

UNITED STATES OF AMERICA  
FEDERAL AVIATION AGENCY  
WASHINGTON, D. C.

Civil Air Regulations Amendments - 4b-15  
40-48  
41-13  
42-12

Effective: September 2, 1964  
Issued: June 26, 1964

[Reg. Doc. No. 3008; Amdts. 4b-15, 40-48,  
41-13, 42-12, 91-4, 514-73]

**PART 4b—AIRPLANE AIRWORTHINESS; TRANSPORT CATEGORIES**

**PART 40—SCHEDULED INTERSTATE AIR CARRIER CERTIFICATION AND OPERATION RULES**

**PART 41—CERTIFICATION AND OPERATION RULES FOR CERTIFICATED ROUTE AIR CARRIERS ENGAGING IN OVERSEAS AND FOREIGN AIR TRANSPORTATION AND AIR TRANSPORTATION WITHIN HAWAII AND ALASKA**

**PART 42—AIRCRAFT CERTIFICATION AND OPERATION RULES FOR SUPPLEMENTAL AIR CARRIERS, COMMERCIAL OPERATORS USING LARGE AIRCRAFT, AND CERTIFICATED ROUTE AIR CARRIERS ENGAGING IN CHARTER FLIGHTS OR OTHER SPECIAL SERVICES**

**PART 91—GENERAL OPERATING AND FLIGHT RULES [NEW]**

**PART 514—TECHNICAL STANDARD ORDERS FOR AIRCRAFT MATERIALS, PARTS, PROCESSES, AND APPLIANCES**

**Installation of Cockpit Voice Recorders in Large Airplanes Used by an Air Carrier or a Commercial Operator**

The purpose of these amendments is to require the installation of approved cockpit voice recorders in certain large airplanes used by air carriers or commercial operators. The requirements include rules for the operation of the recorders, standards of performance for their approval, and standards governing the method of installation on an airplane.

On December 18, 1963, the Federal Aviation Agency published a notice of proposed rule making circulated as Notice 63-46 (28 F.R. 13786), containing proposals to amend Parts 4b, 40, 41, and 42 of the Civil Air Regulations, Part 91

[New] of the Federal Aviation Regulations, and Part 514 of the Regulations of the Administrator, to accomplish this purpose. As stated in the notice, the Agency believes that cockpit voice recorders would be a valuable tool in the investigation of accidents by providing firsthand information of the flight crews' observation and analysis of conditions aboard the airplane and the procedures employed by them to cope with an emergency. This information would also facilitate the development and establishment of appropriate corrective procedures and standards by the Agency and industry.

A large number of comments were received in response to Notice 63-46. These comments have been carefully studied by the Agency and, where appropriate, changes have been made in this final rule. The following is a discussion of the major issues raised in response to the notice and the action, if any, taken by the Agency in the final rule.

1. *Crash and maintenance recorders.* The Air Transport Association urged government and industry to devote their current efforts and funds to crash and maintenance recorders and to exclude a separate voice recorder effort. This comment was based on the belief that the potential benefits of improved crash or maintenance recorders are far greater than those of the cockpit voice recorders proposed in the notice. The ATA pointed out that voice recordings could be misleading in the investigation of accidents, because the spoken words might describe one situation (e.g., approach lights are not visible) and immediately thereafter the situation might change (approach lights are seen) but with no words being spoken.

The Agency agrees that improved flight (crash) or maintenance recorders would be of great assistance in accident investigation; however, it does not believe that the development and eventual installation of such recorders will obviate the present or future need for cockpit voice recorders. Although the flight or maintenance recorder supplies information about the airplane itself, the cockpit

voice recorder is needed to supply firsthand information concerning the flight crew's observation or analysis of the situation and the procedures employed by them. Fragmentary information from voice recorders may, in some instances, be misleading. Nevertheless the Agency believes that the information provided by the voice recorder will in most instances be helpful.

2. *Exemption of certain classes of airplanes.* The ATA also recommended that reciprocating twin-engine airplanes (e.g., DC-3, Convair 240, 340, 440, Martin 202, 404) be excluded from the cockpit voice recorder requirements because these airplanes have a proven safety record as shown by extensive service experience, and their remaining useful life is relatively short. The Agency finds merit in this recommendation, especially since flight recorders are not required on such aircraft and the effectiveness of the voice recorder on such aircraft may be reduced because of the high cockpit sound level. Further, the Agency considers that this reasoning applies also to non-pressurized reciprocating four-engine airplanes. The installation of cockpit voice recorders is therefore being required only for airplanes in the following classes:

(1) All large turbine powered airplanes;

(2) All large pressurized reciprocating four-engine airplanes.

3. *Restricted use of record.* Several comments recommended that the rules prohibit the use of cockpit voice recordings for any purpose other than accident investigation. One comment recommended a rule that recordings shall not be used in any civil penalty or certificate action, and shall not be disclosed publicly when such disclosure would adversely affect the interests of persons involved and is not in the interest of the public. Another comment recommended that only specified unbiased agencies (e.g., the Bureau of Standards, FBI, or Flight Safety Foundation) be authorized to perform readout of tapes.

The Agency agrees that its only purpose in requiring the recorded information is to assist in determining the cause

NOTE: This document also contains Amendment 91-4 to Part 91 of the Federal Aviation Regulations which will be issued as a change to that Part, and TSO-C84 which will be issued as a separate document.

of accidents or occurrences, and that the information should be used only in connection with the investigation of accidents or occurrences pursuant to Part 320 of the Board's Accident Investigation Regulations, (14 CFR Part 320) and not in any civil penalty or certificate action. A provision to this effect has been adopted. The Agency cannot, of course, bind the Courts or the Civil Aeronautics Board with respect to accident information and could not, even if it found it desirable, specify by rule those persons who would be authorized to read out voice recorder tapes.

4. *Bulk erasure.* Recommendations were made that a "bulk erasure" device be required in the recorder. The Agency believes that the provision of a bulk erasure feature should be a matter of individual determination by the air carriers involved and the rules being adopted neither require nor prohibit a bulk erasure feature. If bulk erasure devices are used the rules as adopted herein include a requirement that the installation minimize the probability of inadvertent operation or the actuation of the device during crash impact.

5. *Location of recorder.* The Civil Aeronautics Board recommended that the recorder unit which contains the record be located well back in the pressurized area of the fuselage (to minimize damage in a crash), since the proposed standards for the cockpit voice recorder specify an impact test of only 100g acceleration. Another comment made a similar recommendation.

The Board has supplied information concerning the damage which has occurred to flight recorders during accidents involving severe damage. This information indicates that in 13 out of 15 such accidents, the flight recorder was broken open and in 8 accidents fire also occurred. In all 15 of these accidents, flight recorders were mounted in the radio rack, wheel well, or center section. Thus service experience shows that flight recorders located in the radio rack, wheel well, or center section frequently break open during crashes, and expose the record medium to subsequent fire in about half of these crashes.

The Agency agrees with the recommendation of the Civil Aeronautics Board. Cockpit voice recorders designed to the current 100g impact standard can reasonably be expected to break open as frequently as the presently used flight recorders. The magnetic tape used in cockpit voice recorders should be kept below 250° F., in order to preserve the record, and is, therefore, much more vulnerable to heat damage than is the metal tape used in flight recorders. Therefore, voice recorder records would probably be lost in a number of accidents if the recorder containers have the same crash resistance and the same location in the airplane as the currently installed flight recorders.

There is no statistical evidence to make a direct comparison of the damage suffered by flight recorders in forward and aft locations. However, accident investigators have found that the aft portion of an airplane generally suffers less damage than the forward portion during crash impact.

In accordance with the recommendation of the Board § 4b.656(e) as adopted herein requires that the recorder container be located as far aft as practicable so as to minimize the probability of rupture of the container as a result of crash impact and consequent heat damage to the record because of fire. However, it need not be located outside of the pressurized compartment and must not be located where aft mounted engines are likely to crush the container during impact.

6. *Crash resistance criteria.* A recommendation was received that the proposed standard for impact shock and fire protection tests (section 3.13 of "Minimum Performance Standards for Cockpit Voice Records" dated November 1, 1963) be revised in adopting the final rules by increasing the impact acceleration from 100g for 11 milliseconds to 1000g for 0.5 milliseconds, by adding a crushing force test of 4000 pounds for 5 minutes, and by replacing the 1100 degree C. flame test with a two-step oven test at 1100 degrees C. and 200 degrees C. respectively. It was also recommended that the immersion test specified in section 3.12 be revised to include skydrol as well as sea water. The manufacturer making these recommendations further recommended that the deadline dates for completing recorder installations be delayed six months to enable the development of a recorder meeting the higher crash resistance standards.

The impact acceleration specified in the notice is the same as that currently specified in the standards for flight recorders, except that the 11 millisecond duration has been added. This impact test was specified in the Agency's development program for cockpit voice recorders, and recorders meeting this test are now ready for production.

The Agency plans to include an investigation of crash resistance in a program to develop improved aircraft data recorders. However, before new crash resistance standards could be considered for cockpit voice recorders, it would first be necessary to conduct an experimental test program to verify that the new standards are adequate and can reasonably be met. Although this recommendation may have merit, this procedure may delay the installation program more than one year. On the other hand, the installation of presently available recorders in an aft location which provides increased crash resistance could be accomplished in a shorter time. Accordingly, the rules being adopted at this time incorporate the impact, fire, and immersion test standards that were proposed in the notice.

7. *Compliance dates.* Notice 63-46 proposed the following deadline dates for completing cockpit voice recorder installations:

(1) July 1, 1965, for all turbine powered airplanes;

(2) January 1, 1966, for all pressurized reciprocating four-engine airplanes; and

(3) July 1, 1966, for all other airplanes.

In commenting on the notice, manufacturers recommended that these dates be postponed six months to allow time for determining suitable locations for

microphones and for designing and testing the complete installation. Airlines recommended that the proposed dates be postponed 18 months (setting the deadline for turbine powered airplanes at January 1, 1967), in order to avoid the severe economic and operational effects which would result from taking airplanes out of service to make the installations. One airline having 105 turbine powered airplanes estimated that it would be necessary to remove 31 of these airplanes from service to meet the proposed July 1, 1965, deadline, assuming that the rules were adopted 15 months before the deadline. It was stated that the loss of revenue from removing these airplanes from service (at other than the scheduled maintenance periods) would be about twice the cost of installing the recorders.

Using the airline's estimate that approximately 70 percent of the installations could be completed in 15 months, it appears that the entire turbine powered fleet could be completed in 22 months. Allowing two months additional engineering time for designing the aft installations, the total time from adoption of rules to completion of installations would be approximately two years. Accordingly, the following dates are prescribed in the amendments to Parts 40, 41, and 42 for completing cockpit voice recorder installations in certain large airplanes used by an air carrier or a commercial operator:

(1) July 1, 1966, for all turbine powered airplanes; and

(2) January 1, 1967, for all pressurized reciprocating four-engine airplanes.

8. *Source of electric power.* Several comments referred to the installation requirements proposed for Part 4b. One comment pointed out that the proposed requirement specifying that the cockpit voice recorder be connected to the bus of maximum reliability might jeopardize the operation of other equipment essential to the safe operation of the airplane. The Agency agrees and the adopted rule therefore specifies that the cockpit voice recorder shall receive its electric power from the bus which provides the maximum reliability for operation without jeopardizing service to essential or emergency loads.

9. *Channel priority.* Other comments pointed out the difficulties that might arise on some airplanes if more than one cockpit-mounted area microphone is connected to a single channel, or if loudspeaker systems are connected to the flight recorder. The Agency believes these comments are valid. Accordingly, the channel assignments in § 4b.656(b) have been revised to eliminate these difficulties. In particular, the cockpit-mounted area microphone most suitably located for recording voice communications originating at the first and second pilot's stations has been assigned a separate channel.

10. *Intelligibility.* A recommendation was made that a definite minimum requirement of at least 95 percent intelligibility be prescribed for recordings made under any normal flight operating condition. Studies made by the Agency have shown that this goal is not attainable in the present state of the art and

achieved depends upon the cockpit noise environment of the particular airplane type. For these reasons, the rule being adopted requires that the cockpit-mounted area microphones shall be located so that the intelligibility of the recorded communications will be as high as practicable.

11. *Ejection mechanism and locator aids.* One comment recommended that the recorder: (a) Be ejectable from the airplane upon impact (to remove it from any crash fire); (b) be designed to float on water; (c) be fitted with an impact-triggered homing radio transmitter; (d) have additional channels; and (e) be painted a distinctive color as a locator aid. The Agency believes that the impact and fire test standards set forth in TSO-C84, coupled with the requirement for aft location of the recorder, will serve to preserve the voice record in the event of a ground crash fire without additional ejection features. The suggested ejecting, floating, and signal-transmitting features would apparently be helpful in preserving the voice record in the case of crashes at sea. The Agency is studying the need to require these features (which were not proposed in Notice 63-46) for both voice and flight recorders; if justifiable, further rule making along these lines will be undertaken. As to the matter of additional channels to record additional parameters, the Agency believes such a requirement would be premature in view of the program now under way for the development of improved aircraft data recorders.

The Agency agrees that the recorder container should have a bright distinctive color to assist in locating it after an accident. Such a minor additional requirement should not delay the installation program and it has been included in the installation requirements. Accordingly, the amendments to Part 4b require the recorder container to be painted bright orange.

12. *Time correlation with flight recorder.* One comment noted that it would be desirable to provide time correlation between the cockpit voice recording and the flight recorder record. Such a requirement is unnecessary because a crash impact, if it occurs, should provide an adequate means of correlation between the records.

13. *Sensitivity.* A recorder manufacturer recommended that consideration be given to the need for minimum sensitivity standards for the voice recorder amplifiers. Although no sensitivity requirement is contained in TSO-C84, the Agency believes that adequate sensitivity is prescribed, in effect, by the Part 4b installation requirement (adopted with this rule making action) dealing with the play-back intelligibility of the voice record. Accordingly, sensitivity standards are not being adopted at this time. For similar reasons, the Agency is not adopting a separate recommendation that distortion limits be specified at the extremes of the frequency range.

14. *Operation with inoperative voice recorder.* The ATA also commented on the proposed amendments to §§ 91.36(c) (1) and 91.36(c) (2) concerning continuation of flight with the cockpit voice

recorder inoperative. The comments apparently assumed that these provisions of Part 91 [New] would apply to all air carrier and commercial operations. This assumption is not correct. Part 91 [New] applies, in this respect, only to general operations with air carrier airplanes, such as training and ferry flights. Air carrier and commercial operations, on the other hand, are governed under Parts 40, 41, and 42, wherein the matter of proceeding with inoperative equipment is treated in the "go-no-go" section of the air carrier's or commercial operator's manual. It is anticipated that the "go-no-go" sections of the air carrier's and commercial operator's manuals, dealing with cockpit voice recorders, will be similar to those dealing with flight recorders. Since the provisions being adopted for cockpit voice recorders in Part 91 [New] are identical with corresponding requirements therein for flight recorders, they have been incorporated in § 91.35.

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

In consideration of the foregoing, effective Sept. 2, 1964, unless otherwise specified in this amendment, Parts 4b, 40, 41, and 42 of the Civil Air Regulations, Part 91 [New] of the Federal Aviation Regulations, and Part 514 of the Regulations of the Administrator are amended as follows:

1. By amending Part 4b by adding a new § 4b.656 to read as follows:

**§ 4b.656 Installation of cockpit voice recorders.**

(a) If a cockpit voice recorder is required by the operating rules of this chapter, it shall be of an approved type and shall be installed so that it will record all—

(1) Voice communications transmitted from or received in the airplane by radio;

(2) Voice communications of flight crewmembers on the flight deck;

(3) Voice communications of flight crewmembers on the flight deck using the airplane's interphone system;

(4) Voice communications of flight crewmembers using the airplane's loud speaker system (if such system is provided in the airplane); and

(5) Voice or audio signals identifying navigation or approach aids introduced into a headset or speaker in the airplane.

(b) The cockpit voice recorder shall be installed so that the portion of the communication or audio signals specified in paragraph (a) of this section obtained from each of the following sources is recorded on a separate channel:

(1) *First channel.* Microphones, headsets, or speakers used at the first pilot station;

(2) *Second channel.* Microphones, headsets, or speakers used at the second pilot station;

(3) *Third channel.* The cockpit-mounted area microphone most suitably located for recording voice communications originating at the first and second pilot stations; and

(4) *Fourth channel.* Any other sources including:

(i) A second cockpit-mounted area microphone, if one is required for any required flight crewmember station other than the first or second pilot station;

(ii) Microphones, headsets, or speakers used at the station for a third flight crewmember when he is required, and the signals at that station are not picked up by another channel; and

(iii) Microphones located on the flight deck and used with the airplane's loud speaker system if its signals are not picked up by other channels.

(c) In addition to the requirements of paragraphs (a) and (b) of this section, the cockpit voice recorder must be installed so that—

(1) It receives its electric power from the bus that provides the maximum reliability for operation of the cockpit voice recorder without jeopardizing service to essential or emergency loads;

(2) There is an automatic means to ensure that any erasure feature ceases to function at the instant of crash impact; and

(3) There is an aural or visual means for preflight checking of the recorder for proper operation.

(d) The recording requirements of paragraph (a) (2) of this section shall be met by installing one or more cockpit-mounted area microphones arranged to pick up continuously all voice communications by flight crewmembers when at their assigned stations on the flight deck. The microphones shall be located, and the preamplifiers and filters of the recorder shall be adjusted or supplemented if necessary, so that the intelligibility of the recorded communications will be as high as practicable, when recorded under flight cockpit noise conditions and played back. Repeated aural or visual playback of the record may be employed in evaluating the intelligibility.

(e) The record container shall be located and mounted in the airplane to minimize the probability of rupture of the container as a result of crash impact and consequent heat damage to the record because of fire. In complying with this requirement, the record container shall be located as far aft as practicable, except that it need not be located outside the pressurized compartment and shall not be located where aft mounted engines are likely to crush the container during impact.

(f) If the cockpit voice recorder is provided with a bulk erasure device, the installation shall be designed to minimize the probability of inadvertent operation and the actuation of the device during crash impact.

(g) The color of the recorder container shall be a bright orange.

2. By amending Part 40 by adding a new § 40.212 to read as follows:

**§ 40.212 Cockpit voice recorders.**

(a) On or before the following dates an approved cockpit voice recorder shall be installed in each of the following airplanes having a maximum certificated takeoff weight of more than 12,500 pounds:

(1) July 1, 1966, for all turbine powered airplanes; and

(2) January 1, 1967, for all pressurized reciprocating four-engine airplanes.

(b) Each air carrier shall establish a schedule for the progressive completion of the cockpit voice recorder installation in each airplane specified in paragraph (a) of this section before the dates prescribed in that paragraph. The schedule shall include a list of any airplane specified in paragraph (a) of this section that the air carrier intends to discontinue using before the dates prescribed in that paragraph. The air carrier shall submit the schedule to the Administrator before October 1, 1964.

(c) The cockpit voice recorder shall be installed in accordance with the requirements of Part 4b of this chapter.

(d) The cockpit voice recorder shall be operated continuously from the start of the use of the checklist, prior to starting engines for the purpose of flight, to the completion of the final checklist at the termination of the flight. In complying with this requirement, an approved cockpit voice recorder having an erasure feature may be utilized, so that at any instant during the operation of the recorder, information recorded more than 30 minutes earlier may be erased or otherwise obliterated.

(e) In the event of an accident or occurrence requiring immediate notification to the Board, under Part 320 of its regulations, the recorded information shall be retained by the air carrier for a period of at least 60 days or, if requested by the Administrator or the Board, for a longer period. Information obtained from the record is used to assist in determining the cause of accidents or occurrences in connection with investigations pursuant to Part 320 of the Board's regulations. The Administrator does not use the record in any civil penalty or certificate action.

3. By amending Part 41 by adding a new § 41.212 to read as follows:

**§ 41.212 Cockpit voice recorders.**

(a) On or before the following dates an approved cockpit voice recorder shall be installed in each of the following airplanes having a maximum certificated takeoff weight of more than 12,500 pounds:

(1) July 1, 1966, for all turbine powered airplanes; and

(2) January 1, 1967, for all pressurized reciprocating four-engine airplanes.

(b) Each air carrier shall establish a schedule for the progressive completion of the cockpit voice recorder installation in each airplane specified in paragraph (a) of this section before the dates prescribed in that paragraph. The schedule shall include a list of any airplane specified in paragraph (a) of this section that the air carrier intends to discontinue using before the dates prescribed in that paragraph. The air carrier shall submit the schedule to the Administrator before October 1, 1964.

(c) The cockpit voice recorder shall be installed in accordance with the requirements of Part 4b of this chapter.

(d) The cockpit voice recorder shall be operated continuously from the start of the use of the checklist, prior to start-

ing engines for the purpose of flight, to the completion of the final checklist at the termination of the flight. In complying with this requirement, an approved cockpit voice recorder having an erasure feature may be utilized, so that at any instant during the operation of the recorder, information recorded more than 30 minutes earlier may be erased or otherwise obliterated.

(e) In the event of an accident or occurrence requiring immediate notification to the Board under Part 320 of its regulations, the recorded information shall be retained by the air carrier for a period of at least 60 days or, if requested by the Administrator or the Board, for a longer period. Information obtained from the record is used to assist in determining the cause of accidents or occurrences in connection with investigations pursuant to Part 320 of the Board's regulations. The Administrator does not use the record in any civil penalty or certificate action.

4. By amending Part 42 by adding a new § 42.212 to read as follows:

**§ 42.212 Cockpit voice recorders.**

(a) On or before the following dates an approved cockpit voice recorder shall be installed in each of the following airplanes having a maximum certificated takeoff weight of more than 12,500 pounds:

(1) July 1, 1966, for all turbine powered airplanes; and

(2) January 1, 1967, for all pressurized reciprocating four-engine airplanes.

(b) Each operator shall establish a schedule for the progressive completion of the cockpit voice recorder installation in each airplane specified in paragraph (a) of this section before the dates prescribed in that paragraph. The schedule shall include a list of any airplane specified in paragraph (a) of this section that the operator intends to discontinue using before the dates prescribed in that paragraph. The operator shall submit the schedule to the Administrator before October 1, 1964.

(c) The cockpit voice recorder shall be installed in accordance with the requirements of Part 4b of this chapter.

(d) The cockpit voice recorder shall be operated continuously from the start of the use of the checklist, prior to starting engines for the purpose of flight, to the completion of the final checklist at the termination of the flight. In complying with this requirement, an approved cockpit voice recorder having an erasure feature may be utilized, so that at any instant during the operation of the recorder, information recorded more than 30 minutes earlier may be erased or otherwise obliterated.

(e) In the event of an accident or occurrence requiring immediate notification to the Board under Part 320 of this title, the recorded information shall be retained by the operator for a period of at least 60 days or, if requested by the Administrator or the Board, for a longer period. Information obtained from the record is used to assist in determining the cause of accidents or occurrences in connection with investigations pursuant to Part 320 of this title. The Adminis-

trator does not use the record in any civil penalty or certificate action.

5. By amending § 91.35 to read as follows:

**§ 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.

6. By amending Part 514 by adding the following § 514.90:

**§ 514.90 Cockpit voice recorder—TSO C-84.**

(a) *Applicability.* (1) Minimum performance standards here hereby established for cockpit voice recorders for use on United States civil aircraft. New models of cockpit voice recorders manufactured for use on civil aircraft on or after September 2, 1964, shall meet the standards specified in Federal Aviation Agency Standard, "Minimum Performance Standards for Cockpit Voice Recorders," dated November 1, 1963,<sup>1</sup> and Federal Aviation Agency document entitled, "Environmental Test Procedures for Airborne Electronic Equipment," August 31, 1962,<sup>1</sup> except as provided in subparagraph (2) of this paragraph.

(2) Federal Aviation Agency document, "Environmental Test Procedures for Airborne Electronic Equipment," outlines various test procedures which define the environmental extremes over which the equipment shall be designed to operate. Some test procedures have categories established and some do not. Where categories are established, only equipment which qualifies under one or more of the following categories, as specified in the FAA document, is eligible for approval under this order:

(i) Temperature-Altitude Test—Categories A, B, C, or D;

<sup>1</sup> Copies may be obtained upon request addressed to the Federal Aviation Agency, Attention HQ-620, Washington, D.C., 20553.

(ii) Vibration Test—Categories A, B, C, D, E, or F;

(iii) Audio-Frequency Magnetic Field Susceptibility Test—Categories A or B;

(iv) Radio-Frequency Susceptibility Test—Category A; and

(v) Emission of Spurious Radio-Frequency Energy Test—Category A.

(b) *Marking.* (1) In addition to the markings specified in § 514.3(d), the equipment shall be marked to indicate the environmental extremes over which it has been designed to operate. There are six environmental test procedures outlined in the FAA document, "Environmental Test Procedures for Airborne Electronic Equipment," which have categories established. These shall be identified on the nameplate by the words "environmental categories" or, as abbreviated, "Env. Cat." followed by six letters which identify the categories under which the equipment is qualified. Reading from left to right, the category designations shall appear on the nameplate in the following order so that they may be readily identified:

(i) Temperature-Altitude Category;

(ii) Vibration Test Category;

(iii) Audio-Frequency Magnetic Field Susceptibility Test Category;

(iv) Radio Frequency Susceptibility Test Category;

(v) Emission of Spurious Radio-Frequency Energy Test Category; and

(vi) Explosion Test.

(2) Equipment which meets the explosion test requirement shall be identified by the letter "E". Equipment which does not meet the explosion test requirement shall be identified by the letter

"X". A typical nameplate identification would be as follows: Env. Cat. DBAAAX.

(3) In some cases such as under the Temperature-Altitude Test Category, a manufacturer may wish to substantiate his equipment under two categories. In this case, the nameplate shall be marked with both categories in the space designated for that category by placing one letter above the other in the following manner: Env. Cat. <sup>A</sup><sub>D</sub>BAAAX.

(c) *Data requirements.* In accordance with the provisions of § 514.2, the manufacturer shall furnish to the Chief, Engineering and Manufacturing Branch, Flight Standards Division, Federal Aviation Agency, in the region in which the manufacturer is located the following technical data:

(1) Six copies of the manufacturer's operating instructions and equipment limitations;

(2) Six copies of the installation procedures with applicable schematic drawings, wiring diagrams, and specifications, indicating any limitations, restrictions, or other conditions pertinent to installation; and

(3) One copy of the manufacturer's test report.

(Secs. 313(a), 601, 603, 604 of the Federal Aviation Act of 1958; 49 U.S.C. 1354, 1421, 1423, 1424)

Issued in Washington, D.C., on June 26, 1964.

N. E. HALABY,  
Administrator.

[F.R. Doc. 64-6613; Filed, July 2, 1964;  
8:46 a.m.]

(As published in the Federal Register 29 F.R. 84017 on July 3, 1964)