

C31
EMU CRITICAL ITEMS LIST

12/24/97 SUPERSPOES 01/02/90

ANALYST:

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NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
ELECTRICAL POWER HARNESS, ITEM 151 ----- 64780151-4 (1)	2/2	151FM09: Electrical open in EVC power. CAUSE: Cable chafing against connector shell or shield. Improper connector strain relief. Faulty connection between the connector and the lead wires.	END ITEM: Loss of continuity in EVC power (+) line. OPE INTERFACE: Loss of power to EVC when on battery power. Line is not used when on SCU power. MISSION: Loss of one EMU. Terminates ERA. CREW/VEHICLE: None.	A. Design - Open circuits in any of the circuits in the Item 151 harness are minimized by the following: Conductors are hand potted in Stycast 2651 in the area that they interface with the metal backshell to minimize their movement and chance of shorting to the backshell. The conductors are strain relieved at the connector/harness interface with a molded rubber backshell. This minimizes the effects of cable tension on the individual conductors. Conductors are sheathed within a woven Nomex outer layer. This holds the cables together to share any loading. #22 and #24 AWG Teflon jacketed wires provide electrical and mechanical properties which help prevent breakage. Each connector/adaptor ring interface is locked in place to prevent rotation by a combined mechanical and adhesive lock. Wire crimping per DVS14909 (based on MSFC-Spec-Q-18). B. Test - Component Acceptance: The harness is acceptance tested per the following tests of A1-EMU-151 to insure there are no workmanship problems which could cause open circuits. Pull Test - This test subjects each connector/harness interface to a specific pull test (9 pounds) designed to exceed any stress encountered in actual use. The insulation resistance between each conductor and the ground circuit is measured during the test to insure there is no shorting. The test is followed by a continuity check of each conductor path to insure there are no open circuits. Continuity Test - The resistance of each circuit is measured to insure there are no open circuits or high resistance paths. PDA: The EVC power/battery sense (+) line is checked during the Audio test portion of PLSS PDA testing per para. 6.0 of SEMO-60-D10. Certification: This item has completed the 15 year structural vibration and shock certification requirements during 10/83. Engineering Changes 42005-527-2 (insulation resistance check during Pull Test) and 42804-865 (remove crimp splices) have been incorporated and certified by test since this configuration

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	2/2	TSIPMD:		was certified.

C. Inspection -
During harness manufacturing, the following inspections are performed to insure there are no open circuits. Visual inspection of conductors prior to potting operations to insure there are no damaged conductors and that the conductors are routed properly. Visual inspection of the harness prior to and after rubber boot molding process to insure there are no damaged conductors which could cause an open circuit. In-process electrical checkout of the harness before and after potting and molding to insure there are no open circuits. Visual inspection of the conductors prior to application of the outer sheath to insure there are no damaged conductors that could cause an open circuit. Connector contact crimp samples are made prior to and after crimping and subjected to pull testing to insure the crimping tools are operating properly. This insures there will not be any high resistance problems at the contacts.

D. Failure History -
The following RDR's were issued for Item 151 due to open circuits.
R-EMU-151-0001 (7-6-83)
Intermittent open due to a broken wire at the P12 connector during acceptance testing. This failure was caused by a workmanship problem. The corrective action was to add a visual inspection prior to molding.
R-EMU-151-0002 (12-14-83)
Intermittent open due to a broken wire at the P3 connector during acceptance testing due to a workmanship problem. The corrective action taken was to issue EC 42806-527 which fixes the angular location of the P3 adapter ring slot to insure proper wire exit and EC 42806-527-2 which requires that a pull test be performed to detect opens.

E. Ground Turnaround -
Tested per FEMU-R-001, pre-flight communications check.

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	2/2	15]EMD01		<p>4. Operational Use - EVA: When loss of minimum communication occurs, terminate EVA.</p> <p>Training - Standard training covers this failure mode.</p> <p>Operational Considerations - EVA checklist verify hardware integrity and system operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems. Flight rules require that EVA be terminated if two-way communication between each EV crewmember and orbiter, either direct or through relay is unavailable.</p> <p>Crew Response - PreEVA: Trouble shoot problem. Consider third EMU if available. If no success terminate EVA prep. EVA: When loss of fan, com and CAS data occurs, open helmet purge valve and deactivate EMU power. Terminate EVA.</p> <p>Training - Standard training covers this failure mode.</p> <p>Operational Considerations - EVA checklist procedures verify hardware integrity and system operational status prior to EVA. Real Time Data system allows ground monitoring of EMU systems. Flight rules define go/no go criteria related to EMU battery power.</p>