

PAYLOAD HAZARD REPORT		a. NO: GHR-AMS02-011
b. PAYLOAD: Alpha Magnetic Spectrometer-02 (AMS-02) GSE		c. PHASE: III
d. SUBSYSTEM: Electrical Systems	e. HAZARD GROUP: Electrical	f. DATE: August 2010
g. HAZARD TITLE: Electric Discharge/Shock		i. HAZARD CATEGORY <input checked="" type="checkbox"/> CATASTROPHIC <input type="checkbox"/> CRITICAL
h. APPLICABLE SAFETY REQUIREMENTS: KHB 1700.7, 4.3.2 Electrical		
j. DESCRIPTION OF HAZARD Damage occurs to AMS, AMS GSE, facilities, or injury to personnel due to electrical events triggered by electrical shorting or unwanted electrical contact. (>30 V _{rms} and 50 VDC)		
k. HAZARD CAUSES: 1. Over voltage/over current. 2. Contact with high voltage sources. 3. Mismatching of powered connectors. 5. AMS-02 payload or electrical GSE conductive external parts or surfaces that are not at ground potential. 6. Personnel short an energized AMS-02 payload or GSE electrical circuit during connector mating/demating.		
l. HAZARD CONTROLS: (See continuation sheet)		
m. SAFETY VERIFICATION METHODS: (See continuation sheet)		
n. STATUS OF VERIFICATION: (See continuation sheet)		
o. APPROVAL	PAYLOAD ORGANIZATION	SSP/ISS
PHASE I		
PHASE II		
PHASE DIII	<i>TRENTA MARTIN</i>	<i>8/25/10</i>

PAYLOAD HAZARD REPORT CONTINUATION SHEET	a. NO: GHR-AMS02-011
b. PAYLOAD: Alpha Magnetic Spectrometer-02 (AMS-02) GSE	c. Phase III
k. HAZARD CAUSES: 1. Over voltage/over current.	
l. HAZARD CONTROLS: 1.2 System designed per AMS approved electrical codes (Chinese Electrical Code, IEC, or NEC equivalent code).	
m. SAFETY VERIFICATION METHODS: 1.2.1 Review and approval of AMS and AMS GSE electrical schematics. (For Flight EPDC, see AMS-02-F017, AMS-02-F08 and AMS-02-F12). 1.2.2 Review of COTS hardware for UL or equivalent electrical safety qualification.	
n. STATUS OF VERIFICATION: 1.2.1 Closed to SVTL. 1.2.2 Closed to SVTL.	

PAYLOAD HAZARD REPORT CONTINUATION SHEET

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b. PAYLOAD: Alpha Magnetic Spectrometer-02 (AMS-02) GSE

c. Phase III

k. HAZARD CAUSES:

2. Contact with high voltage/current sources.

l. HAZARD CONTROLS:

2.1 Socket connectors on power (source) side of GSE.

2.3 High voltage sources on flight hardware and GSE are inaccessible during nominal operations.

2.4 Lockout/tag-out procedures during maintenance operations involving GSE power supplies.

m. SAFETY VERIFICATION METHODS:

2.1.1 Inspection of GSE socket connectors/schematics to ensure proper design.

2.3.1 QA inspection of hardware ensuring high voltage locations are inaccessible.

2.4.1 Review of operational procedures showing lockout/tag-out of power supplies for AMS GSE to ensure no power to AMS GSE prior to maintenance operations.

n. STATUS OF VERIFICATION:

2.1.1 Closed to SVTL.

2.3.1 Closed to SVTL.

2.4.1 Closed to SVTL.

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k. HAZARD CAUSES: 3. Mismatching of power connectors, which would lead to personnel injury.	
1. HAZARD CONTROLS: 3.1 Connector keying to preclude mismatching.	
m. SAFETY VERIFICATION METHODS: 3.1.1 Review and approval of electrical schematics and cable drawings.	
n. STATUS OF VERIFICATION: 3.1.1 Closed 12/22/09. ESCG-4390-08-SP-MEMO-0022, <i>Mate/Demate of Connectors</i> , 06/11/08. This closes the verification for all flight related hardware. Non-COTS GSE connectors verified by AMS-02. GSE is either COTS or KSC-supplied and will be used as designed.	

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<p>k. HAZARD CAUSES:</p> <p>5. AMS-02 payload or electrical GSE conductive external parts or surfaces that are not at ground potential.</p>	
<p>l. HAZARD CONTROLS:</p> <p>5.1 Proper grounding and bonding between AMS-02 hardware and KSC facilities will be used. The design, construction and installation of the AMS-02 payload and GSE will assure that all conductive external parts and surfaces are at ground potential at all times.</p>	
<p>m. SAFETY VERIFICATION METHODS:</p> <p>5.1.1 Grounding and bonding verification tests will be performed on the AMS-02 payload, GSE and the interfacing between AMS-02 equipment and KSC facilities.</p>	
<p>n. STATUS OF VERIFICATION:</p> <p>5.1.1 Closed to SVTL.</p>	

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a. NO: GHR-AMS02-011

b. PAYLOAD: Alpha Magnetic Spectrometer-02 (AMS-02) GSE

c. Phase III

k. HAZARD CAUSES:

- 6. Personnel short an energized AMS-02 payload or GSE electrical circuit after improperly mating/demating electrical connectors.

l. HAZARD CONTROLS:

- 6.1 No blind mating will be allowed.
- 6.2 Plug design will preclude inadvertently reversing a connection.
- 6.3 Plugs will be inspected for debris that can short energized pins prior to mating power connectors.

m. SAFETY VERIFICATION METHODS:

- 6.1.1 Review of AMS-02 procedures to ensure there is a warning to not perform blind mating.
- 6.2.1 Review of design for non-COTS connectors.
- 6.3.1 Review of procedures to ensure personnel will inspect power connectors for debris.

n. STATUS OF VERIFICATION:

- 6.1.1 Closed to SVTL.
- 6.2.1 Closed 12/22/09. ESCG-4390-08-SP-MEMO-0022, *Mate/Demate of Connectors*, 06/11/08. This closes the verification for all flight related hardware. GSE that is either COTS or KSC-supplied and will be used as designed.
- 6.3.1 Closed to SVTL.

Location	Item	Manufacturer	Model Number	Commercial Yes/No	Electrical Code	3-Phase Yes/No	KSC Facilities	Batteries Yes/No Commercial/Customer	Functions	Quantity
<u>Diagnostic (used wherever needed)</u>										
	1	Tektronix	TDS 7054	Yes	UL	No	No	No	Oscilloscope	1
	2	Tektronix	TDS 11402	Yes	UL	No	No	No	Oscilloscope	1
	3	Fluke, etc,	Multimeters	Yes	KSC tool crib	N/A	No	Yes, Commercial	Multimeters	5
<u>EGSE (mounted near or on payload during ground operations in SSPF, not used in PCR (TBC))</u>										
TBC	4	Honeywell	HV180	Yes	UL	No	No	No	Fan for main radiator cooling	8
TBC	5	Honeywell	HV180	Yes	UL	No	No	No	Fan for Zenith radiator cooling	4
TBC	6	Honeywell	HT800-E	Yes	CE/GS	No	No	No	Fan for PDS and CAB cooling	3
	7	Texas Instruments	UNK	Yes	CE	No	No	No	AST LED	1
	8	Spirent	STR4500	Yes	CE	No	No	No	GPS simulator	1
	9	MIDWEST MICROWAVE	STA-1043-04-NNN-79	Yes	CE	No	No	No	GPS Attenuator	1
	10	planTec	UNK	Yes	CE	No	No	No	GPS simulator transmitter	1
	11	Greisinger Devices	GMH 3150	Yes	CE	No	No	Yes, Commercial	TRD pressure sensor display and logging device	1
<u>GSC (located near payload during ground operations, e.g., on tables in SSPF High Bay or in MLP)</u>										
	12	Hewlett-Packard	DC7700-CMT	Yes	UL	No	No	No	Personal computer (POC/GSC)	2
	13	Hewlett-Packard	DC7800-CMT	Yes	UL	No	No	No	Personal computer (POC)	2
	14	Hoojum Design	Cubit3	Yes	UL	No	No	No	Personal computer (GSC)	4
	15	Agilent Technologies	N5770A	Yes	UL	No	No	No	DC power supply (120V)	4

	16	D-Link	DGS-1016D	Yes	UL	No	No	No	Gigabit network switch	1
	17	3Com	4400 24PT	Yes	UL	No	No	No	10/1000 network switch	1
	18	NEC	Multisync LCD2170NX	Yes	UL	No	No	No	LCD Monitors	2
	19	Dataprobe	iBB-2N20	Yes	UL	No	No	No	Remote reboot power outlets	2
	20	AMS	EPPCAN	No		No	No	No	EEPCAN interface, 5V	2
	21	AMS	USB422	No		No	No	No	RS422-USB interface (STS DDRS)	2
	22	AMS	USB/HRDL	No		No	No	No	HRDL-USB interface (ISS DDRS)	2
POCC (located in "user area" for controlling the payload during ground operations)										
	23	Hewlett-Packard	DC7700-CMT	Yes	UL	No	No	No	Personal computer (POC/GSC)	4
	24	Hewlett-Packard	DC7800-CMT	Yes	UL	No	No	No	Personal computer (POC)	2
	25	D-Link	DGS-1016D	Yes	UL	No	No	No	Gigabit network switch	1
	26	3Com	4400 24PT	Yes	UL	No	No	No	10/1000 network switch	1
	27	NEC	Multisync LCD2170NX	Yes	UL	No	No	No	LCD Monitors	13
	28	Dell	PowerEdge IDIII	Yes	UL	No	No	No	Personal computer (SOC)	2
	29	Dell	Dell Power Vault DP 600	Yes	UL	No	No	No	Disk server (POC)	1
	30		UPS	Yes	UL	No	No	Yes, Commercial	UPS for disk server	1
	31	Hewlett-Packard	Laserjet printer	Yes	UL	No	No	No	Network printer	1
Offices/POCC (wherever people can find to sit and work)										
	32	Various	Laptop computers	Yes	UL	No	No	Yes, Commercial	Laptop computer	40
	33	Hewlett-Packard	Laserjet printer	Yes	UL	No	No	No	Network printer	1