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**MIL-HDBK-704-1
9 April 2004**

**DEPARTMENT OF DEFENSE
HANDBOOK**

**GUIDANCE FOR
TEST PROCEDURES FOR DEMONSTRATION OF
UTILIZATION EQUIPMENT COMPLIANCE TO
AIRCRAFT ELECTRICAL POWER CHARACTERISTICS
(PART 1 OF 8 PARTS)**



**This Handbook is for guidance only.
Do not cite this document as a requirement.**

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FOREWORD

1. This handbook is approved for use by all Departments and Agencies of the Department of Defense.

2. This handbook provides guidance on test procedures for demonstration of utilization equipment to determine compliance with the aircraft electrical power characteristics of MIL-STD-704.

3. MIL-HDBK-704-1 is Part 1 in a series of 8 Parts. Part 1 provides general guidance information on compliance tests, power groups, aircraft electrical operating conditions, and utilization equipment specifications. Parts 2 through Part 8 provide guidance on application of compliance tests for utilization equipment in specific power groups. These series of handbooks and MIL-STD-704 are companion documents.

4. Comments, suggestions, or questions on this document should be addressed to Commander, Naval Air Systems Command, Code 4.1.4, Highway 547, Lakehurst, NJ 08733-5100 or email to thomas.omara@navy.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil/

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1. SCOPE

1.1 Scope. This handbook provides guidance on test procedures for demonstration of utilization equipment to determine compliance with the aircraft electrical power characteristics of MIL-STD-704. This handbook is for guidance only and cannot be cited as a requirement.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed below are not necessarily all of the documents referenced herein, but are those needed to understand the information provided by this handbook.

2.2 Government documents.

2.2.1 Specifications, standards and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-704

DoD Interface Standard for Aircraft Electric
Power Characteristics

(Copies of these documents are available at <http://assist.daps.dla.mil/quicksearch/> or www.dodssp.daps.mil/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

3. DEFINITIONS

3.1 Acronyms and definitions. The acronyms and definitions of MIL-STD-704 are applicable to this handbook.

4. GENERAL INFORMATION

4.1 Utilization equipment compliance testing. MIL-STD-704 states that equipment testing is required to demonstrate that utilization equipment is compatible with the electric power characteristics as defined in MIL-STD-704. MIL-STD-704 is the interface document that defines the aircraft electrical power characteristics at the input terminals to utilization equipment. The aircraft electrical system must provide power in accordance with MIL-STD-704 and the utilization equipment must perform as specified when provided input power in accordance with MIL-STD-704. MIL-HDBK-704-1 through MIL-HDBK-704-8 provide detail test methods for demonstrating compliance to MIL-STD-704. All previous editions of MIL-STD-704, which have been cited in aircraft platform or subsystem contracts, remain in effect. The applicable edition of MIL-STD-704 for utilization equipment compliance is the edition that is applicable to the aircraft platform or platform(s) in which the utilization equipment will be installed.

4.2 Compliance tests. Compliance tests are intended to give a reasonable assurance that the utilization equipment will perform as specified when installed in aircraft that are

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designed and built to the applicable edition of MIL-STD-704 without unduly burdening the development of utilization equipment. The compliance tests simulate the range of power characteristics that utilization equipment may experience during its life. The compliance test procedures cannot simulate exactly every power condition that may be experienced by the utilization equipment. The designer/manufacturer of utilization equipment must design and build the utilization equipment to be compatible with the power characteristics defined in the applicable edition(s) of MIL-STD-704 and should not design equipment solely based on the test procedures herein.

4.3 Utilization equipment power groups. There are seven utilization input power types defined by the different editions of MIL-STD-704. The MIL-STD-704 compliance tests are organized into power groups based on input electrical power type to utilization equipment. The power groups are:

- a. Single Phase, 400 Hz, 115 Volt (AC)
- b. Three Phase, 400 Hz, 115 Volt (AC)
- c. Single Phase, Variable Frequency, 115 Volt (AC)
- d. Three Phase, Variable Frequency, 115 Volt (AC)
- e. Single Phase, 60 Hz, 115 Volt (AC)
- f. Direct Current, 28 Volt (DC)
- g. Direct Current, 270 Volt (DC)

The preferable input power type for utilization equipment differs for each aircraft platform. The selection of input power type for utilization must take into consideration the aircraft power types available on the intended aircraft platform and the capacity of the electrical system on the aircraft. All power types may not be available on an aircraft platform.

4.4 Aircraft electrical operating conditions. MIL-STD-704 defines six distinct aircraft electrical system operating conditions: (1) Normal Electrical Power, (2) Power Transfers, (3) Abnormal Electrical Power, (4) Emergency Electrical Power, (5) Engine Starting, and (6) Power Failure. The equipment performance specification must explicitly define the performance requirement of the utilization equipment for the six aircraft electrical operating conditions.

4.5 Utilization equipment performance specifications. Utilization equipment specifications should include utilization equipment performance level requirements when operating with electrical input power characteristics that fall within the six aircraft electrical operating conditions. The following are given as examples only and are not intended as recommended performance levels for utilization equipment. Performance levels for utilization equipment for the six aircraft electrical operating conditions should be based on the criticality to flight safety, mission requirements, cost, weight, and reliability; and are unique to each utilization equipment. Current distortion and current spectrum limits may be imposed to minimize undesirable current distortion draw of utilization equipment and reduce the likelihood of the equipment having an adverse effect on the electrical power characteristics of the aircraft. These current distortion limits should take into account the utilization equipment power draw, aircraft electrical system capacity and distribution characteristics, trade-offs with weight, volume, cost, and reliability that are specific to each type of equipment and aircraft.

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4.5.1 Examples of utilization equipment performance requirements.

a. Example 1: Flight Critical Computer and Flight Displays

(1) Performance level for normal aircraft electrical operating condition - The flight critical computer and flight displays shall provide 100 percent full performance during normal aircraft electrical operation. The flight critical computer shall provide all data signals. There shall be no interruption, corruptions, or data loss. Displays shall not flicker or become distorted. The flight critical computer and flight display shall not be damaged or cause an unsafe condition. The flight critical computer and flight display shall not cause the aircraft electrical power to degrade beyond the limits of the applicable edition(s) of MIL-STD-704. Total current distortion shall be less than 12 percent for steady state normal aircraft electrical operation.

(2) Performance level for power transfer aircraft electrical operating condition - The flight critical computer and flight displays shall provide 100 percent full performance before, during, and after power transfer. The flight critical computer and flight displays shall provide the same performance level for power transfer aircraft electrical operating conditions as for normal electrical operating conditions.

(3) Performance level for abnormal aircraft electrical operating condition - The flight critical computer and flight displays shall provide 100 percent full performance during abnormal electrical operation. The flight critical computer and flight displays shall provide the same performance level for abnormal aircraft electrical operating conditions as for normal electrical operating conditions.

(4) Performance level for emergency aircraft electrical operating condition - The flight critical computer and flight displays shall provide 100 percent full performance during emergency electrical operation. The flight critical computer and flight displays shall provide the same performance level for emergency aircraft electrical operating conditions as for normal electrical operating conditions.

(5) Performance level for starting aircraft electrical operating condition - The flight critical computer and flight displays shall provide 100 percent full performance during emergency electrical operation. The flight critical computer and flight displays shall provide the same performance level for starting aircraft electrical operating conditions as for normal electrical operating conditions.

(6) Performance level for power failure aircraft electrical operating condition - The flight critical computer and flight displays are allowed to shutdown for power failures greater than 50 milliseconds. For power failure less than seven seconds, the flight critical computer and flight displays shall automatically return to 100 percent full performance within one second after power is restored. There shall be no corruption, or data loss due to the power failure. The flight critical computer and flight display shall not be damaged or cause an unsafe condition.

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b. Example 2: Mission Data Storage Device and Mission Displays

(1) Performance level for normal aircraft electrical operating condition - The mission data storage device and mission displays shall provide 100 percent full performance during normal aircraft electrical operation. The mission data storage device and mission displays shall provide all data signals. There shall be no interruption, corruptions, or data loss. Displays shall not flicker or become distorted. The mission data storage device and mission displays shall not be damaged or cause an unsafe condition. The mission data storage device and mission displays shall not cause the aircraft electrical power to degrade beyond the limits of the applicable edition(s) of MIL-STD-704. Total current distortion shall be less than 12 percent for steady state normal aircraft electrical operation.

(2) Performance level for power transfer aircraft electrical operating condition - The mission data storage device and mission displays may momentarily interrupt during power transfer. The mission data storage device and mission displays shall automatically return to 100 percent full performance within 5 seconds after the power returns to within normal limits. There shall be no corruption, or data loss. The mission data storage device and mission displays shall not be damaged or cause an unsafe condition due to the power transfer. The mission data storage device and mission displays shall not cause the aircraft electrical power to degrade beyond the limits of the applicable edition(s) of MIL-STD-704.

(3) Performance level for abnormal aircraft electrical operating condition - The mission data storage device and mission displays may momentarily interrupt during abnormal aircraft electrical operation. The mission data storage device and mission displays shall automatically return to normal operation within 5 seconds after the aircraft electrical system operation returns to normal. There shall be no corruption or data loss. Displays may flicker or become distorted, but must still be readable. The mission data storage device and mission displays shall not be damaged or cause an unsafe condition.

(4) Performance level for emergency aircraft electrical operating condition - The mission data storage device shall provide 100 percent full performance and the mission displays may provide degraded performance during emergency aircraft electrical operation. The mission displays shall automatically return to normal operation within 5 seconds when the aircraft electrical system operation returns to normal. There shall be no corruption or data loss. Displays may flicker or become distorted but must still be readable. The mission data storage device and mission displays shall not be damaged or cause an unsafe condition.

(5) Performance level for starting aircraft electrical operating condition - The mission data storage device and mission displays may momentarily interrupt during starting. The mission data storage device and mission displays shall automatically return to 100 percent full performance within 5 seconds after the power returns to within normal limits. There shall be no corruption, or data loss. The mission data storage device and mission displays shall not be damaged or cause an unsafe condition due to the starting operation.

(6) Performance level for power failure aircraft electrical operating condition - The mission data storage device and mission displays are allowed to shutdown for power failures

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greater than 50 milliseconds. For power failure less than seven seconds, the mission data storage device and mission displays shall automatically reboot within 5 seconds and return to 100 percent full performance within 2 minutes after power is restored. There shall be no corruption, but data loss may occur due to the power failure. The mission data storage device and mission displays shall not be damaged or cause an unsafe condition.

c. Example 3: Circulation Fan

(1) Performance level for normal aircraft electrical operating condition - The circulation fan shall provide continuous operation during normal aircraft electrical operation. The circulation fan shall maintain airflow between the minimum and maximum limits during normal aircraft electrical operation. The circulation fan shall not be damaged or cause an unsafe condition.

(2) Performance level for power transfer aircraft electrical operating condition - The circulation fan may shut off during power transfer. The circulation fan shall automatically resume operation within 30 seconds after the transfer is complete and power is restored. The circulation fan shall not be damaged or cause an unsafe condition.

(3) Performance level for abnormal aircraft electrical operating condition - The circulation fan shall provide continuous operation during abnormal aircraft electrical operation. The circulation fan shall maintain airflow between 50 percent below normal minimum limits and 50 percent above the normal maximum limits during abnormal aircraft electrical operation. The circulation fan shall not be damaged or cause an unsafe condition.

(4) Performance level for emergency aircraft electrical operating condition - The circulation fan shall provide continuous operation during emergency aircraft electrical operation. The circulation fan shall maintain airflow between 50 percent below normal minimum limits and 50 percent above the normal maximum limits during emergency aircraft electrical operation. The circulation fan shall not be damaged or cause an unsafe condition.

(5) Performance level for starting aircraft electrical operating condition - The circulation fan may shut off during starting aircraft electrical operations. The circulation fan shall automatically resume operation within 30 seconds after the power reaches normal limits. The circulation fan shall not be damaged or cause an unsafe condition.

(6) Performance level for power failure aircraft electrical operating condition - The circulation fan is allowed to shutdown for power failures greater than 50 milliseconds. For power failure less than seven seconds, the circulation fan shall automatically resume operation within 30 seconds after the power is restored. The circulation fan shall not be damaged or cause an unsafe condition.

d. Example 4: Coffeepot

(1) Performance level for normal aircraft electrical operating condition - The coffeepot shall provide 100 percent performance during normal electrical operating conditions.

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The coffeepot shall not be damaged or cause an unsafe condition. The coffeepot shall not cause the aircraft electrical power to degrade beyond the limits of the applicable edition(s) of MIL-STD-704. The current drawn by the coffeepot shall not have a total current distortion greater than 12 percent for steady state normal aircraft electrical operation.

(2) Performance level for power transfer aircraft electrical operating condition -

The coffeepot may shut off during power transfer. The coffeepot is not required to automatically reset after the power transfer is complete. The coffeepot shall not be damaged or cause an unsafe condition.

(3) Performance level for abnormal aircraft electrical operating condition -

The coffeepot may shutdown for abnormal aircraft electrical operating conditions. The coffeepot is not required to return to normal operation automatically when normal power is restored. The coffeepot shall not be damaged or cause an unsafe condition.

(4) Performance level for emergency aircraft electrical operating condition -

The coffeepot may shutdown for emergency aircraft electrical operating conditions. The coffeepot is not required to return to normal operation automatically when normal power is restored. The coffeepot shall not be damaged or cause an unsafe condition.

(5) Performance level for starting aircraft electrical operating condition -

The coffeepot may shutdown for starting aircraft electrical operating conditions. The coffeepot is not required to return to normal operation automatically when normal power is restored.

(6) Performance level for power failure aircraft electrical operating condition -

The coffeepot may shutdown for power failures. The coffeepot is not required to return to normal operation automatically when normal power is restored. The coffeepot shall not be damaged or cause an unsafe condition.

4.6 Dual source utilization equipment. Special consideration must be taken when utilization equipment is dual sourced, especially for flight critical equipment. Fault conditions may momentarily disturb the electrical power of a battery bus until the battery bus can be isolated from the other systems. Ideally, the tests for compliance to MIL-STD-704 should involve the disconnecting of the backup system to perform testing on the primary system. The tests should then be repeated with the primary system disconnected with only the backup system connected. In cases where this is not possible or not permitted by the design of the equipment, the backup system for MIL-STD-704 test compliance should be representative of the aircraft electrical system performance. If, for example, the unit under test were connected to a transformer rectifier for its backup power, the DC backup power would experience some variation of power quality during AC input disturbances. The test setup should therefore simulate the simultaneous disturbance on both the AC and DC as it would be on the aircraft. Failure to tie the backup power to the dynamic system during testing would not reveal an accurate representation of the backup power during aircraft operations. Circumventing a systems approach to the test may not reflect the unit under test's true performance on actual aircraft.

4.7 Transformer rectifiers units. Transformer rectifiers units fall into a unique category

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that is both utilization equipment and source equipment. The transformer rectifier must provide DC output power that is in accordance with the appropriate edition of MIL-STD-704 when provided AC input power according to the applicable edition of MIL-STD-704. For example, allowing the coupling of AC input transients to the DC output that result in DC power outside of the applicable edition of MIL-STD-704 for a power group would be evaluated as a failure. The transformer rectifier unit should be supplying full rated load during MIL-STD-704 compliance testing.

4.8 Inverters. Inverters fall into a unique category that is both utilization equipment and source equipment. The inverter must provide AC output power that is in accordance with the appropriate edition of MIL-STD-704 when provided DC input power according to the applicable edition of MIL-STD-704. For example, allowing the coupling of DC input transients to the AC output that result in AC power outside of the applicable edition of MIL-STD-704 for a power group would be evaluated as a failure. The Inverter should be supplying full rated load during MIL-STD-704 compliance testing.

4.9 Compliance to aircraft electrical power characteristics demonstration test methods of MIL-HDBK-704-2 through -8. The MIL-HDBK-704-1 through -8 test methods are grouped by power type defined in the applicable editions of MIL-STD-704 and as listed in table I. For each power type, the test methods are further divided into the six aircraft electrical operating conditions as listed in table II. Utilization equipment performance levels may differ for each of the six aircraft electrical operating conditions and must be defined in the utilization equipment performance specification. The nomenclature for individual test method labeling is shown in table III. The Unit Under Test (UUT) must be subjected to all test methods for UUT's applicable power group as shown in tables IV through X. The UUT test method limits are defined by the applicable edition(s) of MIL-STD-704.

4.10 Stimulation and monitoring equipment. Demonstration test stimulation and monitoring equipment is required to confirm utilization equipment performance for the compliance to aircraft electrical power characteristics. Together the stimulation and monitoring equipment should definitively determine if the utilization equipment is performing to specified levels when the utilization equipment is provided with input power in accordance with the applicable edition(s) of MIL-STD-704 testing. This includes input power for the six aircraft electrical operating conditions of both steady state characteristics and transient characteristics.

4.10.1 Stimulation equipment. The stimulation equipment is unique to each utilization equipment and aircraft. Stimulation equipment is the equipment that will simulate all aircraft inputs and outputs other than the electrical input power. These may be analog signals, digital signals, relays, hydraulics, pneumatics, sensors, test patterns, test data, etc. The intent is to closely reproduce the inputs from other systems in the aircraft and the outputs to other systems in the aircraft. Care must be taken to ensure that the stimulation equipment will accurately reproduce the aircraft environment for the MIL-STD-704 compliance testing to be valid. This is especially important during transient testing where the power can deviate from normal power characteristics for only a few milliseconds.

4.10.2 Monitoring equipment. Monitoring equipment is unique to each utilization

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equipment and aircraft. Monitoring equipment is the equipment that determines that utilization equipment is performing at the specified levels during the compliance testing. Monitoring equipment may include means to monitor, measure and/or record sample data exchanges, display test patterns, mechanical outputs, etc. Care must be taken to ensure that the monitoring equipment can accurately measure the performance of the utilization equipment for all the test methods. This is especially important during transient testing where the power can deviate from normal power characteristics for only a few milliseconds.

5. NOTES

5.1 Intended use. This handbook should be used as guidance when establishing test requirements, for inclusion in performance specifications developed for the procurement of utilization equipment, and to ensure compliance with the aircraft electrical power characteristics as specified by MIL-STD-704.

5.2 Single phase test numbers. There are no tests required for SAC103, SAC602, SVF103, SVF602, and SXF103. The numbering has been specified so the Single Phase test numbers coincide with the corresponding Three Phase test numbers.

5.3 Subject term (keyword) listing.

Aircraft, electrical power
Aircraft, electrical test
Electrical operating conditions
Equipment, utilization
Power groups
Specification, utilization equipment

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TABLE I. Power groups.

Power Group	Acronym
Single Phase, 400 Hz, 115 V	SAC
Three Phase, 400 Hz, 115 V	TAC
Single Phase, Variable Frequency, 115 V	SVF
Three Phase, Variable Frequency, 115V	TVF
Single Phase, 60 Hz, 115 V	SXF
Low Voltage DC (28 VDC)	LDC
High Voltage DC (270 VDC)	HDC

TABLE II. Aircraft electrical power systems operating conditions.

Aircraft Electrical Operating Condition	
Normal	1
Transfer	2
Abnormal	3
Emergency	4
Starting	5
Power Failure	6

TABLE III. Test numbering nomenclature example SAC303A.

Power Group	Aircraft Electrical Operating Condition	Test number	Revision letter of test when applicable
SAC	3	03	A
Single Phase, 400 Hz, 115 V	Abnormal	Test 3	Revision A

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TABLE IV. Single phase, 400 Hz, 115 V utilization equipment compliance tests.

Normal, Aircraft Electrical Operation	
SAC101	Load and Current Harmonic Measurements
SAC102	Steady State Limits for Voltage and Frequency
SAC103	No Test See Note #1
SAC104	Voltage Modulation
SAC105	Frequency Modulation
SAC106	Voltage Distortion Spectrum
SAC107	Total Voltage Distortion
SAC108	DC Voltage Component
SAC109	Normal Voltage Transients
SAC110	Normal Frequency Transients
Transfer, Aircraft Electrical Operation	
SAC201	Power Interrupt
Abnormal, Aircraft Electrical Operation	
SAC301	Abnormal Limits for Voltage and Frequency
SAC302	Abnormal Voltage Transients (Overvoltage/Undervoltage)
SAC303	Abnormal Frequency Transients (Overfrequency/Underfrequency)
Emergency, Aircraft Electrical Operation	
SAC401	Emergency Limits for Voltage and Frequency
Starting, Aircraft Electrical Operation	
SAC501	See Note #2
Power Failure, Aircraft Electrical Operation	
SAC601	Power Failure (Single Phase)
SAC602	No Test See Note #1
SAC603	Phase Reversal

Note 1: There are no tests required for SAC103 and SAC602. The numbering has been arranged so that the single phase test numbers coincide with the three phase test numbers.

Note 2: Starting operation conditions are usually not applicable to AC utilization equipment. No test is required for SAC501 unless specified by the equipment performance specification.

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TABLE V. Three phase, 400 Hz, 115 V utilization equipment compliance tests.

Normal, Aircraft Electrical Operation	
TAC101	Three Phase Load and Current Harmonic Measurements
TAC102	Steady State Limits for Voltage (Including Unbalance) and Frequency
TAC103	Voltage Phase Difference
TAC104	Voltage Modulation
TAC105	Frequency Modulation
TAC106	Voltage Distortion Spectrum
TAC107	Total Voltage Distortion
TAC108	DC Voltage Component
TAC109	Normal Voltage Transients
TAC110	Normal Frequency Transients
Transfer, Aircraft Electrical Operation	
TAC201	Power Interrupt
Abnormal, Aircraft Electrical Operation	
TAC301	Abnormal Limits for Voltage and Frequency
TAC302	Abnormal Voltage Transients (Overvoltage/Undervoltage)
TAC303	Abnormal Frequency Transients (Overfrequency/Underfrequency)
Emergency, Aircraft Electrical Operation	
TAC401	Emergency Limits for Voltage and Frequency
Starting, Aircraft Electrical Operation	
TAC501	See Note #1
Power Failure, Aircraft Electrical Operation	
TAC601	Power Failure (Three Phase)
TAC602	One Phase and Two Phase Power Failures
TAC603	Phase Reversal

Note 1: Starting operation conditions are usually not applicable to AC utilization equipment. No test is required for TAC501 unless specified by the equipment performance specification.

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TABLE VI. Single phase, variable frequency, 115 V utilization equipment compliance tests.

Normal, Aircraft Electrical Operation	
SVF101	Load and Current Harmonic Measurements
SVF102	Steady State Limits for Voltage and Frequency
SVF103	No Test, See Note #1
SVF104	Voltage Modulation
SVF105	Frequency Modulation
SVF106	Voltage Distortion Spectrum
SVF107	Total Voltage Distortion
SVF108	DC Voltage Component
SVF109	Normal Voltage Transients
SVF110	Normal Frequency Transients
Transfer, Aircraft Electrical Operation	
SVF201	Transfer Interrupt
Abnormal, Aircraft Electrical Operation	
SVF301	Abnormal Limits for Voltage and Frequency
SVF302	Abnormal Voltage Transients (Overvoltage/Undervoltage)
SVF303	Abnormal Frequency Transients (Overfrequency/Underfrequency)
Emergency, Aircraft Electrical Operation	
SVF401	Emergency Limits for Voltage and Frequency
Starting, Aircraft Electrical Operation	
SVF501	See Note #2
Power Failure, Aircraft Electrical Operation	
SVF601	Power Failure
SVF602	No Test See Note #1
SVF603	Phase Reversal

Note 1: There are no tests required for SVF103 and SVF602. This is done so that the single phase test numbers coincide with the three phase test numbers.

Note 2: Starting operation conditions are usually not applicable to AC utilization equipment. No test is required for SVF501 unless specified by the equipment performance specification.

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TABLE VII. Three phase, variable frequency, 115 V utilization equipment compliance tests.

Normal, Aircraft Electrical Operation	
TVF101	Three Phase Load and Current Harmonic Measurements
TVF102	Steady State Limits for Voltage (Including Unbalance) and Frequency
TVF103	Voltage Phase Difference
TVF104	Voltage Modulation
TVF105	Frequency Modulation
TVF106	Voltage Distortion Spectrum
TVF107	Total Voltage Distortion
TVF108	DC Voltage Component
TVF109	Normal Voltage Transients
TVF110	Normal Frequency Transients
Transfer, Aircraft Electrical Operation	
TVF201	Power Interrupt
Abnormal, Aircraft Electrical Operation	
TVF301	Abnormal Limits for Voltage and Frequency
TVF302	Abnormal Voltage Transients (Overvoltage/Undervoltage)
TVF303	Abnormal Frequency Transients (Overfrequency/Underfrequency)
Emergency, Aircraft Electrical Operation	
TVF401	Emergency Limits for Voltage and Frequency
Starting, Aircraft Electrical Operation	
TVF501	See Note#1
Power Failure, Aircraft Electrical Operation	
TVF601	Power Failure (Three Phase)
TVF602	One Phase and Two Phase Power Failures
TVF603	Phase Reversal

Note 1: Starting operation conditions are usually not applicable to AC utilization equipment. No test is required for TVF501 unless specified by the equipment performance specification.

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TABLE VIII. Single phase, 60 Hz, 115 V utilization equipment compliance tests.

Normal, Aircraft Electrical Operation	
SXF101	Load and Current Harmonic Measurements
SXF102	Steady State Limits for Voltage and Frequency
SXF103	No Test, See Note #1
SXF104	Voltage Modulation
SXF105	Frequency Modulation
SXF106	Voltage Distortion Spectrum
SXF107	Total Voltage Distortion
SXF108	DC Voltage Component
SXF109	Normal Voltage Transients
SXF110	Normal Frequency Transients
Transfer, Aircraft Electrical Operation	
SXF201	Transfer Interrupt
Abnormal, Aircraft Electrical Operation	
SXF301	Abnormal Limits for Voltage and Frequency
SXF302	Abnormal Voltage Transients (Overvoltage/Undervoltage)
SXF303	Abnormal Frequency Transients (Overfrequency/Underfrequency)
Emergency, Aircraft Electrical Operation	
SXF401	Emergency Limits for Voltage and Frequency
Starting, Aircraft Electrical Operation	
SXF501	See Note #2
Power Failure, Aircraft Electrical Operation	
SXF601	Power Failure
SXF602	No Test, See Note #1
SXF603	Phase Reversal

Note 1: There are no tests required for SXF103 and SXF602. The numbering has been arranged so that the single phase test numbers coincide with the three phase test numbers.

Note 2: Starting operation conditions are usually not applicable to AC utilization equipment. No test is required for SXF501 unless specified by the equipment performance specification.

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TABLE IX. 28 VDC utilization equipment compliance tests.

Normal, Aircraft Electrical Operation	
LDC101	Load Measurements
LDC102	Steady State Limits for Voltage
LDC103	Voltage Distortion Spectrum
LDC104	Total Ripple
LDC105	Normal Voltage Transients
Transfer, Aircraft Electrical Operation	
LDC201	Power Interrupt
Abnormal, Aircraft Electrical Operation	
LDC301	Abnormal Steady State Limits for Voltage
LDC302	Abnormal Voltage Transients (Overvoltage/Undervoltage)
Emergency, Aircraft Electrical Operation	
LDC401	Emergency Limits for Voltage
Starting, Aircraft Electrical Operation	
LDC501	Starting Voltage Transients
Power Failure, Aircraft Electrical Operation	
LDC601	Power Failure
LDC602	Polarity Reversal

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TABLE X. 270 VDC utilization equipment compliance tests.

Normal, Aircraft Electrical Operation	
HDC101	Load Measurements
HDC102	Steady State Limits for Voltage
HDC103	Voltage Distortion Spectrum
HDC104	Total Ripple
HDC105	Normal Voltage Transients
Transfer, Aircraft Electrical Operation	
HDC201	Power Interrupt
Abnormal, Aircraft Electrical Operation	
HDC301	Abnormal Steady State Limits for Voltage
HDC302	Abnormal Voltage Transients (Overvoltage/Undervoltage)
Emergency, Aircraft Electrical Operation	
HDC401	Emergency Limits for Voltage
Starting, Aircraft Electrical Operation	
HDC501	Starting Voltage Transients
Power Failure, Aircraft Electrical Operation	
HDC601	Power Failure
HDC602	Polarity Reversal

CONCLUDING MATERIAL

Custodians:

Army - AV
Navy - AS
Air Force - 11

Preparing Activity:

Navy - AS

(Project No. SESS-0047)

Review Activities:

Army - CR, MI, TE
Navy - EC, MC, SA, SH, YD

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at www.dodssp.daps.mil.