

CHANGE NOTICE

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THIS NOTICE INFORMS RECIPIENTS THAT THE DOCUMENT IDENTIFIED BY THE NUMBER (AND REVISION LETTER) SHOWN IN BLOCK 4 HAS BEEN CHANGED. THE PAGES CHANGED BY THIS CDCN BEING THOSE FURNISHED HEREWITH AND CARRYING THE SAME DATE AS THIS CDCN. THE PAGES OF THE PAGE NUMBERS AND DATES LISTED BELOW IN THE SUMMARY OF CHANGED PAGES COMBINED WITH NON-LISTED PAGES OF THE ORIGINAL ISSUE OF THE REVISION SHOWN IN BLOCK 4 CONSTITUTE THE CURRENT VERSION OF THIS DOCUMENT.							
13. CDCN No.	14. Pages Changed (Indicate Deletions)				S*	A*	15. Date
009	Revision and History page Page 3-1 Page C-16.				X X X		07/21/00
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	Order of Incorporation DCN 009						
16. Technical Concurrence (Contracting Agency)					Date		

* "S" indicates supersedes earlier page. "A" indicates added page.

REVISION AND HISTORY PAGE

REV.	DESCRIPTION	PUB. DATE
	Draft Revision B – SDR Version “Reference SSCBD 000008”	03-22-94
B	Revision B (Reference SSCBD 000008 R1, Eff. 6-3-94) Revised to Transition from Freedom to ISS. Changes include extensive simplification of requirements and scope.	09-30-94
C	Revision C (SSCD 000263, Eff. 09-04-96) Administration Update	01-29-97
	DCN 001 incorporates ECP 263 (Supplemental Release)	06-06-97
	DCN 002 incorporates SSCN 000588	05-13-98
	DCN 003 incorporates SSCN 000777	07-21-98
D	Revision D incorporates SSCN 001102	07-21-98
	DCN 004 incorporates SSCN 001405	01-12-99
	DCN 005 incorporates SSCN 001462	06-09-99
	DCN 006 incorporates SSCN 001662	06-09-99
	DCN 007 incorporates SSCN 001920	08-25-99
	DCN 008 incorporates SSCN 002107	08-27-99
E	Revision E incorporates SSCD 002345 Eff. 08-06-99	11-22-99
	DCN 009 incorporates SSCD 003213 Eff. 06-28-00	04-13-01

3.0 REQUIREMENTS

3.1 DEFINITION OF SPACE STATION ELECTRICAL BONDING REQUIREMENTS

The chassis or structure of all equipment which is operating from a common power source shall be bonded such that maximum electrical fault currents can be conducted without creating a thermal or electrical hazard. Electrical bonds between all equipment shall be made to minimize differences in potential. The criteria for bonding design shall be included in the Electromagnetic Effects (EME) Control Plan as specified in SSP 30243 and the actual design included in the EME Design Analysis Report.

3.2 CHARACTERISTICS

3.2.1 CLASSES OF APPLICATION

Where a single bond is used to serve two or more classes of application, the design shall conform to the more stringent requirement of bonding. Hardware providers shall analyze the application of the bond under evaluation and shall apply the class of bond that meets the functional requirements of the device, equipment, structure or interface in question. See appendix C for the exception (EMEP TIA-0216) to this paragraph. **DCN 009**

3.2.1.1 CLASS H BONDING (SHOCK HAZARD)

Class H bonds shall be applied to electrical and electronic equipment, assembled elements or structure and between mated, docked or berthed spacecraft. Class H bonding applies to nonpermanent interfaces such as mobile interfaces, direct current (dc) power sources or during docking or berthing. See appendix C for exception (Electromagnetic Effects Control Board (EMECB) Tailoring/Interpretation Agreement (TIA)-0067, EMECB TIA-0099, and EMECB TIA-0179) to this paragraph.

3.2.1.1.1 RESISTANCE

Conductive conduit carrying electrical wiring shall have a low resistance bond of less than 0.1 ohm to conducting structure at each termination and breakpoint. The bonding path may be through the equipment at which the conduit terminates.

3.2.1.1.2 GROUNDING

Exposed conducting frames or parts of electrical or electronic equipment shall have a low resistance bond of less than 0.1 ohm to conducting structure. If the equipment design includes a ground terminal or pin which is internally connected to exposed parts, a ground connection to the terminal or pin shall be provided.

EMECB TIA-0179

C.3.2.1.1 CLASS H BONDING (SHOCK HAZARD)

Exception: The IMAX audio recorder, battery charger, battery, ballast, and photoflood (PNs ACC0033, ACC0035-7, ACC0051-1, ACC0028-4, ACC0023-1) are allowed to exceed the SSP 57000, paragraph 3.2.4.2 bonding requirements called for in the SSP 30245, paragraph 3.2.1.1 requirement of 100 milli-Ohms resistance by a maximum of 150 milli-Ohms based upon analysis that shows that the IMAX3D equipment exceedance is not hazardous to the ISS crew or ISS hardware. **DCN 009**

Rationale: The battery charger and the ballast both contain isolated DC-to-DC converters which isolate the power output to the battery, recorder, and photoflood from the power which is provided by the ISS to the battery charger and ballast. Therefore, the analysis for resistance should end at the battery charger and ballast rather than extending to the downstream equipment. There are a primary fault ground path (cable pin to cable socket via green safety wire) and a secondary fault ground path (cable connector backshell to cable connector backshell via shield) for the battery charger and the ballast with the following resistances:

Battery Charger Primary Path Worst Case =	144 milli-Ohms	DCN 009
Battery Charger Secondary Path Worst Case =	409 milli-Ohms	DCN 009
Ballast Primary Path Worst Case =	241 milli-Ohms	DCN 009
Ballast Secondary Path Worst Case =	481 milli-Ohms	DCN 009

The IMAX3D is powered by the Utility Outlet Panel which has 12 Ampere circuit protection. With 1 Ohm of resistance in the grounding circuit only 12 Vdc could be generated at the equipment with a direct short from the power source. Since the exceedances are less than 150 milli-Ohms above the 100 milli-Ohm limit for the primary fault bond path and the secondary fault bond path resistances are less than 500 milli-Ohms, the IMAX3D will not pose a hazard to either the ISS crew or ISS equipment. Hazardous voltages to personnel start at 30 Vdc. Approval of this TIA would still maintain 16 dB of margin with respect to developing a hazardous condition. **DCN 009**

EMEP TIA-0216 **DCN 009**

C.3.2.1 CLASSES OF APPLICATION **DCN 009**

Exemption: When evaluating BCDUs (CI 360PG2, PN RE1807) for electrical bonding in accordance with 3.2.1, the dc resistance of the bond between the Acme screw housing (front or back) and the baseplate shall be less than or equal to 5 milli-Ohms. **DCN 009**

Rationale: The BCDU has two main bond paths to the Integrated Equipment Assembly (IEA) which are provided through two Acme screw assemblies (including housings). The BCDU also has two “backup” wire bonds which are routed through the external P3 connector. In the case of BCDU FM11, only one Acme screw housing to baseplate bond did not satisfy the 2.5 milli-Ohms resistance requirement. A parallel combination of the two bond paths would result an equivalent bond of less than 2.5 milli-Ohms. Worst case, if each bond was 5 milli-Ohms, the resultant bond resistance would be 2.5 milli-Ohms. This is in compliance with the Class R bond dc resistance requirement. **DCN 009**

Relaxation of the bond requirement between the Acme screw housing and the baseplate to 5 milli-Ohms should provide adequate relief for remaining BCDUs. This is not a common outage. Of the 14 BCDUs which have been tested thus far, this is the only unit which has exhibited this outage.

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