

12/24/93 SUPERSEDES 12/24/91

ANALYST:

NAME P/N ATTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
CAUTION AND WARNING SYSTEM SWITCH, ITEM 368 ----- SV767792-2 (1)	2/2	368FM03: Electrical open in the program advance position.  CAUSE: Severed wire lead or connection, linkage mechanism fractured.	EMU ITEM: Loss of program advance switch function.  OPE INTERFACE: Unable to acknowledge warnings or recall warnings in memory. Unable to use status display if a fault message occurs. Loss of fault message recall capability during EVA. Unable to acknowledge fault message so highest priority fault message will be continuously displayed.  MISSION: Loss of operational flexibility and EMS assistance in use of EMU during EVA.  CREW/VEHICLE: Failure warning tone will be heard for five minutes until EMS automatically shuts it off.	A. Design - The stationary contacts are part of the external terminal lugs. No interconnecting wiring to fail. Each switch position has dual contacts for redundancy. Switching mechanism and contacts are encased in a hermetically sealed case backfilled with dry nitrogen. Contact is accomplished through a roller type contact. This minimizes switching forces. Operating force is 4 ± 2 lbs. The switch is designed to withstand a toggle force of 25 lbs. without degradation. The lead wires (M22759/12) are soldered to the external switch terminals per MHD5300.4 (3A-1). This area is then potted with stycaat to provide strain relief for the leads. The wire bundle is designed to withstand a pull force of 8 lbs. without damage or degradation.  B. Test - Component Acceptance Test - Vendor acceptance tests include 500 actuation cycles, contact resistance, and dielectric withstanding voltage tests.  In-Process Test - Switch operation and continuity are verified during In-process tests during DCM Item 350 assembly.  POA Test - Proper operation is verified during DCM POA which includes continuity, functional, and operating torque tests. The switch is vibrated and exposed to thermal cycles during POA as part of the DCM.  Certification Test - The item completed the 15 year structural vibration and shock cert requirement during 1983. The item is cyclic certified by similarity to the Item 368 switch which has completed 127,000 cycles during 8/85. No Class I engineering changes have been issued since this configuration was certified.  C. Inspection - The external lead wires are inspected for damage as part of source inspection for the part and again during assembly of the DCM. To preclude failure due to internal contamination,

HWRE P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
	2/2	360FM03:		<p>the switches are assembled by the vendor in a Class 100,000 clean room. The switches are flushed internally using chloroform B6 and Genesolve D to remove contaminants prior to class welding. After welding the switches are vacuum baked and back filled with O<sub>2</sub> to a pressure of 3-5 psig and sealed. Leak checks are performed during subsequent processing to verify seal integrity. Two x-ray inspections are performed, prior to run-in cycling and after vibration, to verify absence of weld splatter and loose pieces, and to verify contact alignment.</p> <p>D. Failure History - None.</p> <p>E. Ground Turnaround - Tested per FEMU-R-001, EMU Performance Chamber Run, DCR Display verification.</p> <p>F. Operational Use - Crew Response - PreEVA: When detected during periodic status check, troubleshoot problem. If no success, consider use of third EMU if available. Otherwise, EMB go for EVA. Perform manual leak checks. EVA: When detected during periodic status check, troubleshoot using RTDS. If status list data valid with no other failures, continue EVA. Training - Standard EMU training covers this failure mode. Operational Considerations - EVA checklist procedures verify hardware integrity and systems operational status prior to EVA. Flight rules define go/no go criteria related to EMU CMS. Real Time Data systems allow ground monitoring of EMU systems.</p>