

12/24/96 SUPERSEDES 12/24/92 ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
COOLANT ISOLATION VALVE, ITEM 171 SV784982-3 (1)	3/2RB	171PH02: Fails open. CAUSE: Electrical open in the solenoid coil or electrical connector; poppet jams due to contamination; spring fractures, failure of electronic component.	END ITEM: Water leakage through valve seat. GPE INTERFACE: None for single failure. If the Item 125 valve or the 134 valve also failed open, the water reservoir would leak into the vent loop. MISSION: None for single failure. Loss of use of one EMU with failed open 125 or 134 valve. CREW/VEHICLE: None.	A. Design - The moving poppet assembly is protected from contamination by 140 micron filters on the inlet and outlet. The valve is closed by combination of electromagnetic force and spring force acting on the poppet. The spring has an operating stress range of 79,000 to 81,000 psi and a stroke of 0.013 inches resulting in infinite life expectancy. Semiconductor failure is minimized through the use of high reliability components. Established reliability capacitors (Level S) and resistors (Level B) are used and are qualified to the requirements of their respective MIL specs and thermal shocked per Condition B of MIL-STD-202 Method 107. The transistors and diodes are qualified to the requirements of MIL-8-19500 and receive the burn-in of JANTRY level parts per the applicable methods 1035, 1039, 1040, of MIL-STD-750. If the failure occurs while in the open drive direction, the 0.5 amps coil current will be continually on. The maximum current draw of 0.5 amps will decrease a 7 hour mission by less than 1 hour. B. Test - Component Acceptance Test (Eckel Valve Co.) - Performance testing per Vendor Acceptance Procedure (AFLE771-9) will detect electrical open circuits and any failure of components by failure to meet the voltage stabilization response, or current draw requirements. Jamming of the poppet and/or spring fracture would be noted during leakage tests per Vendor Acceptance tests. .10A Test - The item is leakage tested per SEMU-60-010 with the 1-171 in the closed position. The 1-171 inlet is pressurized to 15.7 - 15.9 psig and leakage is measured with a volumetric micrometer over a 60 minute test period. Leakage must not exceed 6 cc/hr. This leakage represents a system leakage. Certification Test - The item completed 6,200 cycles during 1/85 which fulfilled the 15 year cycle requirement of 4,140. C. Inspection - A cleanliness level of HS 3150 BM15B is maintained during assembly and testing of the valve.

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	3/288	171FN02:		<p>Internal lead wires are inspected during source inspection and external wiring during PLSS assembly. Fractures Springs: Vendor acceptance test for performance will detect a failure of this nature.</p> <p>D. failure History - H-EMU-171-C001 (5/11/89) Item 171 Shutoff Valve failed to close after 5009 cycles of a 7500 cycle Certification Test. No current draw occurred when 17 volts was applied to the "close" terminal. Most probable cause was momentary switching the valve open/closed/open in less than 450 milliseconds which causes both Darlingtons transistor pairs to be on simultaneously, and full voltage across Q6 (close transistor). Excess current through Q6 falls transistor Q6 open. The test setup power supply was not current limited while during EMU operation the DCM limits the solenoid current (0.7 amps), and actual glove mobility increases switch cycling time above 450 milliseconds.</p> <p>E. Ground Turnaround - None.</p> <p>F. Operational Use - Crew Response - PreEVA/PostEVA: No response, single failure undetectable by crew or ground. Training - Standard EMU training covers this failure mode. Operational Considerations - Not applicable.</p>