

British Standard Aerospace Series : Specification for

General requirements for equipment for use in aircraft

Part 3. Characteristics of aircraft electrical power supplies

Série aérospatiale. Spécification des exigences générales pour les équipements utilisés dans les aéronefs
Partie 3. Caractéristiques de l'alimentation électrique à bord des aéronefs

Luft- und Raumfahrt-Reihe. Spezifikation für allgemeine Anforderungen an Geräte zur Verwendung in Flugzeugen

Teil 3. Eigenschaften der Elektrizitätszufuhr in Flugzeugen

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Foreword

This British Standard is part of a composite standard in the Aerospace Series of British Standards that specifies general requirements for equipment used in aircraft. An introduction to the complete standard is given in British Standard 3G 100 : Part 0.

This revision of British Standard 3G 100 : Part 3 : 1972 has been prepared to specify the characteristics of electrical power supplies at the terminations of electrical equipment used in aircraft.

The requirements of International Standard ISO 1540 'Characteristics of aircraft electrical systems' and the

requirements of this standard are technically interchangeable, although this standard allows a higher degree of current waveform distortion in utilization equipment; see 7.5.

Ground support power supplies for aircraft including interface requirements and essential safety features of the supply facility are specified in British Standard G 219 : 1975, 'General requirements for ground support electrical supplies'. An amendment to this standard is in course of preparation that will introduce an appendix listing the information required to be included in the relevant equipment specification.

Specification

1. Scope

This British Standard specifies the characteristics of electrical power supplied to the terminals of airborne equipment and defines limits for those aspects of utilization equipment that may adversely affect the characteristics of electrical power supplied to other equipment. Its purpose is to achieve compatibility between airborne utilization equipment and aircraft electrical power supplies.

2. Definitions

For the purposes of this British Standard the following definitions apply.

2.1 electrical system (also called simply system).

A combination of power sources and utilization equipment connected to a main distribution point.

NOTE. There may be more than one power source on each system and more than one system in an aircraft electrical installation.

2.2 main power source. A generator, usually driven by one of the aircraft propulsion engines, or a power conversion device (not forming part of utilization equipment) installed to provide electrical power during normal operation of the aircraft.

2.3 emergency power source. A generator, a power conversion device (not forming part of a utilization equipment) or a battery, installed to provide electrical power for essential purposes during conditions of electrical emergency in flight.

2.4 normal system operation. The conditions that obtain when the electrical system performs the various intended operations during the aircraft operational period and when no fault occurs. Examples of such operations are switching of utilization equipments, engine speed changes, busbar switching and paralleling of power sources.

2.5 abnormal system operation. The condition that arises due to deterioration or loss of control of voltage and/or frequency, the magnitude and duration of the disturbance being limited by the protection circuits. This condition only occurs rarely and at random. The probability of this condition may be assumed to be remote (not more frequent than $10^{-5}/h$)*.

NOTE. In the event of a limited fault occurring, the system steady-state voltage could be anywhere within the abnormal steady-state limits since these define the limits for operation of the protective system. Such a fault is extremely rare and would only be revealed by a check of the system voltage, possibly requiring instruments of higher accuracy than those normally installed in the aircraft.

2.6 emergency system operation. The conditions that arise in flight when the main power sources are unable to provide sufficient or proper power, thus requiring use of the limited emergency power source(s).

2.7 steady-state conditions. Conditions that prevail at any fixed load when only inherent or natural changes occur, i.e. no fault occurs and no deliberate change is made to any part of the system.

NOTE. The following abbreviations associated with steady-state conditions are used in this standard:

NSS normal steady-state

ASS abnormal steady-state

ESS emergency steady-state

NSSL normal steady-state limits

ASSL abnormal steady-state limits

ESSL emergency steady-state limits

2.8 utilization equipment. Any individual unit or any functional group of units to which, as a whole, electrical power is applied.

2.9 earth (ground). The primary aircraft structure, which is normally the referenced earth, for the neutral of the a.c. and the negative of the d.c. in the power generation and power utilization systems.

2.10 a.c. phase voltage. The a.c. voltage of any phase supplied to utilization equipment, a phase being considered as the line-to-neutral (earth) circuit at the equipment terminals. The values are r.m.s. unless otherwise stated.

2.11 average r.m.s. value. The arithmetical sum of the individual r.m.s. values of phase voltages divided by the number of phases.

2.12 transient. The short-term changing condition of a characteristic that goes beyond the steady-state limits and returns to the steady-state limits within a specified time period. For the purposes of this standard, voltage transients are divided into surges and spikes.

*This requirement is identical with British Civil Airworthiness Requirements BCAR D1-2.

Amendment No. 1
published and effective from 30 December 1983
to British Standard 3G100 : Part 3 : 1979
(Aerospace Series)

General requirements for equipment for use in aircraft
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NOTE. This amendment introduces an appendix which lists the information which should be included in equipment procurement specifications. The requirements of the voltage spike test have been changed to align them with the requirements of ISO 7137-1981 'Aircraft — Environmental conditions and test procedures for airborne equipment'. A similar amendment to ISO 1540-1977 'Aerospace — Characteristics of electrical systems' is in course of preparation.

Revised text

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December 1983

Contents

Delete the heading 'Appendix' and substitute 'Appendices'.

After the reference to appendix A insert the following.

'B. Information to be included in the equipment
procurement specification'.

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Foreword

In paragraph 4, delete the last sentence and substitute the following.

'Appendix B lists the information that should be included
in the equipment procurement specifications.'

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December 1983

Clause 2.4 Normal system operation

Insert the following note at the end of the clause.

'NOTE. During normal engine shut down and start up,
system parameters may reach ASSL.'

AMD 4425
December 1983

Clause 4.2 Transient characteristics

After the title delete '(see also appendix A)'.

AMD 4425
December 1983

Clause 4.2.1 Voltage

After the title insert '(see also appendix A)'.

AMD 4425
December 1983

Clause 5. Variable-frequency a.c. power system characteristics (including rotorcraft applications)

In note 1, in the second sentence after 'speed' insert the word 'ratio'.

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Clause 5.2 Transient characteristics

After the title delete '(see also appendix A)'.

AMD 4425
December 1983

Clause 5.2.1 Voltage

After the title insert '(see also appendix A)'.

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December 1983

Clause 5.2.2 Frequency

Delete 'shall not' and substitute 'will not normally'.

AMD 4425
December 1983

Clause 6.2.1 Voltage

After the title insert '(see also appendix A)'.

AMD 4425
December 1983

Clause 7.6.2 Single-phase

Delete from the first sentence the words 'unless a three-phase supply is required to comply with the requirement given in 7.5(a)'.

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Clause A.2.1.1

Insert the following note at the end of the clause.

'NOTE. This test is identical with that described in ISO 7137-1981
'Aircraft – Environmental conditions and test procedures for
airborne equipment' (clause 17 – Category A requirements)'.

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Figure 12. Typical voltage spike test arrangement

Delete existing figure 12 and substitute new figure 12 attached.

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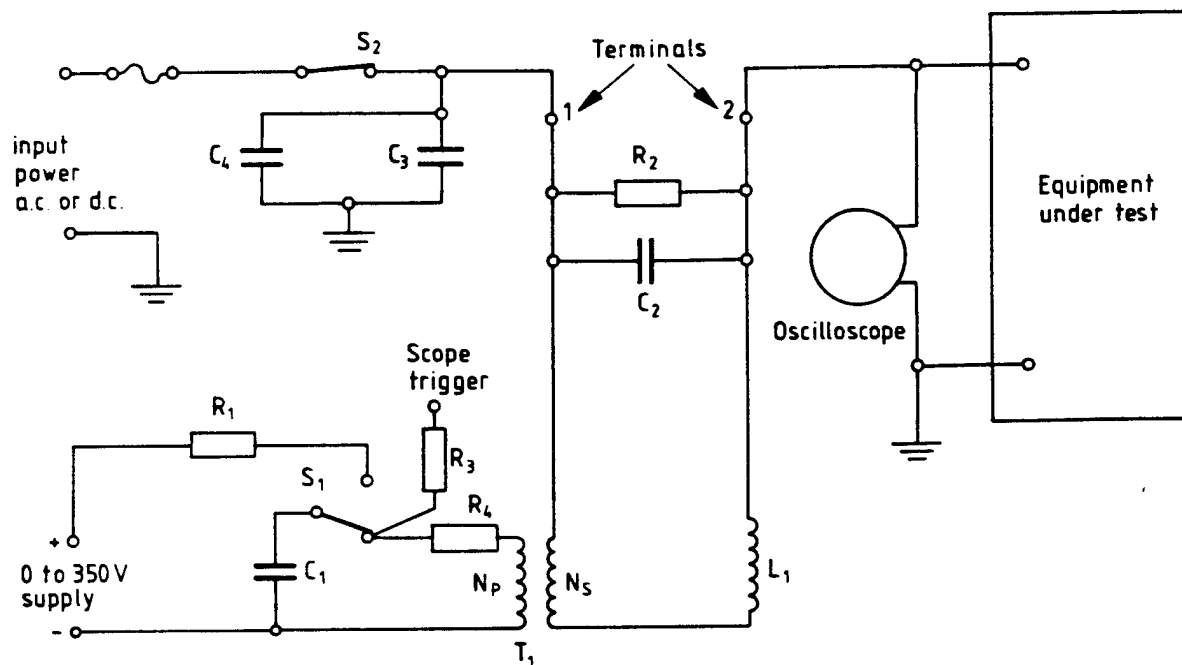
Figure 13. Voltage spike waveform

Delete existing figure 13 and substitute new figure 13 attached.

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New appendix B

After appendix A insert new appendix B attached.



$C_1 = 2,2 \mu\text{F}, 1,500 \text{ V dc}$
 $C_2 = 0,001 \mu\text{F}, 2,000 \text{ V dc}$
 $C_3 = 10 \mu\text{F}$
 $C_4 = 0,01 \mu\text{F}$
 $R_1 = 100\Omega \text{ } 1 \text{ W}$
 $R_2 = 200\Omega \text{ } 1 \text{ W}$
 $R_3 = 1 \text{ M}\Omega \text{ } 0,5 \text{ W}$

$R_4 = 2\Omega \text{ } 1 \text{ W}$
 $S_1 = 20 \text{ A SPDT Switch}$
 $L_1 = 50 \text{ turns, } 51 \text{ mm dia, } 16 \text{ AWG}$
 $(1,4 \text{ mm dia})$
 $T_1 = \text{Air core transformer}$
 $51 \text{ mm dia, } 16 \text{ AWG } (1,4 \text{ mm dia})$
 $N_p = 20 \text{ turns}$
 $N_s = 60 \text{ turns}$

NOTE. A 50Ω resistor replaces the equipment under test for verifying the source impedance.

Figure 12. Typical voltage spike test arrangement

