

CIL
EMU CRITICAL ITEMS LIST

12/24/91 SUPERSEDES 08/31/90

ANALYST:

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NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
EMU ELECTRICAL HARNES, ITEM 440 ----- 3V787690-82 (1)	2/2	440FM04: Unable to latch CCA connector or disconnects. CRSE: Piece-part structural failure of latch spring due to fatigue.	EMU ITEM: Unable to latch CCA connectors. GFE INTERFACE: Loss of all communication functions if connector demated. MISSION: Terminate EVA with loss of communication. CREW/VEHICLE: None.	A. Design - The latches are machined out of 17-4 PH, condition #1075 stainless steel with a minimum tensile strength of 145 ksi. They are attached to the connector housing with roll pins which have a rated load carrying capability of 100 lbs each. The springs used to hold the latches in position are formed from AISI 302 stainless steel wire that is work hardened to a minimum tensile strength of 125 ksi. The latch spring loads the latch against the roll pins with a minimum force of 8.5 lbs. to ensure external loads will not cause disengagement. All mating parts are coated with a dry film lubricant to minimize friction and latch hangup. The latch system is designed so connectors can be mated without depressing the latches but cannot be demated without depressing both latches simultaneously. B. Test - Component Acceptance Test - The EEM is subjected to a connector interface test which mates the CCA and ECG connectors to their mating connector and subjects them to a pull test (10 pounds) to insure the latch mechanism will withstand a minimum load without disconnecting. PDA Test - Connector interface testing per DEMU-68-090, Para. 3.1, verifies each connector's ability to latch properly by subjecting mated connector pairs to a 6 in-oz torque applied to the body of the mated pair. Certification Test - The EEM completed the structural vibration and shock certification requirements during 19/83. EC42806-212-1 (mated connector interface check) has been incorporated and certified. C. Inspection - The EEM and CCA connector housings are inspected to insure the latch mechanism meets B/P dimensions. The ECG and CCA connector latch mechanisms are mated to mating connectors and pull tested during IPI to insure that they function as specified.

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	2/2	440/PN04:		

D. Failure History -
J-EMU-448-002 (5-10-85) During rework of the harness, it was found that the ECO connector could not be properly mated with its interfacing connector. It was determined the latch on the connector did not meet vendor blue print dimensions.

The vendor revised his procedures to require 100% parts inspection. EC 42806-212 was issued which added the critical dimensions to the Hamilton Standard procurement drawing. In addition, EC 42806-212-1 was issued to add a note/denote test to the EEM PDA. The ECO and CCA connectors use the same type of latching mechanism.

H-EMU-440-802 (12-6-83) During EEM Acceptance Testing, the ECO connector pulled away from its mating connector. Investigation at the vendor found that a pivot pin had been improperly installed, inhibiting proper movement of one of the latches. EC 42806-434 was issued to add a 10 lb. pull test of the mated connectors as a part of receiving inspection. The ECO and CCA connectors use the same type of latching mechanism.

J-EMU-448-803 (8-14-84) During preparations for a chamber run, the CCA connector would not remain latched to its CCA connector. The failure was caused by an improperly hardened latch spring. The spring had taken on excessive set and could not provide adequate retention force for the latch. The vendor added extra in-process testing to verify that the springs used are acceptable and Hamilton Standard added a side force test to the PDA to insure the connector would remain mated.

H-EMU-440-002 (7-30-84) 14x EMU electrical harness failed open after a 1000 cycle IEM test. The cause of the failure was Wicking of epoxy into the wires behind the connector during the encapsulation operation. EC 1832402-2 incorporates changes to prevent this problem and will track the configuration impact.

E. Ground Turnaround -
Tested per FEMU-4-001, SEMU Communications Check.

F. Operational Use -
Crew Response - PREVA/EMA; Trouble shoot problem. 14 no success, discontinued use of EMU. Consider third EMU if

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	2/2	440FMD4:		available. training - standard EMU training covers this mode. Operational Considerations - flight rules define go/no go criteria related to EMU minimum communications. ESW checklist procedures verify hardware integrity and systems operational status prior to EVS.