

CIL
EMU CRITICAL ITEMS LIST

12/24/91 SUPERSEDES 10/31/90

ANALYST:

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NAME P/N OFF	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
CAUTION AND WARNING SYSTEM, ITEM 150 SV78597D-13 (1)	2/1RD	ISBFM13: Fails at zero voltage, 5.6 volt power supply. CAUSE: Electronic component failure, broken connection.	END ITEM: Loss of electrical power to operate CMS microprocessors. GPE INTERFACE: CMS computer is shutdown. Loss of BCH display. No failure warning message BITE indicator or warning tones are displayed. MIBB10W: None. CREW/VEHICLE: None for single failure. Possible loss of crewman with loss of DDC, oxygen, or low vent flow.	A. Design - Established reliability capacitors and resistors are qualified to applicable military standards and thermal shocked per Condition B Test Method 107 of MIL-STD-202. Microcircuits are qualified to the requirements of MIL-M-38510 and receive the burn-in of Class B parts of Method 1904 of MIL-STD-883. Transistors, diodes are qualified to the requirements of MIL-S-19500 and receive the burn-in of JANTRY level parts per the applicable methods, 1038, 1039, 1048 of MIL-STD-750. The electronic components are operating within the power dissipating requirements of SVHS7804 (derated to at least 75%). The printed circuit (PC) boards are fiberglass/epoxy per MIL-P-13949 type GF and manufactured in accordance with SM-P-0006. Parts mounting and soldering is per MSFC-STD-136 and WHS500.4 (3A-1). The CMS is a mother/daughter board assembly. The daughter boards are held in place by a metal card guide which also provide thermal transfer from the boards to the CMS case. The top cover of the CMS exerts a downward force on the daughter boards to keep them properly seated in the mother board connectors. Flex Tape (Kapton Insulated, flexible flat conductor) instead of conventional Teflon coated wires is used to provide connections between the mother board and the external connectors. This prevents pinching of the conductor during item assembly. The PC board assemblies are conformal coated per MIL-A-46146 (Dow Corning RTV 3148) for environmental and humidity protection. Electrical connectors are environmentally sealed to prevent damage due to contamination and humidity. B. Test - Component Acceptance Test - Full functioning of the CMS is verified during Item AIP. Tests include continuity, logic flow, n-state sequencing, fault simulation, verification of status and fault messages, warning and alert tones activation, and BITE activation. These tests are conducted upon completion of random vibration testing (6.1g rms). PDA Test - The above electrical tests are repeated during PLSS PDA to verify CMS operation. The CMS is also operational during

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Z/100 150FN03

Other #155 PDA electrical tests such as sensor accuracy checks, Item 123 Fan Operation, Item 174 R108 Checkout, and Solenoid Valve Actuation.

Certification Test -

The item completed the 15 year structural vibration and shock certification requirement during 10/83. EC's 42806-244 (add jumper wires, add diode CR221, change resistor R309), 42806-365-3 (eliminate interference with #155, 42806-718 (overstressed resistor R583 due to an improper interface circuit delta data logger, software change, diode WR201 rewiring), 42806-962 and 42806-962-1 (transistor Q201 lead stress relief) have been incorporated and certified by stability or analysis since this configuration was tested.

C. Inspection -

Each circuit board, the flex tape, and connectors are inspected for damage and contamination prior to being placed into finished stores. The CMS assembly is inspected internally and externally during ATP. All soldering is inspected by MS QA and CCAS QA per W06300.4 (3A-1).

D. Failure History -

H-EMU-150-0000 (6/28/89)
During a logic flow test, the CMS failed to start in the required time limit of ten seconds due to insufficient voltage at the CMS reset circuit. A larger voltage drop across the CR1 diode in series with the CMS reset logic circuitry did not provide the necessary voltage level, 5 volts, to trip the reset circuit within the required 10 seconds. EC 189602-327 tightens the diode screening requirement from a "forward voltage drop of .60 - .80 volts" to a "forward voltage drop of .60 - .72 volts at a forward current of 100 milliamperes" to increase the voltage supplied to the CMS reset logic circuitry.

E. Ground Turnaround -

Tested per FEMU-R-001, Vacuum Chamber Performance, ODM Display Verification.

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	2/100	1507N13:		

f. Operational Use -
 Crew Response -
 PreEVA: Troubleshoot problem, if no success, consider EMU 3
 if available. EMU no go for EVA.
 EVA: When loss of OWS tones and displays detected, terminate
 EVA.
 Training - Standard EMU training covers this failure mode.
 Operational Considerations - Flight rules define and
 operational OWS as at least able to monitor a valid status
 list. EVA checklist procedures verify hardware integrity and
 system operational status prior to EVA. Real Time Data
 System allows ground monitoring of EMU systems.