

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
ELECTRICAL SIGNALS HARNESS, ITEM 152 SV709152-2 (1)	2/2	152FM16: Electrical open or short in HI/LO level microphone lines.  CAUSE: Cable chafing against connector shell or shield, Improper connector strain relief, Faulty connection between the connector and the lead wires, broken or defective wire.	END ITEM: Electrical open or short in HI/LO level microphone lines,  GFE INTERFACE: Loss of microphones,  MISSION: Terminate EVA,  CREW/VEHICLE: None.	A. Design - Open and short circuits in any of the circuits in the item 152 harness are minimized by the following: Conductors are hard 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 Kevlar outer layer. This holds the cables together to share any loading. Each connector/adaptor ring interface is locked in place to prevent rotation by a mechanical and adhesive lock. #22 and #24 AWG Teflon insulated wires provide electrical and mechanical properties to prevent wire breakage and to help prevent shorting. Each connector/cable interface is strain relieved by a molded rubber boot that is molded in place to prevent cable kinking.  B. Test - Component Acceptance Test - The harness is acceptance tested per the following tests of AF-EMU-152 to insure there are no workmanship problems which would cause actual or potential open or short circuits. Pull Test - This test subjects each connector/harness to a specific pull test (10 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. Insulation Resistance/Dielectric Strength Testing - The harness is tested for short circuits or low resistance paths between each conductor to the shield circuits and between each conductor to each other conductor by insulation resistance and dielectric strength measurements of 200 VDC and 200 VAC respectively.  POA Test - An open or short circuit in the HI/LO level microphone lines

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would be detected during the Audio Test portion of PLSS POK testing per Para. 8.0 of SEMU-60-010.

**Certification Test -**  
This item has completed the 15 year structural vibration and shock certification requirements during 19/83. Engineering Changes 42806-527-2 (insulation resistance check during Pull test) and 42806-865 (remove crimp splices) have been incorporated since this configuration was certified.

**C. Inspection -**  
During harness manufacturing, the following inspections are performed:  
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 or short circuit.  
In-process electrical checkout of the harness before and after potting and molding to insure there are no open or short 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 or short circuit. Connector contact crimp samples are made per SVS4009, Class II, based on MSFC-Spec-0-1A) 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 152 due to open circuits:  
H-EMU-152-0001 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 taken was to add a visual inspection prior to molding.  
H-EMU-152-0002 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

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	2/2	1524H16:		<p>which requires that a pull test be performed to detect opens or shorts.</p> <p>Failure History (Continued) - The following RDR's were issued for Item 152 failures caused by short circuits: N-EMU-152-0001 short circuit between P3 connector and the adapter ring caused by an improper rework that rotated the connector adapter ring/connector assembly 20 deg. relative to the molded rubber form. This forced the conductors against the adapter ring slot edge and a short circuit resulted.</p> <p>Corrective Action: EC's 42806-527 and 42806-527-2 have been issued to specify and angular location requirement between the adapter ring slot and master bayway and to pull test each harness/connector interface.</p> <p>E. Ground Turnaround - tested per PEMU-R-001 DEMU Communications and Blended Check.</p> <p>F. Operational Use - Crew Response - Trouble shoot problem. If no success, consider third EMU if available. Otherwise terminate EVA prep. EVA When loss of minimum communication occurs, terminate EVA. Training - Standard training covers this failure mode. Operational Considerations - EVA checklist procedures verify hardware integrity and systems operational status prior to EVA. Flight rules require that EVA be terminated two-way communication between each EV crewmember and orbiter, either direct or through relay, is unavailable.</p>