

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2050 -2 REV:06/15/88

ASSEMBLY : AFT LCA-1 CRIT. FUNC: 1R  
 P/N RI : MC477-0263-0002 CRIT. HDW: 2  
 P/N VENDOR:  
 QUANTITY : 2 VEHICLE 102 103 104  
 : TWO EFFECTIVITY: X X X  
 : PHASE(S): PL LO X OO DO LS

REDUNDANCY SCREEN: A-PASS B-PASS C-PASS  
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):  
 DES J BROWN DES [Signature] EPDC SSM [Signature]  
 REL DEFENSOR REL J. Kamura 6/27/88 EPDC REL [Signature]  
 QE D MASAI QE [Signature] MPS SSM [Signature]  
 MPS REL [Signature]  
 MPS REC [Signature]  
 QE [Signature]

ITEM:  
 CONTROLLER, HYBRID DRIVER (HDC) TYPE III, HELIUM SUPPLY BLOWDOWN VALVE SOLENOID CONTROL POWER.

FUNCTION:  
 CONDUCTS MAIN BUS POWER TO SOLENOID OF HELIUM SUPPLY BLOWDOWN VALVE (LV26/27). 54V76A121AR J1(96), J1(98).

FAILURE MODE:  
 INADVERTENT OUTPUT, FAILS "ON", FAILS TO TURN "OFF".

CAUSE(S):  
 PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY, THERMAL STRESS.

EFFECT(S) ON:  
 (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE (E) FUNCTIONAL CRITICALITY  
 (A) INADVERTENT POWER TO HELIUM SUPPLY BLOWDOWN VALVE CONTROL SOLENOID.  
 (B) NO EFFECT. THE OTHER BLOWDOWN VALVE IS SERIES REDUNDANT TO PREVENT LOSS OF HELIUM.  
 (C,D) NO EFFECT - FIRST FAILURE.

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- (E) 1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE.  
TIME FRAME - ASCENT.  
1) HDC FAILS "ON".  
2) SERIES HELIUM SUPPLY BLOWDOWN VALVE FAILS OPEN.

LOSS OF PNEUMATIC ACTUATION HELIUM RESULTS IN LO2 PREVALVE FAILING TO CLOSE AND INABILITY TO MAINTAIN INJECTED HELIUM AND LO2 PRESSURE TO THE HIGH PRESSURE OXYGEN TURBOPUMP TO PREVENT PUMP OVERSPEED AND CAVITATION AT MECO. RESULTS IN UNCONTAINED ENGINE DAMAGE. AFT COMPARTMENT OVERPRESSURIZATION, AND FIRE/EXPLOSION HAZARD. AT MECO, THE ENGINE 2 HELIUM SUPPLY IS SWITCHED IN TO THE PNEUMATIC VALVE SYSTEM (VIA LV10) AS A BACKUP, BY SOFTWARE COMMAND, WHICH MAY ACTUATE THE LO2 PREVALVES CLOSED. POSSIBLE LOSS OF CREW/VEHICLE.

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A-D) FOR DISPOSITION AND RATIONALE:

REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER.

(B) GROUND TURNAROUND TEST

MDM VERIFICATION, V41AAO.080 EVERY FLIGHT.

(E) OPERATIONAL USE

PNEUMATIC ACTUATION HELIUM BOTTLE PRESSURE IS ON A DEDICATED DISPLAY IN COCKPIT. CREW ACTION IS TO FOLLOW NORMAL LEAK ISOLATION PROCEDURE. PRIOR TO MECO, ISOLATION VALVES (LV7, LV8) WILL BE REOPENED AND THE LEFT ENGINE HELIUM CROSSOVER (LV10) WILL BE OPENED.

EFFECTIVE FOR OI-8D SOFTWARE, CR89397B "MPS PNEUMATIC SYSTEM FDA AND DISPLAY - BFS" ADDS PNEUMATIC TANK, REGULATOR, AND ACCUMULATOR PRESSURE TO THE S/M ALERT FDA SYSTEM AND ADDS THE 3 PRESSURE MEASUREMENTS TO THE BFS SYSTEM SUMMARY DISPLAY. THIS ALLOWS THE FLIGHT CREW TO RESPOND TO A PNEUMATIC SYSTEM LEAK INDEPENDENT OF GROUND CONTROL.