

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
EVC MODE SELECTOR SWITCH, ITEM 362 ----- SV767786-2 (1)	2/2	362FM01 Fails in HL position. Jamming; contact weld caused by arcing, knob or shaft failure, bearing seizure.	END ITEM: Switch stuck in HL position. GFE INTERFACE: Communication system operation is limited to hardline (SCU) operation. Loss of EVA radio transmit modes. MISSION: Terminate EVA. Loss of use of one EMU. CREW/VEHICLE: None. TIME TO EFFECT /ACTIONS: Seconds. TIME AVAILABLE: N/A TIME REQUIRED: N/A REDUNDANCY SCREENS: A-N/A B-N/A C-N/A	A. Design - Switching mechanism ball bearing and contacts are encased in a hermetically sealed case backfilled with dry nitrogen. The design of the DCM incorporates current limiters in the EVC power circuit rated at 1.65 amps. B. Test - Component Acceptance Test - Continuity test through switch and leads and a contact resistance test are performed as part of the vendor acceptance tests for the item. DCM In-Process Test - Switch continuity and output voltage are checked during two In Process tests performed during DCM assembly. PDA Test - Switch continuity and output voltage are checked after completion of Vibration Acceptance testing (VAT) and again upon completion of Thermal Vacuum Acceptance testing. These tests verify the integrity of the switch wiring and connections. PDA is per SEMU-60-015. Certification Test - Certified for a useful life of 15 years. Checkout Test - EVA mode selector switch operation is verified during PIA per FEMU-R-01, para. 4.10, SEMU Communication and Biomed Check. C. Inspection - To preclude failure due to internal contamination, the switches are assembled by the vendor in a class 100,000 clean room. The switches are flushed internally using chlorothane BG and Genesolve D to remove contaminants prior to case welding. After welding the switches are vacuum baked and backfilled with GN2 to a pressure of 3-6 psig and sealed. Leak checks are performed to ensure 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. D. Failure History - B-EMU-300-A003 (3/20/92) - The knob came loose from the shaft of the EVC Mode Selector Switch because the locking set screw stepdown sheared and retracted into the hex socket bore when torque was applied to the set screw during assembly. EC 163402-666 controls the set screw hex bore depth to preclude future thin wall conditions. H-EMU-362-A002 (11/06/95) - Switch S/N 2012 failed acceptance test 100 cycle endurance rotational torque test high over limit (84 in-lb vs. spec of 55 +/- 20 in-lb). Found high torque due to surface damage from wear/galling of detent mechanism and shaft support bearing. Tested all other switches in same lot with acceptable results. Switch design is obsolete and no longer available. No corrective action taken. B-EMU-300-F011 (05/12/99) -

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		362FM01		<p>During STS-88, the DCM Mode Selector Switch detached. The switch knob was not fully engaged on the shaft due to the dimensional tolerancing stack up design of the knob, shaft, and set screw. The knob drawing has been modified to shorten the knob base, and the set screw drawing has been changed to elongate the set screw. A self-locking helicoil will be installed in the knob set screw hole.</p> <p>E. Ground Turnaround - Tested for non-EET processing per FEMU-R-001, Final Pre-Flight Communications. FEMU-R-001 Para 8.2 EMU Preflight KSC Checkout for EET processing.</p> <p>F. Operational Use - Crew Response - PreEVA: Trouble shoot problem, if no success, consider third EMU if available. Otherwise, EMU go for SCU standby. EVA: Terminate EVA. Training - Standard training covers this failure mode. Operational Considerations - EVA checklist procedures verify hardware integrity and systems operational status prior to EVA. Flight rules require that EVA be terminated if two-way communication between each EV crewmember and orbiter, either direct or through relay, is unavailable.</p>

EXTRAVEHICULAR MOBILITY UNIT
SYSTEMS SAFETY REVIEW PANEL REVIEW
FOR THE
I-362 EVC MODE SELECTOR SWITCH
CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

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