

CIL
EMU CRITICAL ITEMS LIST

12/24/91 SUPERSEDES 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 1V789151-4 (1)	2/W	151(M06) Electrical short to ground of fan windings power line. CAUSE: Cable chafing against connector shell or shield, improper connector strain relief.	END ITEM: Short circuit across battery. OPE INTERFACE: Loss of power to fan motor and excessive current draw. There is no current limiting between the battery and the fan motor with loss of all power to the EMU. MISSION: Loss of one EMU, Terminate EMA. CREW/VEHICLE: None for single failure. Possible loss of crewman with loss of SOP.	A. Design - Short circuits in any of the circuits in the Item 151 harness is minimized by the following: Conductors are hand potted in Stycast 2651 in the areas 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 matted rubber backshell. This minimizes the effects of cable tension on the individual conductors. Conductors are sheathed within a woven Kevlar outer layer. This holds the cables together to share any loading. #22 and #24 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. B. Test - Component Acceptance: The harness is acceptance tested per the following tests of AT-EMU-151 to insure there are no workmanship problems which could cause short circuits. Pull Test - This test subjects each connector/harness interface in 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 fan windings power lines are checked during the performance portion of PLS PDA testing per para. 46.8 of SEMU-60-01. Certification: This item has completed the 15 year structural vibration and shock certification requirements during 10/83. Engineering Changes 42006-527-2 (Insulation resistance check during Pull Test) and 42906-865 (remove crimp splices) have been incorporated and certified by test since this configuration was certified. C. Inspection -

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	2/1R	151PMB6;		<p>During harness manufacturing, the following inspections are 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 BOA's were issued for Item 151 due to short circuits:

J-EMU-151-0003 (6-27-85)

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 the 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 ETA Airclock Power Supply functional test. The failures were caused by a short circuit between the EVC power/battery sense (+) line and case ground (connector body). The failure caused the suit return line in the BCM 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 SV789151-3 harness configuration by adding a connector pull test requirement to the acceptance test requirements. Class I EC 42806-865 created the SV789151-4 harness configuration by adding a connector pull test requirement to the acceptance test requirements. Class I EC 42806-865 created the SV789151-4

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	Z/IR	151FM06:		<p>harness configuration by eliminating the two splices in the PF connector, to prevent them from shorting to case.</p> <p>E. Ground Turnaround - Tested per FEMU-R-001, Water Servicing, Leakage, and Gas Removal.</p> <p>F. Operational Use - Crew Response - PreEVA; Trouble sheet problem. Consider third EMU if available. If no success terminate EVA prep. EVA; When CUS data confirms improper battery load, open helmet purge valve, deactivate fan and water switches. Terminate EVA. Training - Standard training covers this failure mode. Operational Considerations - EVA checklist procedures verify hardware integrity and systems operational status prior to EVA. Real Time Data System allow ground monitoring of EMU systems. Flight rules define go/no go criteria related to EMU ventilation.</p>