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

Civil Air Regulations Amendment 3-14
Effective: March 13, 1956
Adopted: February 7, 1956

CAA Technical

AIRPLANE AIRWORTHINESS - NORMAL, UTILITY, AND ACROBATIC CATEGORIES

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MISCELLANEOUS AMENDMENTS RESULTING FROM THE 1955 ANNUAL AIRWORTHINESS REVIEW

There are contained herein amendments with respect to various issues which resulted from the 1955 Annual Airworthiness Review.

Structural failures experienced in the past with small airplanes in the high speed range strongly indicate the inappropriateness of relating a reduction in the maneuvering load factor with any feature of an airplane intended to improve safety only in the low speed range. Therefore, the provision in § 3.186 which permits a reduction of the maximum maneuvering load factor limitation of 3.8 to 3.5 for airplanes incapable of spinning is being deleted.

The currently effective provisions of § 3.242 permit the design landing weight to be less than the maximum certificated weight only for multiengine airplanes which meet the one-engine-inoperative climb, provided such airplanes comply with the fuel jettisoning and certain ground loads and landing gear requirements of Part 4b. All other airplanes are required to comply with all of the ground load requirements at the maximum weight, and experience has shown that this requirement was critical in most instances for such airplanes with respect to the establishment of the maximum weight. It is believed that this requirement has restricted unduly the utility of small airplanes. Accordingly, § 3.242 is being amended to permit, under certain conditions, the design landing weight of all small airplanes to be as low as 95 percent of the maximum weight.

There is being included a new requirement, § 3.330, with respect to the structural design of supporting structure and the attachment of concentrated mass balance weights incorporated on control surfaces.

Section 3.344 is being amended to require the incorporation of design features or the marking of flight control system elements to minimize the possibility of incorrect assembly. For this same purpose, the fuel valve provisions of § 3.551 are being amended.

The currently effective requirements of § 3.390 with respect to the restraining of occupants in berths by safety belts are considered unrealistic. These provisions are being changed by an amendment which excludes safety belts in berths from compliance with the forward acceleration prescribed for an emergency landing, and instead, requires such forward load with respect to occupants in berths to be reacted by means of a padded end board, a canvas diaphragm, or other equivalent means.

Section 3.431 is being amended to require independence of the fuel system for each engine on all multiengine airplanes.

The currently effective provisions of § 3.624 (a) permit the use of fire-resistant rather than fireproof materials for sealing fire-wall openings on unsupercharged engines. On the basis of present engine design, it is believed that the degree of fire hazard is more closely related to the total engine displacement than to whether or not the engine is supercharged. In view of this, there is being included an amendment which permits the use of fire-resistant sealing of fire walls in installations equipped with engines having a maximum displacement of 1,000 cubic inches or less.

Section 3.702 is being amended to make the intensity requirements for the forward red and green position lights and the rear white position light consistent with the requirements prescribed for these lights in Part 4b.

Section 3.771 is being changed to require placarding of the maneuvering air speed.

There are included also a few minor changes which are editorial or clarifying in nature.

Interested persons have been afforded an opportunity to participate in the making of this amendment (20 F.R. 8350), 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 13, 1956:

1. By amending § 3.186 (a) by deleting the following sentence: "For airplanes certificated as characteristically incapable of spinning, n need not exceed 3.5." and the reference "(see Fig. 3-2)".

2. By deleting Figure 3-2.

3. By amending § 3.242 to read as follows:

3.242 Design weight. The design landing weight shall not be less than the maximum weight for which the airplane is to be certificated, except as provided in paragraph (a) or (b) of this section.

(a) A design landing weight equal to not less than 95 percent of the maximum weight shall be acceptable if it is demonstrated that the structural limit load values at the maximum weight are not exceeded when the airplane is operated over terrain having the degree of roughness to be expected in service at all speeds up to the take-off speed. In addition, the following shall apply:

(1) The minimum fuel capacity shall not be less than the total of the capacity prescribed in § 3.440 and of the capacity equivalent to the weight of fuel equal in amount to that by which the maximum weight exceeds the design landing weight.

(2) The operating limitations shall limit the take-off weight in such a manner as to assure that landings in normal operation would not exceed the design landing weight.

(b) A design landing weight equal to less than 95 percent of the maximum weight shall be acceptable for multiengine airplanes meeting the one-engine-inoperative climb requirement of § 3.85 (b) or § 3.85a (b) if compliance is shown with the following sections of Part 4b of this subchapter in lieu of the corresponding requirement of this part: The ground load requirements of § 4b.230, the landing gear requirements of §§ 4b.331 through 4b.336, and the fuel jettisoning system requirements of § 4b.437.

4. By amending Figure 3-12 (a) by deleting the term "n" from all columns in the two lines titled "Main wheel loads (both wheels) $\{V_r$" and "Tail (nose) wheel loads $\{V_f$" and inserting in lieu thereof in each instance the term "(n-L)".

5. By amending Figure 3-12 (a) by deleting the term "KV_r" from the first and fourth columns of the line titled "Main wheel loads (both wheels) $\{D_r$" and inserting in lieu thereof in each instance the term "KnW".

6. By amending Figure 3-12 (a) by deleting the term "KV_r" from the third column of the line titled "Main wheel loads (both wheels) $\{D_r$" and inserting in lieu thereof the term "KnW a'/d'".

7. By amending Figure 3-12 (a) by deleting the term "KV_f" from the third column of the line titled "Tail (nose) wheel loads $\{D_f$" and inserting in lieu thereof the term "KnW b'/d'".

8. By amending Figure 3-12 (a) by adding a new note to read as follows: "NOTE (4). - L is defined in § 3.353."

9. By adding a new § 3.330 to read as follows:

3.330 Mass balance weights. The supporting structure and the attachment of concentrated mass balance weights which are incorporated on control surfaces shall be designed for the following limit accelerations: 24g normal to the plane of the control surface, 12g fore and aft, and 12g parallel to the hinge line.

10. By amending § 3.344 by adding a new sentence at the end thereof to read as follows: "The elements of the flight control system shall incorporate design features or shall be distinctively and permanently marked to minimize the possibility of incorrect assembly which could result in malfunctioning of the control system."

11. By amending § 3.390 to read as follows:

3.390 Seats and berths. All seats and berths shall be of an approved type. They and their supporting structures shall be designed for an occupant weighing at least 170 pounds (190 pounds with parachute for seats intended for the acrobatic and utility categories) and for the maximum load factors corresponding with all specified flight and ground load conditions including the emergency landing conditions prescribed in § 3.386. The provisions of paragraphs (a) through (d) of this section shall also apply:

(a) Pilot seats shall be designed for the reactions resulting from the application of pilot forces to the primary flight controls as prescribed in § 3.231.

(b) All seats in the U and A categories shall be designed to accommodate passengers wearing parachutes, unless placarded in accordance with § 3.74 (b).

(c) Berths shall be so designed that the forward portion is provided with a padded end board, a canvas diaphragm, or other equivalent means, capable of withstanding the static load reaction of the occupant when subjected to the forward accelerations prescribed in § 3.386. Berths shall be provided with an approved safety belt and shall be free from corners or protuberances likely to cause serious injury to a person occupying the berth during emergency conditions. Berth safety belt attachments shall withstand the critical loads resulting from all relevant flight and ground load conditions and from the emergency landing conditions of § 3.386 with the exception of the forward load.

(d) In determining the strength of the attachment of the seat and berth to the structure, the accelerations prescribed in § 3.386 shall be multiplied by a factor of 1.33.

12. By deleting § 3.391.

13. By amending § 3.431 by deleting from the first sentence the following clause: "which are required to comply with the provisions of §§ 3.85 (b) or 3.85a (b)".

14. By amending § 3.431 by deleting the last sentence and inserting in lieu thereof the following note: "(NOTE: It is not necessarily intended that fuel tanks proper be separate for each engine if a common tank is provided with separate outlets and the remainder of the fuel system is independent.)"

15. By amending § 3.551 by adding a new paragraph (d) to read as follows:

3.551 Fuel valves. * * *

(d) Fuel valve handles and their connections to the valve mechanism shall incorporate design features to minimize the possibility of incorrect installation.

16. By amending § 3.624 (a) to read as follows:

3.624 Fire wall construction.

(a) Fire walls and shrouds shall be constructed in such a manner that no hazardous quantity of liquids, gases, or flame could pass from the engine compartment to other portions of the airplane. All openings in the fire wall or shroud shall be sealed tight with fireproof grommets, bushings, or fire-wall fittings, except that, such seals of fire-resistant materials shall be acceptable for use on single-engine airplanes and multiengine airplanes not required to comply with § 3.85 (b) or § 3.85a (b), if such airplanes are equipped with engine(s) having a volumetric displacement of 1,000 cubic inches or less; and if the openings in the fire walls or shrouds are such that, without seals, the passage of a hazardous quantity of flame could not result.

17. By amending § 3.702 to read as follows:

3.702 Position light distribution and intensities.

(a) General. The intensities prescribed in this section are those to be provided by new equipment with all light covers and color filters in place. Intensities shall be determined with the light source operating at a steady value equal to the average luminous output of the light source at the normal operating voltage of the airplane. The light distribution and intensities of position lights shall comply with the provisions of paragraph (b) of this section.

(b) Forward and rear position lights. The light distribution and intensities of forward and rear position lights shall be expressed in terms of minimum intensities in the horizontal plane, minimum intensities in any vertical plane, and maximum intensities in overlapping beams within dihedral angles L, R, and A, and shall comply with the provisions of subparagraphs (1) through (3) of this paragraph.

(1) Intensities in horizontal plane. The intensities in the horizontal plane shall not be less than the values given in Figure 3-15. (The horizontal plane is the plane containing the longitudinal axis of the airplane and is perpendicular to the plane of symmetry of the airplane).

(2) Intensities above and below horizontal. The intensities in any vertical plane shall not be less than the appropriate value given in Figure 3-16, where I is the minimum intensity prescribed in Figure 3-15 for the corresponding angles in the horizontal plane. (Vertical planes are planes perpendicular to the horizontal plane.)

(3) Overlaps between adjacent signals. The intensities in overlaps between adjacent signals shall not exceed the values given in Figure 3-17, except that higher intensities in the overlaps shall be acceptable with the use of main beam intensities substantially greater than the minima specified in Figures 3-15 and 3-16 if the overlap intensities in relation to the main beam intensities are such as not to affect adversely signal clarity.

18. By adding Figures 3-15 through 3-17.

Dihedral Angle (light involved)	Angle from right or left of longitudinal axis, measured from dead ahead	Intensity (Candles)
L and R (forward red and green)	0° to 10°	40
	10° to 20°	30
	20° to 110°	5
A(Rear white)	110° to 180°	20

Figure 3-15
Minimum Intensities in the Horizontal Plane
of Forward and Rear Position Lights

Angle above or below horizontal	Intensity
0°	1.00 I
0° to 5°	0.90 I
5° to 10°	0.80 I
10° to 15°	0.70 I
15° to 20°	0.50 I
20° to 30°	0.30 I
30° to 40°	0.10 I
40° to 90°	at least 2 candles

Figure 3-16
Minimum Intensities in any Vertical Plane
of Forward and Rear Position Lights

Overlaps	Maximum Intensity	
	Area A (Candles)	Area B (Candles)
Green in dihedral angle L	10	1
Red in dihedral angle R	10	1
Green in dihedral angle A	5	1
Red in dihedral angle A	5	1
Rear white in dihedral angle L	5	1
Rear white in dihedral angle R	5	1

NOTE: Area A includes all directions in the adjacent dihedral angle which pass through the light source and which interest the common boundary plane at more than 10 degrees but less than 20 degrees. Area B includes all directions in the adjacent dihedral angle which pass through the light source and which interest the common boundary plane at more than 20 degrees.

Figure 3-17
Maximum Intensities in Overlapping Beams
of Forward and Rear Position Lights

19. By amending §§ 3.715 by adding a new sentence at the end thereof to read as follows: "In the case of safety belts for berths, the forward load factor need not be applied."

20. By amending § 3.771 by adding a new paragraph (c) to read as follows:

3.771 Airspeed placards. * * *

(c) Rough air or maneuvering speed determined in accordance with § 3.741.

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

By the Civil Aeronautics Board:

/s/ M. C. Mulligan

M. C. Mulligan
Secretary

(SEAL)

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