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

Civil Air Regulations Amendment 4b-7
Effective: October 17, 1957
Adopted: September 12, 1957

AIRPLANE AIRWORTHINESS; TRANSPORT CATEGORIES

INSTRUMENT INSTALLATIONS

In 1953 the Civil Aeronautics Board promulgated § 4b.611 (b) of Part 4b of the Civil Air Regulations and established a standard arrangement for the location on the instrument panel of required basic flight instruments. This amendment to § 4b.611 (b) prescribes a new standard for the arrangement of basic flight instruments.

Studies made by representatives of the Government and industry indicated that the standard prescribed in § 4b.611 (b) no longer reflects the optimum instrument arrangement, and does not provide the flexibility needed to include new instruments, or to integrate related instruments, which have been or may be developed in the future. Accordingly, a proposal to replace the existing standard for flight instrument arrangement with a new one commonly referred to as the "Basic T" was published for comment in accordance with public rule making procedures and circulated as Civil Air Regulations Draft Release No. 57-5 on April 3, 1957.

In this draft release it was proposed to establish a "Basic T" arrangement consisting of a group of 6 instruments giving the following information: (1) speed, (2) attitude, (3) altitude, (4) flight path deviation, (5) direction, and (6) climb. However, after consideration of the comment received in response to the proposal and after further analysis of the problem, the Board has concluded that there are only 4, rather than 6, basic flight instruments that require a standard location on the instrument panel. The 4 instruments are those which present basic information as to air speed, attitude, altitude, and direction.

While it was originally proposed to establish standard positions for those instruments giving information as to flight path deviation and climb, it is believed such a proposal would make the standard so inflexible as to interfere with the possible integration of such instruments with the 4 basic instruments, and the use of newly developed instruments. Accordingly, this amendment prescribes standard positions on the instrument panel for only the 4 instruments which present basic information as to air speed, attitude, altitude, and direction.

The concept of the "Basic T" involves more than location of specifically named instruments. The theory is that it will constitute a system by which various items of related flight information will be cataloged and placed in certain standard locations in all instrument panels, regardless of type or make of instruments used. In this manner the "Basic T" takes advantage of the new types of integrated instruments which display more than one item of flight information. It is apparent, however, that if the proposed standard is to be a standard in fact, one basic indication must be specified for each instrument position. This eliminates, for example, the possibility of air speed being replaced by angle of attack under the theory that air speed is no longer required except for navigational purposes. It appears to be generally agreed that the basic indication of position 1 is air speed. In this location may be added related flight information such as Mach number and angle of attack. It also appears to be generally agreed that the basic indications for positions 2 and 3 are pitch and bank, and (barometric) altitude. Command signals for adjusting pitch or turning right or left may be added to the attitude instrument (pitch and bank) and similarly, terrain clearance information and rate of climb may be included in position 3 with the altimeter.

Some difference of opinion was registered by interested parties with respect to position 4, previously position 5 in Draft Release 57-5. This instrument has been labeled "direction," and is intended primarily for navigational information. Certain groups have contended that the basic indication for this location should be heading. Their reason is that heading is paramount in maintaining a course, or making good a desired track, and that a gyroscopically stabilized indication of heading logically belongs immediately below the attitude instrument where it can be read simultaneously with the attitude instrument for three-dimensional control of the airplane. Others, on the other hand, contend that there should be a choice left to the operator to place a display for heading, flight path deviation, or both in this location. The reasoning is that certain carriers desire to use an integrated instrument in this position which shows pictorially the airplane's position in reference to a desired track, but not a quantitative indication of heading.

In considering the above issue the Board takes cognizance of the fact that most air transports of today do not have installed a flight path director or steering computer. In these airplanes heading must be read continually to give significance to the signals received from radio navigation aids.

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Accordingly, heading is the basic indication to be required in position 4. However, with increased use of electronic computers and installation of instrument systems which include command signals to make good required flight tracks there will be less dependence upon heading, and it is possible, therefore, that in the future the basic indication required by the pilot to maintain a given track will not be heading. Consequently, the rule establishes that the number 4 position shall be that instrument which most effectively indicates direction of flight with the understanding that the basic indication of this instrument shall be heading but that if future developments prove it feasible the basic indication of this instrument may be changed so long as it is demonstrated that it is the instrument which most effectively indicates direction of flight. It is believed that this solution is consonant with present and known future aircraft flight instrument systems and will at the same time provide sufficient flexibility to permit use of newer direction instruments if these prove more operationally feasible.

With respect to the specific location of the basic flight instruments, we believe that the attitude (bank and pitch) indicator is the keystone of any instrument arrangement, and should, therefore, be located in the central position on the panel, with the other basic instruments disposed around it. The indicator providing directional information is constantly monitored along with the attitude indicator, in order to provide continuous three-dimensional control of the flight path. Since directional information is associated with the longitudinal axis of the airplane, this instrument should be most naturally positioned centrally beneath the attitude indicator. Control of air speed and altitude are directly related to attitude, so their location laterally adjacent to the attitude indicator is a natural one.

Interested persons have been afforded an opportunity to participate in the making of this amendment (22 F.R. 2538), 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 October 17, 1957.

1. By amending § 4b.611 (b) to read as follows:

4b.611 Arrangement and visibility of instrument installations. * * *

(b) Flight instruments required by § 4b.603 shall be grouped on the instrument panel and centered as nearly as practicable about the vertical plane of the pilot's forward vision. The four basic instruments specified in subparagraphs (1) through (4) of this paragraph shall be located on the flight instrument panel as follows:

(1) The top center position on the panel shall contain that instrument which, of all instruments on the panel, most effectively indicated attitude.

(2) The position adjacent to and directly to the left of the top center position shall contain that instrument which, of all instruments on the panel, most effectively indicates air speed.

(3) The position adjacent to and directly to the right of the top center position shall contain that instrument which, of all instruments on the panel, most effectively indicates altitude.

(4) The position adjacent to and directly below the top center position shall contain that instrument which, of all instruments on the panel, most effectively indicates direction of flight.

2. By deleting Figure 4b-23.

(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

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