NOTICE OF CHANGE

METRIC

MIL-STD-188-124B
NOTICE 3
18 December 2000

DEPARTMENT OF DEFENSE
INTERFACE STANDARD

GROUNDING, BONDING AND SHIELDING

TO ALL HOLDERS OF MIL-STD-188-124B

1. THE FOLLOWING PAGES OF MIL-STD-188-124B HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
i	1 February 1992	i	Reprinted without change
ii	18 December 2000	ii	1 February 1992
v	18 December 2000	v	1 February 1992
vi	1 February 1992	vi	Reprinted without change
1	18 December 2000	1	1 February 1992
2	1 February 1992	2	Reprinted without change
3	1 February 1992	3	Reprinted without change
4	18 December 2000	4	1 February 1992
15	18 December 2000	15	1 February 1992
16	18 December 2000	16	1 February 1992
17	18 December 2000	17	1 February 1992
18	18 December 2000	18	1 February 1992
31	18 December 2000	31	1 February 1992
32	1 February 1992	32	Reprinted without change
DD Form 1426	18 December 2000	DD Form 1426	1 February 1992

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

3. Holders of MIL-STD-188-124B will verify that page changes and additions indicated above have been entered. This notice and 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 standards is completely revised or canceled.

CUSTODIANS:
ARMY: AC
AIR FORCE:02
NAVY: EC
DIA: DI
NSA: NS
USMC: MC

Preparing Activity:
DISA: DC1
(Project TCSS-0059)

AMSC N/A

AREA TCSS

DISTRIBUTION STATEMENT A - Approved for public release; distribution is unlimited.

METRIC

MIL-STD-188-124B
1 Feb 92
SUPERSEDING
MIL-STD-188-124A
2 FEBRUARY 1984

DEPARTMENT OF DEFENSE INTERFACE STANDARD

GROUNDING, BONDING AND SHIELDING
for
Common Long Haul/Tactical Communication Systems Including Ground Based Communications-Electronics Facilities and Equipments

AMSC N/A AREA TCSS

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

FOREWORD

1. This Military Standard is approved and mandatory for use by all Departments and Agencies of the Department of Defense in accordance with Department of Defense Instruction 5000.2, dated 23 February 1991.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to:DISA/JIEO Center For Standards, ATTN: JEBB, Fort Monmouth, NJ, 07703-5613, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

3. Standards for all military communications are published as part of a MIL-STD-188 series of documents: Military Communications System Technical Standards are subdivided into Common Long Haul/Tactical Standards (MIL-STD-188-100 series), Tactical Standards (MIL-STD-188-200 series) and Long Haul Standards (MIL-STD-188-300 series).

4. This document contains technical standards and design objectives to ensure the optimum performance of ground-based telecommunications C-E equipment installations. This is accomplished by reducing noise and by providing adequate protection against power system faults and lightning strikes. Thorough consideration must be given to the grounding of equipment and facility installations, the bonding required, and the methods of shielding and implementation needed for personnel safety and equipment control.

5. This standard is also recommended for applicable use on any ground facility or equipment where grounding, bonding, shielding, personnel safety, lightning and EMC are required. Examples of such facilities are aircraft simulators, computer centers, laboratory buildings, weapons checkout and assembly, etc.

6. Paragraph 5.1, Grounding, for this standard is divided as follows:

I. Detailed requirements for facilities, including buildings and associated structures used principally for C-E equipment.

II. Detailed requirements for C-E equipment which address grounding, bonding, and shielding for tactical/long haul fixed ground transportables and military communications electronics equipment installations and associated subsystems.

7. Detailed requirements for Bonding and Shielding are contained in 5.2 and 5.3.

8. This standard is further implemented by MIL-HDBK-419; Grounding, Bonding, and Shielding for Electronic Facilities and Equipments.

9. Notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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CONTENTS (Con't)

FIGURES

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1. SCOPE

1.1 Purpose. This standard establishes the minimum basic requirements and goals for grounding, bonding, and shielding of ground-based telecommunications C-E equipment installations, subsystems, and facilities including buildings and structures supporting tactical and long haul military communication systems.

1.2 Content. This standard addresses the facilities ground systems, as well as grounding, bonding, and shielding and lightning protection for telecommunications C-E facilities and equipment. Grounding for building and structures is listed under the headings of Earth Electrode Subsystem, Fault Protection Subsystem, Lightning Protection Subsystem and Signal Reference Subsystem.

1.3 Applications. This standard shall be used in the design and engineering of new ground-based military communication systems, subsystems, and equipment installations as well as those C-E facilities undergoing major retrofit requiring Military Construction (MILCON) Funding. This includes air traffic control and navigational aid facilities, radio, radar, satellite ground terminals, telephone central offices, microwave and data communications systems, as well as C-E transportables, aircraft simulators, computer centers, and weapon assembly facilities. When upgrading existing facilities for installation of minor C-E equipment, the requirements of this standard shall be established on a case-by-case basis by the cognizant engineering agency. Use of this standard for other ground C-E facilities or equipment is also encouraged. It is not to be used solely as the basis for retrofit of existing C-E facilities. It does not apply to general construction such as barracks, administration buildings, dining facilities, warehouses, and non-communications facilities, nor does it apply to mobile units such as tanks, trucks, jeeps, etc. When MILCON Funding improvements are made to any structure housing a communications, computer, or electronic facility this standard does apply.

1.4 Objectives. The objectives of this standard are to provide for the protection of personnel, equipment, buildings and structures against the hazards posed by electrical power faults and lightning strikes. It also provides for the reduction of noise and electromagnetic interference caused by inadequate grounding, bonding and shielding of ground based military communications installations to acceptable performance levels. It shall be required that the grounding, bonding, and shielding system be engineered to be compatible with the supplemental requirements of the specific equipment or facility supporting these communications.

1.5 System Standards and Design Objectives. The parameters and other requirements specified in this document are mandatory system standards if the word “shall” is used in connection with the parameter value or requirement under consideration. Non-mandatory design objectives are indicated by parentheses after a standardized parameter value or by the word “should” in connection with the parameter value or requirement under consideration. For a definition of the terms “system standard” and “design objective” (DO), see FED-STD-1037.

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2. REFERENCED DOCUMENTS

2.1 Government Documents.

2.1.1 Specifications, Standards, and Handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in a solicitation form a part of this standard to the extent specified herein.

SPECIFICATIONS

FEDERAL

P-D-680	-	Dry Cleaning and Degreasing Solvent
TT-P-1757	-	Primer Coating, Zinc Chromate, Low Moisture Sensitivity

STANDARDS

FEDERAL

FED-STD-1037	-	Glossary of Telecommunication Terms
FIPS PUB 94	-	Guideline on Electrical Power for ADP Installations

MILITARY

AN-735	-	Clamp, Loop Type Bonding
AN-742	-	Clamp, Loop, Plain, Support, Aircraft
MIL-E-6051D	-	Electromagnetic Compatibility System Requirements
MIL-STD-285	-	Attenuation Measurement for Enclosures, Electromagnetic Shielding, for Electronic Test Purposes, Method of
MIL-STD-454	-	Standard General Requirements for Electronic Equipment
MIL-STD-461	-	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
MIL-STD-462	-	Electromagnetic Interference Characteristics, Measurement of
MIL-STD-463	-	Definitions and Systems of Units, Electromagnetic Interference and Electromagnetic Compatibility Technology
MIL-STD-1857	-	Grounding, Bonding and Shielding Design Practices

MIL-C-83413	-	Connectors and Assemblies, Electrical Aircraft Grounding: Type IV Jumper Cable Assembly, Lead, Electrical
MIL-STD-188-125	-	High Altitude Electromagnetic Pulse (HEMP) Protection for Ground-Based C4I Facilities

HANDBOOKS

MILITARY

MIL-HDBK-232	-	Red/Black Engineering Installation Guidelines
MIL-HDBK-419	-	Grounding, Bonding, and Shielding for Electronic Equipments and Facilities
MIL-HDBK-1195	-	Radio Frequency Shielded Enclosures
FM-1 1-487-4/ TO 31-1024	-	Installation Practices: Communications Systems Grounding, Bonding, and Shielding

2.1.2 Other Government Documents, Drawings, and Publications. The following other Government documents, drawings, and publications form a part of this standard to the extent specified herein.

DOD Directive 1000.3	-	Safety and Occupational Health Policy for the Department of Defense
DOD Directive 3222.3	-	Department of Defense Electromagnetic Compatibility Program

(Copies of specifications, standards, handbooks, drawings, and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other Publications. The following document(s) form a part of this standard to the extent specified herein. The issues of the documents which are indicated as DOD adopted shall be the issue listed in the current DODISS and the supplement thereto, if applicable.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC S326	-	Specification for the Design, Fabrication and Erection of Structural Steel for Buildings

(Application for copies of the AISC specification should be addressed to the American Institute of Steel Construction, 400 North Michigan Avenue, Chicago IL 60611.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 32	-	Standard Specification for Solder Metal (DOD Adopted)

(Application for the ASTM document should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

AMERICAN WELDING SOCIETY (AWS)

AWS A 5.8	-	Specification for Brazing Filler Metal (DOD Adopted, ANSI Approved)

(Application for the AWS specification should be addressed to the American Welding Society, 550 Northwest Lejeune Road, P.O. Box 351040, Miami, Florida 33135.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA No. 70	-	National Electrical Code
NFPA No. 780	-	Lightning Protection Code (ANSI Approved)

(Application for NFPA-70 or 780 should be addressed to the National Fire Protection Association, Batterymarch Park, Quincy MA 02269.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Source of Documents. Copies of Federal and military standards, specifications, and associated documents listed in the Department of Defense Index of Specifications and Standards (DODISS), should be obtained from the Standardization Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia PA 19111-5094. To expedite a customer's ability to obtain a document, a computerized Telephone Order Entry System (TOES) has been implemented which provides the capability to place an order directly into the computer via a touch-tone telephone. This system may also be used to receive immediate status or follow-up on a previously submitted order. In order to use TOES you must obtain your customer number from previously ordered material. If a customer number has not been assigned, one can be obtained by calling AC (215) 697-2179 or DSN 442-2179. TOES can then be accessed by dialing AC (215) 679- 1187 or DSN 442-1187. It is important to replace the letter “Q” with the number “7” and the letter “Z” with the number “9” since the telephone dial does not include these letters.

Copies of industry association documents should be obtained from the sponsor. Copies of all other listed documents should be obtained from the contracting activity or as directed by the contracting officer.

2.4 Order of Precedence. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.

5.1.1.2.4.2 Cable Trays or Raceways. The individual sections of all metallic cable tray systems shall be bonded to each other and to the raceways which they support. All electrically continuous bonds shall be in accordance with the procedures and requirements specified in 5.2 through 5.2.8. Direct bonding methods of 5.2.6 are preferred. All metallic cable tray assemblies shall be connected to ground within 0.6m (2 feet of each end of the run and at intervals not exceeding 15m (50 feet) along each run).

5.1.1.2.4.3 Wiring System Enclosures. All electrical and electronic wiring and distribution equipment enclosures, not otherwise specifically covered herein, shall be grounded. The grounding conductor shall not penetrate equipment cabinets or cases but rather shall be terminated on a ground stud peripherally welded to the metal barrier.

5.1.1.2.4.4 Metallic Power Cable Sheaths. Metallic cable sheaths on electrical power cables shall be connected to ground at both ends.

5.1.1.2.5 Electrical Power Systems. All electrical power distribution systems shall be grounded in accordance with the following:

5.1.1.2.5.1 AC Distribution Systems. AC power distribution systems shall have the neutral conductor grounded at the distribution transformer and to the earth electrode subsystem of the facility. The size of the ground conductor from the first service disconnect means to the earth electrode subsystem shall be as specified in Table 1-20 of MIL-HDBK-419 or Table 250-66 of the National Electrical Code. In each facility served by a common distribution transformer, the neutral shall be directly connected to the nearest point of the earth electrode subsystem. Where delta-wye system conversion is employed, the service entrance shall be a five-wire system consisting of three phase conductors, a grounded (neutral) conductor, and a grounding (green) conductor. In each facility, all power distribution neutrals shall be isolated from the C-E equipment case and the structure elements so that no ac return current flows through the equipment and fault protection subsystem or the signal reference network. The fault protection subsystem grounding (green) conductor shall be installed in accordance with the National Electrical Code for all C-E equipment. Conduit shall not be used in lieu of the separate grounding (green) wire.

5.1.1.2.5.1.1 Single Building with Multiple Power Sources. All grounded (neutral) conductors shall be grounded at the first service disconnect means of each source. For delta-wye conversions, a five- wire system shall be utilized from each source. Delta systems shall employ four-wires from the source, consisting of three phase conductors and a grounded conductor for grounding purposes.

5.1.1.2.5.1.2 Multiple Buildings with Single Power Source. Neutral conductors from multiple buildings being serviced from a single commercial power source shall be grounded at the source only. The neutral shall be isolated at the first disconnect means. A five-wire system shall be utilized from the source.

5.1.1.2.5.2 Standby AC Generators. Motor and generator frames and housings shall be grounded in accordance with Article 250 of the National Electrical Code. The generator neutral shall be grounded directly to the earth electrode subsystem. When generators are connected in parallel, the neutrals shall be interconnected and grounded with a single ground conductor.

5.1.1.2.5.3 AC Outlets. Grounding of receptacles and associated grounding terminals shall meet the requirements of Articles 250-146 and 250-66 of the National Electrical Code (1999 or later). However, aluminum and copper clad aluminum conductors permitted by Article 410-56 shall not be used. When necessary to control noise problems, grounding of grounding terminals may be accomplished IAW Article 250-146 (d). Grounding of metallic outlet boxes shall not be dependent upon serrated strips or clips.
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5.1.1.2.5.4 Electrical Motors and Generators. The frames of motors, generators, and other types of electrical rotating machinery shall be grounded to the fault protection subsystem, according to Article 430 of the National Electrical Code.

5.1.1.2.5.5 DC Power Sources. One leg of each dc power system shall be grounded with a single connection directly to the earth electrode subsystem. The size of the grounding conductor shall be as specified by Article 250 of the National Electrical Code. Whether grounded at the source or at a load, a separate current return from load to the source shall be used to assure that no dc current flows in the fault protection or the signal reference subsystem.

5.1.1.2.5.6 Metallic Battery Racks. Metallic battery racks shall also be grounded to the facility ground system at the nearest point.

5.1.1.2.5.7 Ground Fault Circuit Interrupters. All 120 volt single phase 15 and 20 ampere receptacle outlets located in bathrooms or on rooftops shall use ground fault circuit interrupters (GFCI) for personnel protection (See NEC Article 210 and 215).

5.1.1.2.6 Secure Facilities. All areas required to maintain communications security equipment and associated power systems shall be grounded in accordance with MIL-HDBK-419.

5.1.1.3 Lightning Protection Subsystem.

5.1.1.3.1 General. Lightning protection shall be provided as required for buildings and structures in accordance with the National Fire Protection Association (NFPA) No. 780, and the following:

5.1.1.3.2 Buildings and Structures. Lightning protection shall be provided as required for buildings and structures in accordance with the additions and modifications specified herein and the applicable paragraphs of NFPA No. 780. This protection shall be extended to all electrical, electronic, or other elements which are a part of, or are in support of all C-E facilities. Such elements shall include, but shall not be limited to, substations (to the extent that additional protection beyond that provided by the electric utility is necessary), power poles, towers, antennas, masts, etc.

5.1.1.3.3 Down Conductors. Where copper-clad steel down conductors are used on structures not greater than 23m (75 feet) in height, the dc resistance of solid wires or stranded cables shall not be greater than 0.176 ohms per 305m (1000 feet). On structures greater than 23m (75 feet) in height, the dc resistance of the wire or cable shall not be greater than 0.088 ohms per 305m (1000 feet). The size of wires in copper-clad stranded cable shall not be less than No. 14 AWG. (In cases where mechanical and installation situations warrant, a larger (preferably No. 6 AWG copper) wire may be utilized.) The copper covering of all copper-clad steel down conductors shall be permanently and effectively welded to the steel core. The conductivity of copper- clad conductors shall not be less than 30% of a solid copper conductor of equivalent cross-sectional area. Down conductors bends shall be gradual and not have a radius less than 20cm (8 in). The angle of any bend shall not be less than 90 degrees (see Figure 5). Any metal object within 1.8m (6 feet) of the lightning download shall be bonded to the down conductor (see NEC Article 250). Where practicable, a separation of at least 1.8m (6 feet) shall be maintained between open conductors of power and communications systems and lightning down conductors (see NEC Article 800). On structures higher than 18m (60 feet) there shall be at least one additional down conductor for each additional 18m (60 feet) of height fractions thereof, except that the interval between down conductors around the perimeters shall not be less than 15m (50 feet) nor greater than 30m (100 feet). Down conductors shall be continuous and shall be bonded in accordance with 5.1.1.1.5 and 5.2.3 to an earth electrode subsystem or to a ground rod bonded to this subsystem installed as near as practicable and within 1.8m (6 feet) from the structure.

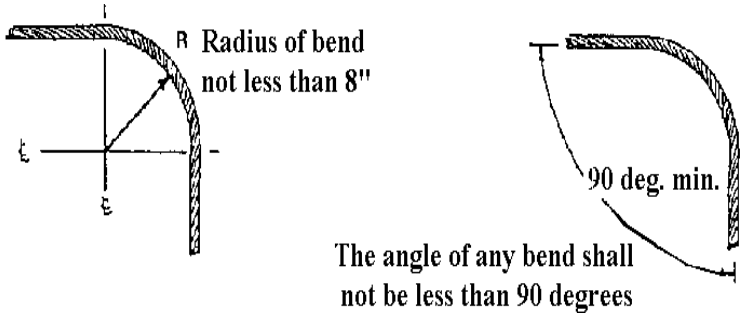

Figure 5. Radius and Angle of Down Conductor Bends

5.1.1.3.4 Bonding. All bonds between elements of the lightning protection subsystems shall be made by welding or brazing or UL approved high compression clamping devices. Welding or brazing shall be used for all bonds not readily accessible for inspection and maintenance. Soft solder shall not be used for bonding any conductor in the lightning protection subsystem.

5.1.1.3.5 Structural Steel. Substantial metal structural elements of buildings and towers (including overall building shield where it exists) shall be acceptable substitutes, for lightning down conductors provided they are permanently bonded in accordance with 5.2 and bonded to the earth electrode subsystem. Bonding straps across all structural joints shall be IAW 5.2.3.3.1.

5.1.1.3.6 Air Terminals (Lightning Rods). Non-metallic objects, extensions, or protrusions requiring protection shall have the air terminals designed and installed in accordance with requirements of NFPA No. 780, chapters 3-7 and 3-8.

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5.1.1.3.7 Guards. Where conductive guards must be used, the guards shall be electrically bonded at each end of the enclosed lightning conductor. Each isolated section of conductive guards shall also be bonded to the lightning conductor.

5.1.1.3.8 Supporting Structures. Lightning protection shall be provided for radar, communications or navigational aid antenna towers, and similar supporting structures in accordance with the following:

5.1.1.3.8.1 Earth Electrode Subsystem. An earth electrode subsystem conforming to requirements 5.1.1 through 5.1.1.1.7 shall be provided for all supporting structures. If a tower is adjacent to another structure such that the minimum distance between the tower and the structure is 6m (20 feet) or less, one earth electrode subsystem encompassing both the tower and the other structure shall be provided.
For distances greater than 6m (20 feet), separate earth electrode subsystems shall be installed. These subsystems shall be interconnected for separations up to 200 feet. Two bare 1/0 AWG copper cables shall be used by independent routes to bond the earth electrode subsystem of the tower to the earth electrode subsystem of buildings and structures that have signal, control, or power line interfaces with the tower and are separated less than 60m (200 feet). (See Figures 1 and 2).

5.1.1.3.8.2 Air Terminals. An air terminal shall be installed on the tower as specified in 5.1.1.3.6. A minimum of two conductive paths shall exist between any two air terminals and between any air terminal and the earth electrode subsystem (except for dead ends less than 5m (16 feet)).

5.1.1.3.8.3 Antennas. Antennas installed on towers or platforms shall be within a 1:1 zone of protection of an air terminal. Large array type antennas such as rhombics, yagis, etc. shall be protected by 0.6m (2 feet) air terminals installed on the top of the mast or structure supporting the antenna. For additional information see MIL-HDBK-419.

5.1.1.3.8.4 Down Conductors. As a minimum, down conductors shall meet the requirements of 5.1.1.3.3. Each down conductor shall be continuous and shall be bonded to the earth electrode subsystem for the tower in accordance with 5.2. For metal towers, where the structural elements are not used as down conductors, the down conductors shall be bonded to the tower legs at the base. Down conductors connecting cables to the earth electrode subsystem shall be protected against mechanical damage. Connecting cables passing through foundations or footings shall be installed in plastic or non-metallic conduit.

5.1.1.3.8.5 Waveguide Grounding. As a minimum, all waveguides shall be grounded as follows:

a. All waveguides to the antennas shall be grounded at three points: near the antenna, at the vertical-to-horizontal transition near the base of the tower, and at the waveguide entry port.

b. Metallic supporting structures for waveguides shall be electrically continuous and shall be connected to the exterior earth electrode subsystem at the first and last support columns as a minimum. The wire leads shall be as direct as possible.

c. Waveguides shall be grounded with solid copper strap or copper wire at least equal to No. 6 AWG. The size of wires in this cable shall not be less than No. 14 AWG. Braid or finer-stranded wire than No. 14 AWG shall not be used. All bends of ground conductors shall have a radius of 20 cm (8 in) or greater and the angle of any bend shall not be less than 90 degrees.

CUSTODIANS:
 ARMY: AC
 AIR FORCE: 02
 NAVY: EC
 DIA: DI
 NSA: NS
 USMC: MC

OTHER:
 USSPACECOM:US

Reviewing Activities:
 ARMY: CR, MI
 NAVY: CG, NC, OM, TD,
 AIR FORCE: 11, 13, 93
 NIMA: MP
 DOT: OST
 OUSD(AT&L): SE
 OASD: IR
 STRICOM: PT
 DCMA: CM
 DISA: DC5

Preparing Activity:
 DISA: DC1
 (Project TCSS-0059)

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APPENDIX - Discussion of Signal Ground Systems

10 General. The following methods can be used to ground signal reference subsystems within a piece of electronic equipment, or within a facility containing several pieces of equipment: floating point, single point, and multiple-point (also known as multipoint or equipotential plane). However, due to personnel hazards, the floating point method is not generally utilized.

20 Single Point Ground System. In the single point ground system (for use at lower frequencies)[1], all signal circuit grounds are referenced to a single point; this reference ground is then connected to the facility ground or a special ground connection provided for this purpose. In a cabinet, all electronic circuits (including the chassis) are bonded to a ground which is isolated from the cabinet and are then bonded to the one reference point. This isolates the cabinet and prevents any conducted, circulating currents in the facility ground from producing potential (noise) drops within the equipment. Conversely, no conducted circulating currents are introduced into the facility ground from the cabinets. Ground currents can produce voltage drops within the facility ground, and this can be a source of interference. However, the magnitude is generally small enough that it doesn't cause the signal-to-noise ratio to become intolerable.

While the cable or bus to the single point ground offers the most effective low impedance path for lower frequency signals, its impedance at higher frequencies prevents it from being an effective ground at frequencies above 300 Khz. In some instances, it may even be an ineffective ground at frequencies above 30 Khz. A single wire ground bus, even though terminated in zero impedance, assumes the characteristics of a single wire unbalanced transmission line. The impedance of such a line can be calculated by taking into account such parameters as length, height above ground (radiation effects) and finite earth conductivity. Since one end of the ground bus is not terminated, it can be accurately represented as an open-ended transmission line.

From this, it can be assumed the impedance of the grounding system is very high throughout the frequency spectrum, except in very narrow frequency ranges where the impedance changes signs. Consequently, a ground distribution system which performs adequately for dc or lower frequencies presents an entirely different characteristic at higher frequencies.

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[1]Lower frequencies - includes all voltages and currents whether signal, control, or power from dc to 30 Khz and may extend up to 300 Khz depending on the electromagnetic and physical aspects of the equipment, subsystem, and/or facility involved. (Audio and tone signaling devices operate in the lower frequency ranges).

The paths of copper that connect the single reference point become longer as the systems become larger and begin to generate appreciable unavoidable ground loops which, in turn, increase the magnitude of the noise. The effectiveness of this type of system must then be weighed against other possible solutions.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER: MIL-STD-188-124B	2. DOCUMENT DATE (YYMMDD) 920201

3. DOCUMENT TITLE: Grounding, Bonding, and Shielding

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) AUTOVON *(If applicable)*	7. DATE SUBMITTED

8. PREPARING ACTIVITY

a. NAME DISA/JIEO/JEBB	b. TELEPHONE *(Include Area Code)* (1) Commercial (732) 427-6868 (2) DSN 987-6868
c. ADDRESS *(Include Zip Code)* JIEO/CFS/JEBB BLDG 283, Squier Hall Fort Monmouth, NJ 07703-5613	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Rd, Suite 2533, Ft Belvoir, VA 22060-6221 Telephone (703) 767-6888 AUTOVON 427-6888

DD Form 1426, FEB 1999 (EG) PREVIOUS EDITIONS ARE OBSOLETE WHS/DIOR, Feb 99

SUPERSEDES DD FORM 1426 OF MIL-STD-188-124B