



The European Organisation for Civil Aviation Equipment
L'Organisation Européenne pour l'Équipement de l'Aviation Civile

MINIMUM OPERATIONAL PERFORMANCE SPECIFICATION FOR DEVICES THAT PREVENT UNINTENTIONAL OR CONTINUOUS TRANSMISSIONS

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FOREWORD

1. This document, prepared by EUROCAE Working Group 38 was accepted by the Council of EUROCAE on April 30, 1991.
2. EUROCAE is an international non-profit making organisation. Membership is open to users and manufacturers, in Europe, of equipment for aeronautics, trade associations, national civil aviation administrations and, under certain conditions, non-European Members. Its work programme is directed to the study of technical problems facing users and manufacturers of electronic equipment for aeronautics and all related topics. It aims to contribute at national and international levels to the solution of such problems.
3. The findings of EUROCAE are resolved after discussion among members of EUROCAE, European airlines and interested administrations, and in collaboration with the Radio Technical Commission for Aeronautics (RTCA), Washington, DC, and/or the Society of Automotive Engineers (SAE), Warrendale, PA, USA, through their appropriate committees.
4. Co-ordination of this document has been achieved with RTCA SC-163 during the preparation of DO-207 "MOPS for devices that prevent blocked channels used in radio communications due to unintentional transmissions", January 1991.

A significant difference between this document and DO-207 is the mandating of an indication that a transmission has been terminated. (See paragraph 3.1.2).

5. EUROCAE Minimum Operational Performance Specifications are recommendations only. EUROCAE is not an official body of the European Governments; its recommendations are valid as statements of official policy only when adopted by a particular government or conference of governments.
6. Copies of this document may be obtained from

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CHAPTER 1

INTRODUCTION1.1 PURPOSE AND SCOPE

1.1.1 This document defines the minimum operational performance specification for devices and systems that prevent disruption of Air traffic Control (ATC) two-way radio communications caused by unintentional or continuous transmissions.

1.1.2 The specification is applicable to aircraft two-way VHF radio communications equipment used for control of air traffic. It is primarily intended to apply to devices and circuitry which are an integrated feature of the design of communication equipment. However, it is recognised that initially, the methods of incorporating these devices will include retrofit, modification or add-on circuitry.

1.1.3 Although this minimum operational performance specification is intended to apply to aircraft VHF communication equipment, it is recommended that it be applied also to ground-based, and ground mobile UHF and VHF aeronautical communications systems and equipments.

1.1.4 Chapter 1 of this document provides information necessary to understand the need for the equipment characteristics and tests defined in the remaining chapters. Typical equipment applications and operational objectives are described which are the basis for the performance criteria stated in Chapters 2 and 3. Definitions essential to proper understanding of this document are also provided in Chapter 1.

1.1.5 Chapter 2 contains general design specifications.

1.1.6 Chapter 3 contains the minimum performance specification for the equipment, defining performance under standard operating conditions.

1.1.7 Chapter 4 specifies the environmental test conditions which provide a laboratory means of determining the overall performance characteristics of the equipment under conditions representative of those which may be encountered in actual operations.

1.1.8 Chapter 5 describes recommended test procedures for demonstrating compliance with Chapters 3. and 4.

1.1.9 Chapter 6 specifies the performance demanded of the installed equipment. Ground and flight tests for the installed equipment are included when performance cannot be adequately determined through testing under standard test conditions.

1.2 APPLICATION

1.2.1 Compliance with this minimum performance specification by manufacturers, installers and users is recommended as a means of ensuring that the equipment will satisfactorily perform its intended function(s) under all conditions normally encountered in routine aircraft operations.

1.2.2 Any regulatory application of this document in whole or in part is the sole responsibility of appropriate government agencies.

1.2.3 As the measured values of equipment performance characteristics may be a function of the method of measurement, standard test conditions and methods of test are recommended in this document.

1.3 DESCRIPTION OF SYSTEM

1.3.1 The aviation communications system includes ground-based and airborne receiving and transmitting equipment which provide air-to-ground and ground-to-air communications.

1.3.2 The equipment addressed in this document provides the means for reducing unintentional or continuous transmissions that adversely affect two-way voice radio communications. The main causes of this (often referred to as the "stuck mike" problem) are jammed microphone push-to-talk (PTT) buttons or equipment malfunction.

1.3.3 Emergency Communications

An emergency condition may demand unrestrained radio operation; the facility to override transmission termination circuits is provided for in this document.

1.4 COMPOSITION OF EQUIPMENT

The word "equipment" as used in this document includes all components and units necessary for the system to properly perform its intended function(s). For example, the "equipment" may include transmitter, receiver, power supply, microphone, control panels, antenna, interconnecting cables, and related accessories.

(In the case of this example, all of the foregoing components and units comprise the "equipment". It should not be inferred from this example that each equipment design will necessarily include all of the foregoing components or units. This will depend on the specific design chosen by the manufacturer).

1.5 DEFINITIONS AND ABBREVIATIONS

1.5.1 Mandating and Recommendation Phrases

a. "Shall"

The use of the word SHALL indicates a mandated criterion; ie compliance with the particular procedure or specification is mandatory and no alternative may be applied.

b. "Should"

The use of the word SHOULD (and phrases such as "IT IS RECOMMENDED THAT ...", etc.) indicate that though the procedure or criterion is regarded as the preferred option, alternative procedures, specifications or criteria may be applied, provided that the manufacturer, installer or tester can provide information or data to adequately support and justify the alternative.

1.5.2 Unintentional Transmissions

This is commonly referred to as a "stuck-mike" condition; it occurs when a transmitter is permanently keyed by misoperation or equipment fault.

1.5.3 PTT

Press-To-Talk (or Push-To-Talk)

CHAPTER 2

GENERAL DESIGN SPECIFICATION2.1 AIRWORTHINESS

The equipment shall not, under normal or fault conditions, impair the airworthiness of the aircraft in which it is installed.

2.2 INTERNATIONAL TELECOMMUNICATIONS UNION

The equipment shall comply with the relevant International Telecommunications Union Radio Regulations.

2.3 FIRE PROTECTION

Except for small parts (such as knobs, fasteners, seals, grommets and small electrical parts) that would not contribute significantly to the propagation of a fire, all materials used shall be self-extinguishing.

***NOTE:** One means of showing compliance is contained in Joint Airworthiness Requirement (JAR), Part 25, Appendix F.*

2.4 OPERATION OF CONTROLS

2.4.1 The operation of controls intended for use during flight, in all possible positions, combinations and sequences, shall not result in a condition whose presence or continuation would be detrimental to the continued performance of the equipment or associated communication systems. (See also paragraph 2.7.)

2.4.2 It is recommended that if a by-pass facility is incorporated in the installation (see paragraph 3.3), the switch or control providing the by-pass facility should be operable in conjunction with, and by the same hand as, the PTT control. If such a co-location of facilities is achieved, the by-pass switch shall be designed and constructed in such a way as to obviate unintentional operation during normal PTT actions.

2.4.3 Controls which are not intended to be adjusted in flight shall not be readily accessible to flight personnel.

2.5 EFFECTS OF TESTS

Unless otherwise stated, the design of the equipment shall be such that, during and after the application of the specified tests, no condition exists which would be detrimental to the subsequent performance of the equipment.

2.6 SOFTWARE DESIGN

Software design shall follow the guide-lines specified in document RTCA DO-178A/EUROCAE ED-12A, "Software Considerations in Airborne Systems and Equipment Certification". The software criticality level will depend on the particular equipment function and application.

2.7

FAIL-SAFE

The equipment shall be designed and constructed to ensure that a fault or failure in the equipment or associated circuitry is unlikely to cause permanent inhibition of the associated transmitter.

CHAPTER 3

MINIMUM PERFORMANCE SPECIFICATION
UNDER STANDARD TEST CONDITIONS3.1 AUTOMATIC TERMINATION OF TRANSMISSIONS

- 3.1.1 The equipment shall automatically terminate a continuous, modulated or unmodulated transmission after a maximum transmission time of 35 seconds, except as provided in paragraph 3.3.

NOTE 1: *It is recommended that transmissions be detected by sensing signals which are provided within, directly to, or directly from the transmitter.*

NOTE 2: *The radio and audio equipment should normally return to the receive mode after automatic termination of transmission.*

- 3.1.2 The equipment shall provide a means to indicate to the crew that the transmission has been terminated.

NOTE: *An indication to the user that transmission is about to be terminated is also desirable, providing the opportunity for the user to override the termination function.
(See paragraph 3.3.)*

3.2 REACTIVATION OF THE TRANSMITTER (TIMER RESET)

Following automatic termination of a transmission, the transmitter shall be capable of being reactivated (and the timer reset) by one or both of the following conditions:

- a. by the initiation of a transmission (PTT), ie: at the beginning of a transmission (except as provided by paragraph 3.3)
- b. by a momentary power interrupt.

3.3 BY-PASS FACILITY

- 3.3.1 A means of immediate operator by-pass or override of the transmitter termination function may be provided.
- 3.3.2 Such means of override shall be substantially incapable of being left in the by-pass or override position, either deliberately or accidentally, and shall not reset the transmission timer.

CHAPTER 4

MINIMUM PERFORMANCE SPECIFICATION
UNDER ENVIRONMENTAL TEST CONDITIONS

4.1 INTRODUCTION

The environmental test conditions and performance requirements described in this chapter provide a laboratory means of determining the overall performance characteristics of the equipment under conditions representative of those which may be encountered in actual operation.

4.2 Unless otherwise specified, the test procedures applicable to the determination of equipment performance under environmental test conditions are contained in document EUROCAE ED-14C/RTCA DO-160C, "Environmental Conditions and Test Procedures for Airborne Equipment", (December 1989).

4.3 Some of the environmental tests contained in this chapter do not have to be performed unless the manufacturer wishes to qualify the equipment for that particular environmental condition; these tests are identified by the phrase "If Required". If the manufacturer wishes to qualify the equipment to these additional environmental conditions, then the "If Required" tests shall be performed.

4.4 TEMPERATURE AND ALTITUDE (ED-14C/DO-160C, Section 4)4.4.1 Low Temperature (ED-14C/DO-160C, paragraph 4.5.1)

During this test,

a. establish compliance with the following paragraphs:

- 3.1 Automatic Termination of Transmission
- 3.2 Reactivation of transmitter

b. ensure that all mechanical devices operate satisfactorily.

4.4.2 High Temperature (ED-14C/DO-160C, paragraphs 4.5.2, 4.5.3 and 4.5.4)

4.4.2.1 During the high, short-time operating temperature and loss of cooling test,

a. establish compliance with the following paragraphs:

- 3.1 Automatic Termination of Transmission
- 3.2 Reactivation of transmitter

b. ensure that all mechanical devices operate satisfactorily.

4.4.2.2 During the high operating temperature test,

a. establish compliance with the following paragraphs:

- 3.1 Automatic Termination of Transmission
- 3.2 Reactivation of transmitter

b. ensure that all mechanical devices operate satisfactorily.

4.4.3 Altitude (ED-14C/DO-160C, paragraph 4.6.1)

During this test,

- a. establish compliance with the following paragraphs:
 - 3.1 Automatic Termination of Transmission
 - 3.2 Reactivation of transmitter
- b. ensure that all mechanical devices operate satisfactorily.

4.4.4 Decompression (If required) (ED-14C/DO-160C, paragraph 4.6.2)

During this test,

- a. establish compliance with the following paragraphs:
 - 3.1 Automatic Termination of Transmission
 - 3.2 Reactivation of transmitter
- b. ensure that all mechanical devices operate satisfactorily.

4.4.5 Overpressure Test (If required) (ED-14C/DO-160C, paragraph 4.6.3)

During this test,

- a. establish compliance with the following paragraphs:
 - 3.1 Automatic Termination of Transmission
 - 3.2 Reactivation of transmitter
- b. ensure that all mechanical devices operate satisfactorily.

4.5 TEMPERATURE VARIATION (ED-14C/DO-160C, Section 5)

During this test,

- a. establish compliance with the following paragraphs:
 - 3.1 Automatic Termination of Transmission
 - 3.2 Reactivation of transmitter
- b. ensure that all mechanical devices operate satisfactorily.

4.6 HUMIDITY (ED-14C/DO-160C, Section 6)

After subjection to this test and the application of primary power for 15 minutes, immediately,

- a. establish compliance with the following paragraphs:
 - 3.1 Automatic Termination of Transmission
 - 3.2 Reactivation of transmitter
- b. ensure that all mechanical devices operate satisfactorily.

4.7 SHOCK (ED-14C/DO-160C, Section 7)

4.7.1 Following the application of the operational shocks,

- a. establish compliance with the following paragraphs:
 - 3.1 Automatic Termination of Transmission
 - 3.2 Reactivation of transmitter
- b. ensure that all mechanical devices operate satisfactorily.

4.7.2 Following the application of the crash safety shocks, the equipment shall remain in its mounting and no part of the equipment or its mounting shall have become detached and free of the shock test table.

NOTE: The application of this test may result in damage to the equipment. It may therefore be conducted after the other tests and paragraph 2.5 "Effects of Tests", does not apply.

4.8 VIBRATION (ED-14C/DO-160C, Section 8)

During this test,

- a. establish compliance with the following paragraphs:
 - 3.1 Automatic Termination of Transmission
 - 3.2 Reactivation of transmitter
- b. ensure that all mechanical devices operate satisfactorily.

4.9 EXPLOSION PROOFNESS (if required) (ED-14C/DO-160C, Section 9)

While the equipment is being subjected to this test, it shall not cause detonation of the explosive mixture within the test chambers under normal and fault conditions.

NOTE: The application of this test may result in damage to the equipment, it may therefore be conducted after the other tests and paragraph 2.5 does not apply.

4.10 WATER PROOFNESS (if required) (ED-14C/DO-160C, Section 10)

After subjection to this test,

- a. establish compliance with the following paragraphs:
 - 3.1 Automatic Termination of Transmission
 - 3.2 Reactivation of transmitter
- b. ensure that all mechanical devices operate satisfactorily.

4.11 FLUIDS SUSCEPTIBILITY (if required) (ED-14C/DO-160C, Section 11)

- a. Subsequent to the 24 hour test, establish that no failures have occurred.

- b. Subsequent to a 2 hour operational period at ambient temperature, after the 160 hour exposure period, establish compliance with the following paragraphs:

- 3.1 Automatic Termination of Transmission
- 3.2 Reactivation of transmitter

- c. Ensure that all mechanical devices operate satisfactorily.

4.12 SAND AND DUST (if required) (ED-14C/DO-160C, Section 12)

After subjection to this test,

- a. establish compliance with the following paragraphs:

- 3.1 Automatic Termination of Transmission
- 3.2 Reactivation of transmitter

- b. ensure that all mechanical devices operate satisfactorily.

4.13 FUNGUS RESISTANCE (if required) (ED-14C/DO-160C, Section 13)

After subjection to this test,

- a. establish compliance with the following paragraphs:

- 3.1 Automatic Termination of Transmission
- 3.2 Reactivation of transmitter

- b. ensure that all mechanical devices operate satisfactorily.

4.14 SALT SPRAY (if required) (ED-14C/DO-160C, Section 14)

After subjection to this test,

- a. establish compliance with the following paragraphs:

- 3.1 Automatic Termination of Transmission
- 3.2 Reactivation of transmitter

- b. ensure that all mechanical devices operate satisfactorily.

- c. inspect for corrosion.

4.15 MAGNETIC EFFECT (ED-14C/DO-160C, Section 15)

Determine the magnetic effect of the equipment and establish that it meets the category to which it is declared.

4.16 POWER INPUT (ED-14C/DO-160C, Section 16)

4.16.1 Normal Operating Conditions

When subjected to this test, for the category corresponding to the type of aircraft electrical supply system used, the equipment shall comply with the following paragraphs for Normal Operating Conditions, (ED-14C/DO-160C, paragraphs 16.5.1 and 16.5.2).