

CIL  
EMU CRITICAL ITEMS LIST

12/24/91 SUPERSEDES 01/02/90

Page: 1  
Date: 12/02/93

ANALYST:

NAME P/R QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
ELECTRICAL SIGNALS HARNESS, ITEM 152 ----- S4789132-2 (1)	2/2	152FN17: Electrical open or short in earphone signal HI/LO lines.  CAUSE: Cable chafing against connector shell or shield. Improper connector strain relief. Faulty connection between the connector and the lead wires.	END ITEM: Open or short in earphone signal lines.  OFF INTERFACE: Loss of incoming radio signals to earphones.  MISSION: Loss of one EMU.  CREW/VEHICLE: None.	A. Design - The following design considerations have been incorporated to prevent an open or short in the HI/LO level microphone lines: The applicable cable/connector interfaces are strain relieved by a molded rubber strain relief boot to reduce the chance of wire fatigue during use. The conductors are bundled within a woven copper strand sheath which causes them to act together and share any loading placed on it. A woven Kevlar sheath is assembled over the shielded cables to provide protection from abrasion and impact. The conductors are hand packed within the adapter ring to prevent their chafing against the metal adapter ring. Each connector/adapter ring interface is locked in place to prevent rotation by a mechanical lock and an adhesive lock. Wire crimping is per S4784903 (based on MSFC-SPEC-Q-1A).  B. Test - Component Acceptance Test - The 152 harness is subjected to acceptance testing per AT-EMU-152 prior to final acceptance testing. This testing includes the following tests which insure there are no workmanship problems which would cause an electrical short to ground or an open circuit in the HI/LO level microphone lines or microphone power lines: 1. The insulation resistance and dielectric strength between each conductor and the shield ground is measured to insure there are no shorts. 2. Each connector/cable interface is pull tested to detect any workmanship problems which could cause a short circuit. Continuity testing of each conductor is performed after pull testing to insure there were no open circuits.  PDA Test - The HI/LO level microphone lines are functionally checked during PLSS PDA testing per SEMU-6-010, Test 6.0, to insure there are no shorts to shield ground or opens which affect the performance of the microphones.  Certification test - This item has completed the structural vibration and shock certification requirements during 18/83, EC 42806-527-2 (added connector pull test) has been incorporated since this

CIL  
EMU CRITICAL ITEMS LIST

12/24/91 SUPERSEDES 01/02/90

Page: 2  
Date: 12/02/91

ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
	2/2	152PH07:		configuration was certified.

C. Inspection -  
To insure there are no workmanship problems which would cause a short or open circuit in the harness conductors, the following inspections are performed:  
Harness cables and conductors are visually inspected prior to assembly to insure there are no defects which could cause a short to ground or an open circuit due to defects in the cable insulation.  
Connector wiring is inspected before and after potting to insure there is no conductor damage and that the conductors are properly strain relieved and properly dressed to prevent conductor shorting to the adapter ring or an open circuit. Insulation resistance and dielectric strength are measured between each conductor and shield ground to insure there are no shorts prior to and after potting of the conductors. Contact crimp sockets are made prior to the start of contact crimping and the conclusion of crimping and subjected to a pull test to insure the crimping tools are operating properly. This insures there will not be any high resistance problems at the conductor.

D. Failure History -  
J-EMU-152-001 (8-17-80) An open circuit in the hard-line communication line was found during functional testing. The failure was determined to be caused by the pulling and twisting the harness was normally exposed to during installation on the PLSS. This handling caused the wire to break. EC 42803-205 revised cable lengths and improved cable flexibility.  
H-EMU-152-A001 (7-9-84) During PLSS Acceptance Test, all sensor outputs read full scale. A short circuit in the harness was found between Vref and ground. The short was due to improper assembly and testing by the vendor. The vendor's assembly and test procedures were revised.  
J-EMU-152-002 (4-11-85) During a pre-flight communications check, it was not possible to transmit through the right microphone on the CCA. The failure was caused by a short circuit between the right microphone power line and the cable grounding shield.  
The insulation on the power line has been damaged prior to the cable assembly. EC 42806-527-2 was issued to create the

SEMU-44-001H  
Page 1173

CIL  
 EMU CRITICAL ITEMS LIST

12/24/91 SUPERSEDES 01/02/90

Page: 3  
 Date: 12/02/91

ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
--------------------	------	-----------------------------	----------------	--------------------------

2/2 152PH17:

SP780152-2 harness configuration by adding a connector pull test to the acceptance testing requirements.  
 E-EMU-152-R001 (6/11/90) - No warning tones were generated during P18 tones test. Boeing found high resistance (indicating an open circuit) in the item 152 electrical signal harness wire between pins P10-9 and P11-7. This is the earphone signal low (ground) wire which connects the EVC (radio) with the crewmember's earphones. The anomaly could not be reproduced at Hamilton. No Corrective Action was taken.

E. Ground Turnaround -  
 Tested per FEMU-R-001, Communication and Blamed Check.

F. Operational Use -  
 PreEVA: Trouble shoot problem, if no success, consider third EMU if available. Otherwise, terminate EVA prep.  
 EVA: When loss of minimum com occurs, terminate EVA.  
 Training -  
 Standard training covers this failure mode.  
 Operational Considerations -  
 EVA checklist procedures verify hardware integrity and system operational status prior to EVA. Flight rules require that EVA be terminated if two-way communication between each EV crewmember and orbiter, either direct or through relay, is unavailable.