



Specific Technical Requirements STR-22

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Airborne Systems for Non Required Telecommunication Services in Non Aeronautical Frequency Bands (ASNRT)

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1 General

1.1 PURPOSE AND SCOPE

- 1.1.1 This minimum operational performance specification defines the minimum performance expected from an Airborne System for Non Required Telecommunication Services in Non Aeronautical Frequency Bands (ASNRT). The performance of a specific equipment may be enhanced or superior to this specification depending on the intended application and configuration.
- 1.1.2 Chapter 1 describes typical equipment applications and operational objectives and is the basis for the performance criteria specified in Chapter 2 and Chapter 3. Definitions essential to proper understanding of this document are also provided in Chapter 1.
- 1.1.3 Chapter 2 contains general design requirements.
- 1.1.4 Chapter 3 contains the minimum performance specification for the equipment, defining performance under standard operating conditions.
- 1.1.5 Chapter 4 prescribes the environmental test conditions which provide a laboratory means of determining the performance characteristics of the equipment under conditions representative of those which may be encountered in actual operations.
- 1.1.6 Chapter 5 specifies the performance of the installed equipment and gives guidance for the installation.

1.2 APPLICATION

- 1.2.1 Compliance with this minimum operational performance specification by manufacturers, installers and users is recommended as a means of ensuring that the equipment will satisfactorily perform its intended functions under the conditions normally encountered in routine aircraft operations.
- 1.2.2 **This STR does not cover telecommunication aspects. It is the responsibility of the manufacturer as well as the operator to obtain the necessary approvals from the responsible telecommunication authority and from the network provider, if applicable.**
- 1.2.3 Any regulatory application of this document in whole or in part is the sole responsibility of appropriate government agencies.
- 1.2.4 Mandating and Recommendation Phrases:
- a) „Shall“
The use of the word SHALL indicates a mandated criterion; i.e. 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.) indicates that 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.

1.3 DESCRIPTION OF SYSTEM

The purpose of the Airborne System for Non-Required Telecommunication Services (ASNRT) is to provide flight crew and passengers with additional air-ground / air-air voice and data communication service. The system does not support safety related applications like Air Traffic Service (ATS).

It consists of electronic on board equipment which is not required for any phase of flight by any aviation rule. It is normally not connected to nor interact with any aircraft system except the intercom, electrical power and mechanical mounting. In special cases it may be useful to establish additional interfaces to other systems. Examples are communication management Systems for transmission of data such as position, heading, etc. as well as company data. Furthermore it might be useful to connect the ASNRT to devices serving as steering units.

Systems which generate RF radiation inside the aircraft like wireless LAN or similar are not in the scope of this STR.

The following drawing shows an example of such a system utilising Iridium satellite network. It does not define a requirement.

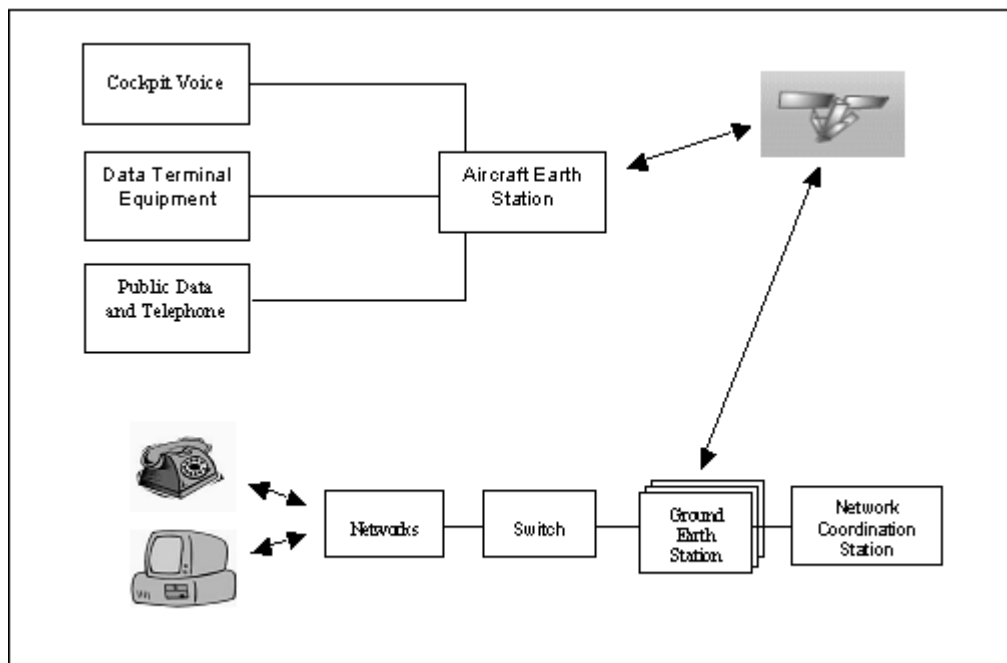


Figure 1-1: Example Block Diagram: Airborne System for Non-Required Communication Services using the IRIDIUM satellite network

2 GENERAL DESIGN REQUIREMENTS

2.1 AIRWORTHINESS

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

2.2 OPERATION OF CONTROLS

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 safe operation of the equipment.

Operating the system shall not significantly affect the workload of the air crew.

2.3 DESIGN OF CONTROLS

Controls and indicators intended for use by flight crew shall be of suitable design for the intended cockpit environment / philosophy (e.g. size, readability, illumination).

2.4 EFFECTS OF TESTS

Unless otherwise provided, the design of the equipment shall be such that, subsequent to the application of the specific tests, no condition exists which would be detrimental to the continued safe operation of the equipment.

2.5 DIGITAL COMPUTER TECHNIQUES

If the equipment design is implemented using digital computer techniques, the computer software package should follow guidelines contained in EUROCAE document ED-12B „Software Considerations in Airborne Systems and Equipment Certification“. The RTCA equivalent document DO-178B, or later editions of both ED-12B and DO-178B, may be used.

2.6 COMPLEX HARDWARE DEVELOPMENT

Guidance on the development of complex hardware can be found in EUROCAE document ED-80 (Design Assurance Guidance for Airborne Electronic Hardware) (identical to RTCA-DO-254).

3 MINIMUM PERFORMANCE SPECIFICATION UNDER STANDARD CONDITIONS

3.1 GENERAL

3.1.1 The Aeronautical System for Non-Required Telecommunication Services (ASNRT) must meet the basic requirement not to interfere with on-board systems.

3.1.2 It must be ensured that the equipment can neither become a source of danger in themselves nor threaten the proper functioning of any essential system or service.

Note: It is assumed that the manufacturer also consults the telecommunication administration and (if applicable) the network provider as early as possible for approval of the technical parameters and requirements for the usage of the equipment.

3.2 SYSTEM SPECIFIC PARAMETERS

3.2.1 If appropriate, the manufacturer shall define details to show compliance with subpart 3.1 of this document.

3.2.2 A set of technical parameters showing that the system performs its intended functions shall be declared by the manufacturer. This set of data should include the quality, availability and reliability of the information channel and all the requirements which may be defined by the telecommunication administration or network provider for such an equipment. However, when agreed by the responsible authority, compliance demonstration is only necessary for a very basic requirement like „communication link established“.

3.2.3 If the system interfaces to other on board equipment, compliance with the interface related requirements for that equipment has to be shown in order to exclude adverse effects on connected systems and the aircraft itself. In case of the intercom system electrical interface related parts of RTCA DO-214 (Audio Systems Characteristics and Minimum Operational Performance Standards for Aircraft Audio Systems and Equipment) Section 2.4 apply.

3.2.4 Means to disconnect the equipment from power bus or other systems (if applicable) shall be provided (i.e. Master Switch) for the case of unexpected interference, fire, smoke or other hazards.

Note: Compliance with subpart 3.2.4 of this document can be achieved by the design of the equipment itself or measures described in the Installation Manual.

3.3 Classes of Equipment

There are two classes defined in accordance with technical means to ensure the proper operation of the equipment. There may be additional operational requirements which are not covered by this STR.

Class 1: Equipment with the operation restriction to parked and (air-) taxiing aircraft:

Technical means shall be provided to ensure that the equipment cannot be operated during other phases of flight (eg. by connection to sensors for airspeed, weight on wheels, etc.).

Note: Equipment which can, due to interference problems, only be allowed to operate in a parked aircraft with engines and other systems switched off, is not in the scope of this STR.

Class 2: Equipment for operation during all phases of flight:

The manufacturer shall obtain concurrence for the intended operation from the telecommunication authority or network provider (if applicable) before applying for an airworthiness approval.

4 MINIMUM PERFORMANCE SPECIFICATION UNDER ENVIRONMENTAL TEST CONDITIONS

4.1 INTRODUCTION

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

The Airborne System for Non-Required Telecommunication Services in Non Aeronautical Frequency Bands (ASNRT) needs to comply to environmental tests so far as it is necessary to ensure that the equipment cannot become a source of danger under environmental conditions.

Some of the tests contained in this chapter are identified with the phrase „if required“. They do not have to be performed unless the manufacturer wishes to qualify the equipment to these additional environmental conditions or if requested by the responsible authority.

Unless otherwise specified, the test procedures applicable to a determination of equipment performance under environmental test conditions are contained in document EUROCAE ED-14D/RTCA DO-160D „Environmental Conditions and Test Procedures for Airborne Equipment“, December 2000 or later editions respectively amendments.

4.2 EQUIPMENT PERFORMANCE COMPLIANCE

The performance requirements as defined in chapter 3 are not required to be tested under all of the conditions contained in ED-14D/DO-160D. Details have to be agreed with the responsible authority.

When exposed to high temperature and/or pressure as well as power input and voltage spike test, it shall be ensured that there is no risk of fire, smoke or similar induced by the equipment.

During all shock and vibration tests 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.

Direct lightning tests for antennas or other equipment to be mounted outside the aircraft are only intended to ensure that a lightning strike is already blocked at the antenna itself and cannot influence other installations or the aircraft itself.

4.3 PERFORMANCE TESTS

The equipment is sorted in two categories. Category 1 is for devices which are to be installed inside the aircraft, e.g. in the avionics bay. Category 2 covers subsystems to be installed outside, especially antennas.

RTCA-DO160D Test	Section	Category 1	Category 2
Temperature and Altitude	4	+	+
Temperature Variation	5.0	-	-
Humidity	6.0	-	-
Operational Shocks and Crash Safety	7.0	+	+
Vibration	8.0	+	+
Explosion Proofness	9.0	-	-
Waterproofness	10.0	-	-
Fluids Susceptibility	11.0	-	-
Sand and Dust	12.0	-	-
Fungus Resistance	13.0	-	-
Salt Spray	14.0	-	-
Magnetic Effect	15.0	+	+(1)
Power Input	16.0	+	-
Voltage Spike	17.0	+	-
Audio Frequency Cond. Susceptability	18.0	-	-
Induced Signal Susceptability	19.0	-	-
Radio Frequency Susceptability	20.0	-	-
Emission of Radio Frequency Energy	21.0	+	+(1),(3)
Lightning Induced Transient Susceptibility	22.0	-	-
Lightning Direct Effects	23.0	-	+(2)
Icing	24.0	-	-
Electrostatic Discharge	25.0	-	-

+: mandatory test

- : if required

(1): active antenna only

(2): This test can be omitted if compliance with the requirement is ensured by other means.

(3): nonintended radiation

The tests marked with „if required“ may become mandatory in case of specific technical reasons. This shall be agreed with the responsible authority.

5 INSTALLED EQUIPMENT PERFORMANCE

The material contained in the following paragraphs is intended as guidance material only and does not have direct significance in the type certification of the equipment concerned. The aircraft installation must comply with the applicable airworthiness requirements and needs to be agreed by the responsible authority.

5.1 EQUIPMENT INSTALLATION

General guidance on installation which can be found in FAA AC 25-10, 25-16, 43.13-1b (or later editions) should be applied. Special care should be taken in selecting the antenna installation location in relation to other receiving and transmitting RF systems. Non interference tests are required. Aircraft lightning zones and system lightning protection has to be determined. Additionally, for satellite systems a free sight to the sky is necessary for good system performance. Covering the antenna by structural elements will directly influence the installed communication performance. The interface to the on board intercom or other systems should be installed in a manner so that a malfunction of the communication system does not cause conditions which prevent the safe continuation of the flight. The equipment should be installed in accordance with the manufacturer's installation instructions.

5.2 OPERATING RESTRICTIONS

All operation restrictions which are defined e.g. by the rules of telecommunication authority and/or network provider should be enforced by technical provisions and procedures stated in Installation Manual as well as Operation Manual.