371 *Seaplane main floats*. Seaplane main floats shall be of an approved type and shall comply with the provisions of § 3.265. In addition, the following shall apply.

(a) *Buoyancy*. Each seaplane main float shall have a buoyancy of 80 percent in excess of that required to support the maximum weight of the seaplane in fresh water.

(b) *Compartmentation*. Each seaplane main float for use on airplanes of 2,500 pounds or more maximum weight shall contain not less than 5 watertight compartments, and those for use on airplanes of less than 2,500 pounds maximum weight shall contain not less than 4 such compartments. The compartments shall have approximately equal volumes.

18. By amending § 3.390 (a) by inserting a new sentence at the beginning of the paragraph to read as follows: "Seats and berths shall be of an approved type."

19. By amending the last sentence of § 3.624 (a) to read as follows:

§ 3.624 *Fire wall construction*. (a) * * * On single-engine airplanes using unsupercharged engines, sealing parts of fire-resistant material shall be acceptable, provided that the engine installation contains no flammable fluid-carrying components other than essential fuel lines and oil pressure gauge lines or components which are an integral part of the engine, and further provided that the opening which might result in case of fire would not involve a serious hazard from the standpoint of flame propagation to the sheltered side of the fire wall.

20. By amending § 3.627 by changing the reference in the first sentence from "§ 3.759" to "§ 3.762."

21. By amending § 3.668 to read as follows:

§ 3.668 *Gyroscopic indicators*. All gyroscopic instruments installed in airplanes intended for operation under instrument flight rules shall derive their energy from a power source of sufficient capacity to maintain their required accuracy at all airplane speeds above the best rate-of-climb speed. They shall be installed to preclude malfunctioning due to rain, oil, and other detrimental elements. Means shall be provided for indicating the adequacy of the power being supplied to each of the instruments. In addition, the following provisions shall be applicable to multiengine airplanes:

(a) There shall be provided at least two independent sources of power, a manual or an automatic means for selecting the power source, and a means for indicating the adequacy of the power being supplied by each source.

(b) The installation and power supply systems shall be such that failure of one instrument or of the energy supply from one source will not interfere with the proper supply of energy to the remaining instruments or from the other source.

22. By rescinding present § 3.669 and by adding a new § 3.669 to read as follows:

§ 3.669 *Flight director instrument*. If a flight director instrument is installed, its installation shall not affect the performance and accuracy of the required instruments. A means for disconnecting the flight director instrument from the required instruments or their installations shall be provided.

23. By amending § 3.764 (d) by inserting the word "usable" before the word "capacity".

(Sec. 205, 52 Stat. 984; 49 U.S.C. 425. Interpret or apply secs. 601, 603, 52 Stat. 1007, 1009; 49 U.S.C. 551, 553)

By the Civil Aeronautics Board:

M.C. Mulligan,

Secretary

[SEAL]

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