

CFL  
 EMU CRITICAL ITEMS LIST

12/24/90 SUPERSEDES 08/31/90

Page: 1  
 Date: 12/02/91

ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
CAUTION AND WARNING SYSTEM, ITEM 130 SV785970-13 (1)	5/288	150FM11: BITE circuit fails "038#".  CAUSE: Electronic component failure.	EMU ITEM: No visual BITE indication of a CMS failure.  GFE INTERFACE: None for single failure. If a subsequent CMS internal malfunction occurred, no BITE indication would be displayed. Warning tone is unaffected.  MISSION: None for single failure. Terminate EMU if subsequent CMS failure occurs, issuing a warning tone unaccompanied by a failure message.  CREW/VEHICLE: None for single failure of BITE circuit or subsequent CMS internal malfunction.	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-R-30510 and receive the burn-in of Class B parts per Method 1004 of MIL-STD-883. Transistors, diodes are qualified to the requirements of MIL-S-19500 and receive the burn-in of JMINV level parts per the applicable Methods, 1036, 1039, 1040 of MIL-STD-750. The electronic components are operating within the power dissipating requirements of SV837004. The printed (PC) boards are fiberglass/epoxy per MIL-P-13949 type OF and manufactured in accordance with SN-P-0806. Parts mounting and soldering is per MSFC-STD-136 and MS8300.4 (SN-1). The CMS is mother/daughter board assembly. The daughter boards are held in place by metal card guides 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 340) 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 ATP. Tests include continuity, logic flow, K-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 (6.1 gms).  PDA Test - The above electrical tests are repeated during P1SS PDA to verify CMS operation. The CMS is also operational during

CIL  
EMU CRITICAL ITEMS LIST

12/24/90 SUPERSEDES 08/31/90

ANALYSIS:

Page: 2  
Date: 12/02/91

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

3/288 150FH111

Other PLSS PDA electrical tests such as sensor accuracy checks, Item 123 Fan Operation, Item 176 RTDS checkout, and Solenoid Valve Actuation.

Certification Test -

The item completed the 15 year structural vibration and shock certification tests during 80/83. EC's 42886-244 (add jumper wires, add diode CR221, change resistor R301), 42806-363-3 (eliminate interferences with PLSS), 42806-798 (overstressed resistor R303 due to an improper interface circuit in the delta taper OFE, software change, diode WR207 rewiring) 42806-942 and 42806-942-1 (transistor Q201 lead stress relief) have been incorporated and certified by similarity or analysis since this configuration was tested.

Checkout Test -

Proper operation of the CMS is verified during electrical PIA Tests per FEMU-B-001 during such tests as Transducer and DCM Gauge Calibration Check (RPSA). A Fuel CMS Logic Test is performed a minimum of one every two years per FEMU-B-001, CMS Logic Flow Test.

E. 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 for damage and contamination during item assembly and externally during ATP. All soldering is inspected by NS RR and DCRS DA per WWS300.4 (3A-1).

D. Failure History -

J-EMU-150-A001 (7-36-85) During PIA Testing, several failures occurred: BITE light did not come on after power switchover as required, CMS failed the entire Logic Flow Test, and Sulk failed the Tone Test. The BITE light failure was due to a short circuit in the flex tape between battery power discrete and BITE light control lines. The Logic Flow and Tone Test failures were due to a faulty EPROM in the CMS. Both the flex tape assembly and the faulty EPROM were replaced. Additional tests were added to the CMS IPT and PIR via EC 42806-B96.

SEMU-44-001H  
PAGE 1075

CIL  
EMU CRITICAL ITEMS LIST

12/24/90 SUPERSEDES 08/31/90

ANALYST:

Page: 3  
Date: 12/13/91

NAME P/N QTY	CRIF	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
	3/288	150FNU1:		

E. Ground Turnaround -  
Tested per FEMU-B-001, Para. 7.3.3.2.4.6, Chamber Vacuum  
Performance Site Light Check.

F. Operational Use -  
Crew Response  
Pre-EVA : Troubleshoot problem, if no success consider EMU  
3 if available. EMU go for EVA. Rely on tones.  
Post EVA : N/A  
EVA : When tone is generated without displayed CMS message,  
terminate EVA.  
Training :  
Standard EMU training covers this failure mode effect.  
Crewmen are trained for one man EVA scenario.  
Operational Considerations -  
Flight rules define an operational EMU as at least able to  
monitor a valid status list.  
Flight rules define EMU as go to remain on SCU (available  
for rescue if required). EVA checklist procedures verify  
hardware integrity and systems operational status prior to  
EVA. Real Time Data System allows ground monitoring of EMU  
systems.