

12/24/91 SUPERSEDES 01/02/90

ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
ELECTRICAL POWER HARNESS, ITEM 151 ----- S278151-4 (1)	2/M	IS(FHDB): Electrical short of battery (+) line to ground. CAUSE: Cable chafing against connector shell or shield. Improper connector strain relief.	EMU ITEM: Short circuit across battery. GPE INTERFACE: Loss of Battery power to EMU components and excessive current draw. Loss of all power to EMU. MISSION: Loss of one EMU. Forminate EVA. CREW/VEHICLE: None for single failure. Possible crew loss with loss of SOP.	A. Design - Short circuits in any of the circuits in the Item 151 harness are minimized by the following: Conductors are hard putted in Bycast 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/adapter ring interface is locked in place to prevent rotation by a combined mechanical and adhesive lock. B. Test - Component Acceptance: The harness in acceptance tested per the following tests of AF-EMU-151 to insure there are no workmanship problems which would cause short 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. PDA: The battery (+) lines are checked during the Performance portion of PLSS PDA testing per para. 45.0 SEMU-60-810. Certification: This item has completed the 15 year structural vibration and shock certification requirements during 10/83. Engineering Changes 42806-327-2 (insulation resistance check during Pull Test) and 42808-865 (remove crimp splices) have been incorporated and certified by test since this configuration was certified. C. Inspection - During harness manufacturing, the following inspections are

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	2/IR	151PN03:		<p>performed to insure there are no short circuits. Visual inspection of conductors prior to potting operations to insure there are no damaged conductors and that the conductors are routed properly.</p> <p>Visual inspection of the harness prior to and after rubber boot molding process to insure there are no damaged conductors which could cause a short circuit.</p> <p>In-process electrical checkout of the harness before and after potting and molding to insure there are no short circuits.</p> <p>Visual inspection of the conductors prior to application of the outer sheath to insure there are no damaged conductors that could cause a short circuit.</p>

D. Failure History -
The following ADR's were issued for Item 151 due to short circuits:
J-EMU-151-003 (8-27-84)
The harness failed dielectric Acceptance testing. Investigation determined the cause of the failure to be an intermittent short circuit between the warning tone line and P3 connector body. This was due to improper strain relief of the wire which allowed it to come in contact with the connector adapter ring. The wire insulation was broken when the rubber backshell was molded to the connector.
J-EMU-151-004 (6/12/85)
J-EMU-151-005 (6/12/85) -
Both failures occurred during an EIA Aircraft Power Supply functional test. The failures were caused by a short circuit between the ENE power/battery sense (+) line and case ground (connector body). The failure caused the suit return line in the DEN to fuse open. The failure investigation found that a crimp splice within the molded backshell was not sufficiently covered by shrink tubing. The exposed portion of the crimp was allowed to come in contact with the connector body.
Corrective Action:
Class I EC 42806-527-2 created the S4709151-3 harness configuration by adding a connector pull test requirement to the acceptance test requirements. Class I EC 42806-865 created the S4709151-4 harness configuration by eliminating the two splices in the #9 connector, to prevent them from shorting to case.

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	2/1R	YS1F00B;		

E. Ground Turnaround -
Tested per FEMU-R-001, E1A airlock battery recharge
verification.

F. Operational Use -
Crew Response - PreEVA: Trouble shoot problem. Consider
third EMU if available. If no success, EMU go for SCU
standby.
EVA: When loss of fan, cone and CWs data occurs, open helmet
purge valve and deactivate EMU power. Terminate EVA.
Training - standard training covers this failure mode.
Operational Considerations - EVA checklist procedures verify
hardware integrity and systems operational status prior to
EVA. Best Time Gate System allows ground monitoring of EMU
systems. Flight rules define go/no go criteria related to
EMU battery power.