NOTICE OF CHANGE

INCH-POUND

MIL-STD-1760B
NOTICE 2
25 June 1993

MILITARY STANDARD

AIRCRAFT/STORE ELECTRICAL INTERCONNECTION SYSTEM

TO ALL HOLDERS OF MIL-STD-1760B:

1. THE FOLLOWING PAGES OF MIL-STD-1760B HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
iii	25 June 1993	iii	15 April 1991
iv	15 April 1991	-	REPRINTED WITHOUT CHANGE
ix	25 June 1993	ix	15 April 1991
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1	25 June 1993	1	15 April 1991
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63	15 April 1991	-	REPRINTED WITHOUT CHANGE
64	25 June 1993	64	15 April 1991
65	25 June 1993	-	NEW PAGE

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-1760B will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the military standard is completely revised or cancelled.

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FOREWARD

Prior to this standard, an aircraft and the stores which it carried were typically developed independently of each other or were developed exclusively for each other. This usually resulted in unique aircraft/store electrical interconnection requirements and the general proliferation of overall store interface designs. The lack of standards within DoD for the aircraft/store electrical interconnection led to low levels of interoperability and costly aircraft modifications to achieve required store utilization flexibility. Trends in store technology toward more complex store functions which require increasing amounts of avionics data and control information from aircraft systems were predicted to lead to insurmountable aircraft/store interfacing problems.

This standard significantly reduces the aircraft/store electrical integration problem by specifying requirements for one standard electrical interconnection system for aircraft and stores. The interconnection system described herein is based on recognized trends in stores management systems which use serial digital transmission for control, monitor, and release of stores. It is not intended that this standard specify the requisite signals to achieve emergency jettison of stores. This does not, however, preclude the use of these signals in this standard if they are compatible with the requirements for emergency jettison. Application of this standard to new and existing aircraft and new stores will serve to significantly reduce and stabilize the number and variety of signals required at aircraft/store interfaces, minimize the impact of new stores on future stores management systems, and increase store interoperability among the services, within NATO, and with other allies.

Limitations. The following areas are not covered in this standard:

a. Requirements for mechanical, aerodynamic, logistic, and operational compatibility.

b. Since factors such as size, shape, loads, clearances and functional limitations are not specified, full operability of stores on aircraft cannot be assured.

* c. Simple store MSI signal set and intermateability characteristics.

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the intended duty cycle, both normal and emergency, and

CONTENTS - Continued

FIGURES

TABLES

1. SCOPE

1.1 Scope. This standard defines implementation requirements for the Aircraft/Store Electrical Interconnection System (AEIS) in aircraft and stores. This interconnection system provides a common interfacing capability for the operation and employment of stores on aircraft, and includes the following.

1.1.1 The electrical (and fiber optic) interfaces at aircraft store stations and the interface on mission stores.

1.1.2 Interrelationships between aircraft and store interfaces.

1.1.3 Interrelationships between the interfaces at different store stations on an aircraft.

1.2 Purpose. The purpose of this standard is to minimize the proliferation of electrical interfacing variations required in aircraft for operating stores. The implementation of this standard shall enhance the interoperability of stores and aircraft by defining specific electrical and physical requirements for the AEIS.

1.3 Application. This standard applies to all aircraft and stores that electrically interface with each other. This coverage encompasses stores and aircraft presently in concept development stages and future aircraft and store development. This standard also applies to existing aircraft which are required to carry MIL-STD-1760 compatible stores.

2. APPLICABLE DOCUMENTS

2.1 Government documents

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

Military

MIL-B-5087	Bonding, Electrical and Lightning Protection for Aerospace Systems
MIL-E-6051	Electromagnetic Compatibility Requirements, Systems
MIL-A-8591	Airborne Stores, Suspension Equipment and Aircraft-Store Interface (Carriage Phase); Gen Design Criteria For
* MIL-C-38999	Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded and Breech Coupling), Environment Resistant, Removable Crimp and Hermetic Solder Contacts, Gen Spec For
MIL-C-39029	Contacts, Electrical Connector, Gen Spec For
* MIL-C-83538	Connectors, Electrical, Circular, Gen Spec For

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nonstationary fault; the embedded diagnostic capability)

STANDARDS

Military

MIL-STD-461	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
MIL-STD-462	Electromagnetic Emission and Susceptibility, Test Methods For
MIL-STD-704	Aircraft Electric Power Characteristics
MIL-STD-1498	Circuit Breakers, Selection and Use Of
MIL-STD-1553	Digital Time Division Command/Response Multiplex Data Bus
MIL-STD-1560	Insert Arrangements for MIL-C-38999 and MIL-C-27599 Electrical, Circular Connectors

NATO

STANAG 3350AVS	Monochrome Video Standard for Aircraft System Applications

HANDBOOKS

Military

MIL-HDBK-235	Electromagnetic (Radiated) Environmental Considerations for Design and Procurement of Electrical and Electronic Equipment

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks shall be available from the Naval Publications and Forms Center, ATTN: NPODS, 5801 Tabor Avenue, Philadelphia PA 19120-5099.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issues of the documents cited in the solicitation.

EIA-STD-RS-170	Electrical Performance Standards - Monochrome Television Studio Facilities
EIA-STD-RS-343	Electrical Performance Standards - High Resolution Monochrome Closed Circuit Television Camera
EIA-STD-RS-485	Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems

(Application for copies should be addressed to the Electronics Industries Association, 2001 Eye Street NW, Washington DC 20006.)

5.1.1.12.3 First communication. The aircraft shall send to the store (over the digital multiplex data interface) transmit command(s) for the store description message as defined in Appendix B. The aircraft shall not require a valid store response (see Appendix B) to any of these transmit commands if sent within 150 milliseconds after both AC and DC power application. The aircraft shall not require a "not busy" response (see Appendix B) to any of these transmit commands if sent within 500 milliseconds after both AC and DC power application.

5.1.2 ASI connector characteristics

5.1.2.1 Primary signal set connector. The primary signal set connector and insert arrangement shall be in accordance with Table III. The contact assignments shall be in accordance with Table IV.

5.1.2.2 Auxiliary power signal set connector. The auxiliary power signal set connector and insert arrangement shall be in accordance with Table V. The contact assignments shall be in accordance with Table VI.

5.1.2.3 Connector receptacle. The connector on the aircraft side of the ASI mated connector pair shall be a receptacle with socket contacts or with plugged cavities.

5.1.2.4 Connector orientation. The ASI connector location on the aircraft shall be compatible with store connector locations. The connector keyway orientation shall conform to the following:

a. With the interface connector positioned such that the longitudinal axis of the connector (the axis that traverses from the back of the connector through the center to the front of the connector) is in the horizontal plane of the aircraft and the connector face is facing forward on the aircraft, the major (large) keyway shall be located in the up position (see Figure 11a).

b. With the interface connector positioned such that the longitudinal axis of the connector is in the vertical plane of the aircraft and the connector face is facing down on the aircraft, the major (large) keyway shall be located in the forward position (see Figure 11b).

c. With the interface connector positioned such that the longitudinal axis of the connector is in the horizontal plane of the aircraft and the connector face is facing aft of the aircraft, the major (large) keyway shall be located in the down position (see Figure 11c.)

d. With the interface connector positioned such that the longitudinal axis of the connector is in the horizontal plane of the aircraft and the connector face is facing inboard or outboard of the aircraft, the major (large) keyway shall be located in the forward position (see Figure 11d).

5.1.3 Electromagnetic compatibility (EMC). The aircraft shall comply with the EMC requirements of MIL-E-6051 and applicable sections of MIL-HDBK-235 when loaded with stores which comply with 5.2 and after store release.

TABLE III. Primary signal set connector requirements.

ASI connector characteristics:

* Connector: The Type 1 connector (see 6.3.14) shall be in accordance with MIL-C-38999, Series III, Shell Size 25, Polarization Key Identification N.

The Type 2 connector (see 6.3.14) shall be in accordance with MIL-C-83538.

Contacts: The contacts shall be in accordance with the following slash sheets to MIL-C-39029.

Size	Slash Sheet	Abbreviated Title
20	/56	Contact, socket
20	/58	Contact, pin
16	/56	Contact, socket
16	/58	Contact, pin
12	/28	Contact, shielded, pin
12	/102	Contact, coaxial, pin
12	/75	Contact, shielded, socket
12	/103	Contact, coaxial, socket
8	/90	Contact, concentric twinax, pin
8	/91	Contact, concentric twinax, socket

Insert Arrangement: The insert arrangement shall be in accordance with MIL-STD-1560, Arrangement No. 25-20.

* MSI connector characteristics: The MSI primary signal set connector shall comply with the intermateability dimensions of MIL-C-38999, or MIL-C-83538, MIL-C-39029 and MIL-STD-1560.

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6.3.10 28V DC and 115V/200V AC power interface current limits. The maximum overcurrent and maximum load current curves of Figures 7 and 8 were derived from the trip and no-trip calibration data for MIL-STD-1498 circuit protection devices. These curves represent a locus of time-current points (such as a 23 ampere current for one second duration, or a 13 ampere current for ten seconds duration). The curves are not intended to be a continuous profile of current versus time.

6.3.10.1 Store electrical load. Under fault free conditions, a store must limit its applied load (as measured at the MSI) such that the maximum load current locus is not exceeded. A conservative indication of this compliance would occur if the maximum true RMS of the load current profile averaged over all time intervals does not exceed the current associated with the same time intervals as defined by the maximum load current locus. Under conditions of internal store power interface faults, the store must be capable of safely withstanding (operational impairment expected) overcurrents for the duration defined by the maximum overcurrent locus of Figures 7 or 8, as applicable.

6.3.10.2 Aircraft electrical capability. The aircraft must be capable of sourcing through an ASI any current for the duration defined by the locus of points designated by the maximum load current curve in Figures 7 or 8, as applicable. The aircraft may remove power from an ASI (by tripping a circuit breaker, for example) whenever the ASI load current exceeds any point defined by the maximum load current locus. The aircraft must remove power from any ASI before the current exceeds the maximum overcurrent locus in Figure 7 or 8, as applicable. The maximum load current curve and maximum overcurrent curve, therefore, define the area of a current time band within which an aircraft's circuit protection devices must trip.

6.3.11 Cable selection for HB interfaces. The use of concentric triaxial cable in aircraft and stores for implementing the HB interfaces is highly recommended. Recent aircraft implementations have shown improved signal quality when triaxial cable is used instead of coaxial cable. These improvements are due to the protection afforded by the triaxial cable from both magnetic field and electric field interference to which low frequency signals are particularly susceptible. The interface definition in this standard allows use of triaxial cable even though only coaxial style contacts are contained within the interface connector. This apparent connector limitation can be overcome by electrically terminating the outer shield of the triaxial cable to the conductive backshells of the interface connectors. This termination can be made by means of a multishield terminating device such as an inverted-cone contact ring or tag ring (or other techniques). The inner shield of the triaxial cable is used for signal return for the high bandwidth signal.

6.3.12 Power deadfacing. The aircraft should ensure that unmated ASI connectors are not powered. As a minimum, the aircraft should ensure that no power is applied to a store until store presence is assured. As soon as is practical, power deadfacing should be carried out on receipt of store-gone signals.

6.3.13 HB radiated emissions. Table I defines the maximum allowed signal power levels for HB signals as part of the HB general signal characteristics. Specific HB signals currently defined for the HB interfaces have power levels significantly lower than these maximum ratings. The maximum allowed signal power levels in this standard are relatively high when electromagnetic interference radiated emissions are considered. Aircraft, stores and the associated umbilicals may require additional cable shielding to maintain radiated emissions within required limits when signals near these maximum allowed power levels are used.

* 6.3.14 Use of Type 1 and Type 2 connectors. Table III defines two connector types for the MIL-STD-1760 primary signal set. The Type 1 Connector is used to make the visible connection to an eject launched store. The Type 2 Connector is used to make the Blind Mate Connection to an Eject Launched Store and a Visible or Blind Mate Connection to a Rail Launched Store.

* 6.3.14.1 Type 1 Connector. The Type 1 Connector complies with the requirements of MIL-C-38999, Shell Size 25 and is satisfied by using MIL-C-38999/20 and MIL-C-38999/24 Receptacles Mating with the MIL-C-38999/31 Plug Connector. The slash 31 mechanism requires that the connector is mated by hand (360 degree tri-start lock) and de-mated by the ejected store tensioning the lanyard on its bail lug, retracting the mechanism. The store may also be disconnected from the aircraft by reversing the mating procedure.

* 6.3.14.2 Type 2 Connector. The Type 2 Connector complies with the requirements of MIL-C-83538 and is satisfied by using MIL-C-83538/1 through MIL-C-83538/10 Connectors. The Type 2 mechanism retains the basic two part philosophy of the Type 1, but no thread is involved in the mating or its retention. The mating is achieved by uploading the store until the two parts engage and lock. De-mating is achieved by:

a. Ejecting the store from the aircraft, or operating the umbilical retract followed by store ejection.

b. Operating the umbilical retract and the rail launch of the store.

6.4 Keyword listing.

aircraft
aircraft station
audio signals
avionics
bus controller
data word
discrete signals
electrical connector
electrical interface
electrical power

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high bandwidth signals
low bandwidth signals
remote terminal
serial time division multiplex data bus
store
stores management system
suspension and release equipment
video signals

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