ENVIRONMENTAL CONDITIONS AND TEST PROCEDURES FOR AIRBORNE ELECTRONIC/ ELECTRICAL EQUIPMENT AND INSTRUMENTS

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FOREWORD

This report was prepared by Special Committee 112 of the Radio Technical Commission for Aeronautics (RTCA). It was approved by RTCA on June 27, 1968.

The objective of SC-112 was to revise RTCA DO-108, "Environmental Test Procedures - Airborne Electronic Equipment," for the purposes of:

1. Updating the procedures in light of current and anticipated operational needs using test data which has become available subsequent to the time DO-108 was prepared.

2. Resolving the conflicts which existed between the subsonic environmental conditions and test procedures set forth in DO-108 and those of other organizations.

3. Incorporating additional procedures to meet the needs of supersonic aircraft operations.

4. Expanding the scope of DO-108 by including such additional environmental conditions and test procedures as are applicable to airborne electrical equipments and instruments.

In updating this report to include the SST equipment environmental conditions, careful consideration was given to such exotic environments as solar radiation, ultraviolet, acoustic noise, etc. However, there are no data available at this time to substantiate such test requirements or the means by which such tests should be performed. Therefore, the committee felt that, until substantiating data are made available, these unique tests should not be included in its report.

RTCA is an association of aeronautical organizations of the United States from both government and industry. Dedicated to the advancement of aeronautics, RTCA seeks sound technical solutions to problems involving the application of electronics and telecommunications to aeronautical operations. Its objective is the resolution of such problems by mutual agreement of its member organizations.

The findings of RTCA are in the nature of recommendations to all organizations concerned. Since RTCA is not an official agency of the government of the United States, its recommendations may not be regarded as statements of official government policy, unless so enunciated by the government organization or agency having statutory jurisdiction over any matters to which the recommendations relate.

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1.0 PURPOSE AND APPLICABILITY

1.1 This report sets forth Environmental Conditions and Test Procedures applicable to Airborne Electronic/Electrical Equipment and Instruments. The purpose of these tests is to provide a laboratory means of determining the performance characteristics of the equipment and instruments under conditions representative of those which may be encountered in actual aeronautical operations.

NOTE: In each of the test procedures contained herein, the following phrase will be encountered one or more times:

"DETERMINE COMPLIANCE WITH APPLICABLE EQUIPMENT PERFORMANCE STANDARDS"

In the case of RTCA standards, these are found in Paragraph 3.0, "Minimum Performance Standards Under Environmental Test Conditions" of the appropriate RTCA Airborne Electronic Minimum Performance Standards Document. When testing to other than RTCA standards, refer to the applicable portion of those standards.

1.2 All of the environmental conditions and test procedures contained in this paper are not necessarily applicable to all airborne electronic/electrical equipment and instruments. The selection of the appropriate environmental conditions and test procedures is the responsibility of those who write the performance standards for the individual airborne electronic/electrical equipment and instruments.

NOTE: There are several additional environmental conditions that selected airborne electronic/electrical equipment and instruments may be subjected to that have not been included in this report. These include ice, rain, hail, and powerplant lubricating oils and fuels. Members of SC-112 felt that the procedures for testing equipment under these environmental conditions are so uniquely related to those few equipments that are exposed to these environmental conditions that, if a test procedure is required for any one of these conditions, it should be written by those persons who write the performance standards for the equipment involved.

2.0 DEFINITION OF TERMS

2.1 Equipment Temperature Stabilization

Equipment Temperature Stabilization is that condition wherein (1) the temperature of the largest internal mass is within 3°C of the specified value when the equipment is not operating, or (2) the crest temperature of the largest internal mass does not vary by more than 5°C, when the equipment is operating.

In cases where it is impracticable to determine internal mass temperature, an exposure of three (3) hours at the specified temperature will be considered adequate.

2.2 Maximum Duty Cycle

Maximum Duty Cycle is the relationship between the maximum length of time for which an equipment is designed to deliver its rated output power and the length of time during which "standby" power only may be applied, when such "ON-OFF" operation is periodic.

2.3 Not Operating

Not Operating is that condition wherein no power is applied to the equipment.

2.4 Controlled Temperature Location

Controlled Temperature Location is a space within an aircraft in which the temperature of the air is maintained, either manually or automatically, within the limits specified in the appropriate category of Table I of Paragraph 4.0, Temperature and Altitude Tests.

2.5 Total Excursion

Total excursion means the total displacement from positive maximum to negative maximum.

2.6 Equipment

The word "equipment" as used herein includes all of the components or units necessary (as determined by the equipment manufacturer) for the equipment to properly perform its intended function.