

CIL
EWI CRITICAL ITEMS LIST

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ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
LIQUID CRYSTAL DISPLAY MODULE, ITEM 331 ----- SV792526-5 (1)	2/2	351FN01: BITE indicator fails ON. CAUSE: Semiconductor failure, short to +5V power supply.	END ITEM: BITE indicator on DCM fa continuously on. OPE INTERFACE: Indication of OVB failure, but unaccompanied by a warning tone and display backlighting. MISSION: Terminate EVA when BITE indicator is noticed during periodic status checks, or when tone sounds. CREW/VEHICLE: None.	A. Design - Item 331 utilizes small ceramic circuit boards with surface mounted electronic components. The chip resistors are per MIL-R-55342 Level B. The chip capacitors are per MIL-C-55601 Level B. The microcircuits conform to MIL-M-38510 and MIL-D10-883 including pre-encapsulated visual inspection and PIND testing to detect loose particles. The diode used is a JAN1XV part per MIL-S-19500. The assembled boards are conformal coated per MIL-A-64146. All hand soldering is per NH6308.4 (3A-1) and crimping of the external connector contacts is per SVHS4909. The display consists of 2 pieces of etched glass sandwiched together with the liquid crystal material and is UV stabilized to eliminate bleach out during long exposure to sunlight. The 12 alphanumeric characters are provided in a 14 segment format plus a specialized 13th character which acts as the BITE indicator. Five incandescent bulbs provide backlighting for the display for visibility in dark environments. The backlighting is activated by the DCM only when a message is displayed or the BITE indicator is on. The backlighting brightness is controlled by the Display Intensity Control (Item 361). The bulbs used are MS 90451-7152 per MIL-L-6363. The bulbs are subsequently burned-in and vibration tested prior to use. Interconnections between the circuit boards and the display are made using elastomeric connectors which meet the requirements of MIL-STD-454J. The module housing and rear cover are anodized aluminum. An optically coated Lexan lens is assembled in front of the display to provide impact protection and enhanced visibility in bright sunlight. B. Test - Component Acceptance: Vendor acceptance includes vibration (14.0 gms), thermal vacuum, thermal cycling (-15 degrees C to +70 degrees C, 30 min. minimum dwell 30 minutes, 5 cycles), optical (intensity and contrast), and functional testing prior to shipment to Hamilton Standard. In-process:

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	2/2	351FH01:		<p>Functioning of the item is verified during Item 350 assembly; after board inter-connection, after assembly into the BCM housing, and after installation of the front cover.</p> <p>PDA: Item 351 undergoes PDA testing as part of Item 350. Testing includes vibration, thermal vacuum, and functional operation.</p> <p>Certification: The LCD, as a component, has completed all certification testing per SEMU-45-002, Appendix G0, including structural vibration (Paragraph 6.2), shock (paragraph 6.3 & 6.4), qualification vibration (Paragraph 6.1), Thermal vacuum (Paragraph 6.3), and EMI (Paragraph 6.8).</p> <p>C. Inspection - Soldering on the boards and lead wires are inspected per MMS300.4 (3A-1) prior to module assembly. The lens and display are inspected to insure no defects exist which could affect visibility. The lead wires and connector are inspected during source inspection for the part and again during BCM assembly.</p> <p>D. Failure History - None.</p> <p>E. Ground Turnaround - Operation of the BITE indicator is verified during test per FEMU-R-001.</p> <p>F. Operational Use - Draw Response - Pre-EVA : When detected during EMU power cycling or scheduled status checks, activate EMU RF data downlink to RCC to verify failure. Consider use of third EMU is available. Otherwise, continue EVA operations relying on warning tone indication of future actual BITE failure. EVA : When detected, consult with RCC to verify failure. Continue EVA operation relying on warning tone indication of future actual BITE failure.</p>

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	2/2	351FNO1:		Special Training - Standard training covers this failure mode. Operational Considerations - EVA checklist procedures verify hardware integrity and systems operational status prior to EVA. Flight rules define operational EMU CVS as at least able to monitor a valid status list. Real Time Data System allows ground monitoring of EMU systems.