

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
JUMPER HARNESS, ITEM 391 ----- SV821755-1 (1)	2/2	391FM03 Electrical short to ground in warning tone or status tone lines. Cable chafing against connector shell or shield. Improper connector strain relief, insulation breakdown.	END ITEM: Electrical short in warning tone or status tone lines to ground. GFE INTERFACE: Tones will be continuously activated. MISSION: Terminate EVA due to crew discomfort and loss of warning tones for future warning messages. CREW/VEHICLE: None. TIME TO EFFECT /ACTIONS: Seconds. TIME AVAILABLE: N/A TIME REQUIRED: N/A REDUNDANCY SCREENS: A-N/A B-N/A C-N/A	A. Design - Short circuits are minimized by the following: Each connector/adaptor ring interface is locked in place to prevent rotation a mechanical lock. #24 AWG Teflon insulated wires and connector provide electrical conduction and insulation properties. Connector pins are operated at 56.7% of derated temperature and 4.3% of derated voltage, and wire is at less than 1% of derated current. The convoluted tubing provides an additional layer of insulation to prevent shorts between the EMI braid and any internal unshielded conductors. The woven Halar sheath is assembled over the internal cables to provide protection from abrasion and impact. Connector pins are insulated by a polyphenylene sulfide insert. The P3 connector backshell housing has internal edges blended smooth to prevent cable chafing. Strain relief is provided by the combination of convolute tubing, metal EMI braid, and 0.5' extra cable length. The braided items are secured by a band strap at each connector/cable interface. The convolute tubing is threaded into the connector. Wire crimping is performed per SVHS4909 (based on MSFC Spec-Q-1A). B. Test - Component Acceptance Test - The 391 harness is subjected to acceptance testing per AT-E-391 prior to final acceptance to ensure there are no workmanship problems that could cause an open or short circuit. Each connector/harness interface is subjected to a 9-lb. test. The insulation resistance between each conductor and the ground circuit is measured during this test to ensure there are no intermittent shorts and verify the integrity of the harness strain relief. A continuity test is performed to measure the resistance of each circuit to ensure there are no open circuits or high resistance paths. The insulation resistance and dielectric strength between each conductor and the shield ground is measured to ensure there are no shorts. PDA Test - The warning tone and status tone lines are checked during DCM PDA testing per SEMU-60-015 para. 4.0 (Electrical Testing). Certification Test - Certified for a useful life of 15 years (ref. EMU1-13-046). C. Inspection - To ensure that there are no workmanship problems which could cause a short circuit in the harness conductors, the following inspections are made: Contact crimp samples are made prior to start of crimping and at the conclusion of crimping and pull tested to ensure the crimp tooling is operating properly. Crimp terminations are inspected for defects. Harness cables and conductors visually inspected prior to assembly to ensure there are no defects which could cause a short due to workmanship. Electrical bond test is performed to verify ground path through various points on the harness. In-process and final electrical checkout of the harness (conductor continuity, dielectric strength and insulation resistance tests) are performed to ensure there are no open circuits. D. Failure History - None.

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		391FM03		<p>E. Ground Turnaround - Ground Turnaround tested per FEMU-R-001, Tones Test.</p> <p>F. Operational Use - Crew Response -PreEVA: Trouble shoot problem. Consider third EMU if available Terminate EVA prep due to crew discomfort caused by continuous tone and loss EMU annunciation capability. EVA: Terminate EVA. EMU is go for SCU if noise level is bearable.</p> <p>Training - Standard training covers this failure mode.</p> <p>Operational Considerations - Flight rule A15.1.2-2 of "Space Shuttle Operational Flight Rules", NSTS-128 defines go/no go criteria related to EMU CWS. Generic EVA Checklist, JSC-4 procedures Section 3 (EMU Checkout) and 4 (EVA prep) verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.</p>

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JUMPER HARNESS, ITEM 391 ----- SV821755-1 (1)	2/1R	391FM04 Electrical short in Fan Switch Line. Cable chafing against connector shell or shield. Improper connector strain relief, insulation breakdown.	END ITEM: Short circuit across battery GFE INTERFACE: Loss of power to PLSS (no fan, no communications . Current meter shunt will fuse open MISSION: Loss of one EMU. Terminate EVA. CREW/VEHICLE: None for single failure. Possible crew loss with loss of SOP. TIME TO EFFECT /ACTIONS: Seconds. TIME AVAILABLE: Minutes. TIME REQUIRED: Seconds. REDUNDANCY SCREENS: A-PASS B-PASS C-PASS	A. Design - Short circuits are minimized by the following: Each connector/adapter ring interface is locked in place to prevent rotation by a mechanical lock. #22 Teflon insulated wires and connector provide electrical conduction and insulation properties. Connector pins are operating at 56.7% of derated temperature and 6.5% of derated voltage, and wire is at 4.4% of derated cur The convoluted tubing provides an additional layer of insulation to prevent shorts between the EMI braid and any internal unshielded conductors. The w Halar sheath is assembled over the internal cables to provide protection fr abrasion and impact. Connector pins are insulated by a polyphenylene sulfic insert. The P3 connector backshell housing has internal edges blended smoc prevent cable chafing. Strain relief is provided by the combination of convolute tubing, metal EMI braid, and 0.5 in. extra cable length. The bra items are secured by a band strap at each connector/cable interface. The convolute tubing is threaded into the connectors. Wire crimping is performe SVHS4909 (based on MSFC Spec-Q-1A). B. Test - Component Acceptance Test - The 391 harness is subjected to acceptance testing per AT-E-391 prior to fi acceptance to ensure there are no workmanship problems that could cause an or short circuit. Each connector/harness interface is subjected to a 9-lb. test. The insulation resistance between each conductor and the ground circ is measured during this test to ensure there are no intermittent shorts and verify the integrity of the harness strain relief. A continuity test is performed to measure the resistance of each circuit to ensure there are no circuits or high resistance paths. The insulation resistance and dielectri strength between each conductor and the shield ground is measured to ensure there are no shorts. PDA Test - The fan switch lines are checked during the DCM PDA SEMU-60-015 para. 4.0 (Electrical Testing). Certification Test - Certified for a useful life of 15 years (ref. EMU1-13-046). C. Inspection - To ensure that there are no workmanship problems which could cause a short circuit in the harness conductors, the following inspections are made: Cont crimp samples are made prior to start of crimping and at the conclusion of crimping and pull tested to ensure the crimp tooling is operating properly crimp terminations are inspected for defects. Harness cables and conductor visually inspected prior to assembly to ensure there are no defects which c cause a short due to workmanship. Electrical bond test is performed to veri ground path through various points on the harness. In-process and final electrical checkout of the harness (conductor continuity, dielectric streng and insulation resistance tests) are performed to ensure there are no open, circuits. D. Failure History - None.

EXTRAVEHICULAR MOBILITY UNIT
SYSTEMS SAFETY REVIEW PANEL REVIEW
FOR THE
I-391 JUMPER POWER HARNESS
CRITICAL ITEM LIST (CIL)
EMU CONTRACT NO. NAS 9-97150

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