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

Civil Air Regulations Amendment 4b-4
Effective: April 1, 1957
Adopted: February 25, 1957

AIRPLANE AIRWORTHINESS; TRANSPORT CATEGORIES

POSITION AND ANTI-COLLISION LIGHT REQUIREMENTS

The continuing increase in air traffic density and the advent of airplanes capable of appreciably higher speeds than heretofore attained demand further improvement in the exterior lighting of aircraft. The presently effective regulations in Part 4b of the Civil Air Regulations prescribe certain specifications for anti-collision lights and, in addition, require the installation of a position light flasher and prescribe certain specifications for position lights.

The presently effective specifications for anti-collision lights contained in § 4b.637 were established a few years ago. They were based upon conclusions reached from experimentation and studies conducted by both industry and government. The use on a relatively large number of aircraft of lights conforming to these specifications has revealed the need for further modification. Furthermore, during the past year or so experimentation has led to the development of condenser-discharge type lights which appear to have certain advantageous features. The inherent characteristics of such lights, however, do not permit compliance with certain of the specifications presently contained in § 4b.637. The Board considers that both incandescent and condenser-discharge lights have sufficient advantages to permit their use, provided that the design features essential in an effective anti-collision light system are incorporated. Accordingly, § 4b.637 is being amended to include new specifications which establish in more detail the essential features of an anti-collision light and which at the same time are sufficiently broad to permit the use of new lights currently under development.

Experience with anti-collision lights has shown that the relatively high intensity of these lights may have a deleterious effect on the visibility of the position lights, particularly if the latter are flashing. Apparently the flashing of wing and tail position lights, the fuselage lights, and the anti-collision lights is conducive to confusion as regards the direction of flight. Tests have shown that with the presently used system the clearest indication is obtained when, in addition to the flashing anti-collision light, the lighting system is limited to two wing lights and a white tail light, and when these three position lights are on steady. In view of the foregoing, the provisions of § 4b.632 which require fuselage lights, red tail light, and the flasher are being deleted. Concurrently with this amendment, Part 40 of the Civil Air Regulations is being amended to delete the provision for flashing position lights.

These new specifications for anti-collision and position lights will be applicable to all transport category airplanes for which application for type certification is made after the effective date of this amendment. However, the new lighting system may be installed on current airplanes on a voluntary basis.

It is considered that these new requirements set forth necessary and sufficient conditions for anti-collision light systems to provide a reasonable level of safety. However, since these requirements entail more conditions than have been required in the past, experience with them on individual airplanes might indicate the need for future revisions, particularly with respect to light intensities and coverage. Further, as current research and development programs progress, the question of color of the light might need re-evaluation. The Board will consider any necessary changes as might be indicated by future developments.

Interested persons have been afforded an opportunity to participate in the making of this amendment (21 F.R. 3388), and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, the Civil Aeronautics Board hereby amends Part 4b of the Civil Air Regulations (14 CFR Part 4b, as amended) effective April 1, 1957.

1. By amending § 4b.632 (a) by deleting the paragraph reference "(f)" and inserting in lieu thereof the paragraph reference "(d)".

2. By amending § 4b.632 by deleting paragraphs (d) and (e) and redesignating paragraph (f) as paragraph (d).

3. By amending § 4b.632 (c) to read as follows:

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4b.632 Position light system installation. * * *

(c) Rear position light. The rear position light shall consist of a white light mounted on the airplane as far aft as practicable. The light shall be of an approved type.

4. By amending § 4b.634 by deleting paragraph (c).

5. By amending Figure 4b-18 by deleting the last line from all columns.

6. By amending Figure 4b-20 by deleting the words "or rear red" from the 5th and 6th titles of the first column.

7. By amending § 4b.637 to read as follows:

4b.637 Anti-collision light system. An anti-collision light system shall be installed which shall consist of one or more approved anti-collision lights so located that the emitted light will not be detrimental to the crew's vision and will not detract from the conspicuity of the position lights. The system shall comply with the provisions of paragraphs (a) through (d) of this section.

(a) Field of coverage. The system shall consist of such lights as will afford coverage of all vital areas around the airplane with due consideration to the physical configuration and the flight characteristics of the airplane. In any case, the field of coverage shall extend in all directions within 30° above and 30° below the horizontal plane of the airplane, except that a solid angle or angles of obstructed visibility totaling not more than .03 steradians shall be permissible within a solid angle equal to .15 steradians centered about the longitudinal axis in the rearward direction.

(b) Flashing characteristics. The arrangement of the system, i.e., number of light sources, beam width, speed of rotation, etc., shall be such as to give an effective flash frequency of not less than 40 and not more than 100 cycles per minute. The effective flash frequency shall be the frequency at which the airplane's complete anti-collision light system is observed from a distance, and shall apply to all sectors of light including the overlaps which might exist when the system consists of more than one light source. In overlaps, flash frequencies higher than 100 cycles per minute shall be permissible, except that they shall not be higher than 180 cycles per minute.

(c) Color. The color of the anti-collision lights shall be aviation red in accordance with the specifications of § 4b.635 (a).

(d) Light intensity. The minimum light intensities in all vertical planes, measured with the red filter and expressed in terms of "effective" intensities, shall be in accordance with Figure 4b-27. The following relation shall be assumed:

$$I_e = \frac{\int_{t_1}^{t_2} I(t)\,dt}{0.2 + (t_2 - t_1)};$$

where:

I_e = effective intensity (candles),

$I(t)$ = instantaneous intensity as a function of time,

$t_2 - t_1$ = flash time interval (seconds).

NOTE: Normally, the maximum value of effective intensity is obtained when t_2 and t_1 are so chosen that the effective intensity is equal to the instantaneous intensity at t_2 and t_1.

Angle above or below horizontal plane	Effective intensity (candles)
0° to 5°	100
5° to 10°	60
10° to 20°	20
20° to 30°	10

Figure 4b-27 - Minimum effective intensities for anti-collision lights

(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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