

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2244 -2 REV: 11/04/87

ASSEMBLY : AFT LCA-2, 3 CRIT. FUNC: 1R  
 P/N RI : MC477-0263-0002 CRIT. HDW: 3  
 P/N VENDOR: VEHICLE 102 103 104  
 QUANTITY : 4 EFFECTIVITY: X X X  
 : FOUR PHASE(S): PL LO X OO DC LS  
 : 2 PER LH2/LO2 FEED DISCONNECT VALVE

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS  
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):  
 DES J BROWN DES [Signature] EPDC SSM [Signature]  
 REL F DEFENSOR REL [Signature] MPS SSM [Signature]  
 QE D MASAI QE [Signature] EPDC REL [Signature]  
 MPS REL [Signature]  
 QE [Signature]

ITEM:

CONTROLLER, HYBRID DRIVER (HDC), TYPE III, LH2/LO2 17-INCH FEEDLINE DISCONNECT VALVE OPEN SOLENOID POWER

FUNCTION:

CONDUCTS POWER TO THE OPEN SOLENOID IN EACH REDUNDANT CIRCUIT FOR THE LH2/LO2 TANK FEED DISCONNECT VALVE. THE HDC IS IN SERIES WITH A RPC AND DIODE IN EACH CIRCUIT. 56V76A123AR-J3(69), (71); 55V76A122AR-J3(69), (71).

FAILURE MODE:

INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT.

CAUSE(S):

PIECE PART FAILURE, CONTAMINATION, MECHANICAL SHOCK, VIBRATION, THERMAL STRESS.

EFFECT(S) ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE (E) FUNCTIONAL CRITICALITY

(A) DEGRADATION OF REDUNDANCY AGAINST PREMATURE OPEN SOLENOID POWER.

(B,C,D) NO EFFECT - FIRST FAILURE.

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(E) POSSIBLE LOSS OF CREW/VEHICLE AFTER THIRD FAILURE (SECOND FAILURE - SERIES RPC FAILS ON RESULTING IN PREMATURE POWER TO OPEN SOLENOID. THIRD FAILURE - DURING ET/ORBITER UMBILICAL RETRACTION, BACKUP MECHANICAL LINKAGE FAILS, PREVENTING FLAPPER CLOSURE) RESULTING IN INABILITY TO CLOSE THE FEED DISCONNECT VALVE PRIOR TO UMBILICAL RETRACTION. FOR NOMINAL, ATO, AND AOA MISSIONS ET SEPARATION IS DELAYED FOR SIX MINUTES TO VENT RESIDUAL PROPELLANT THROUGH FAILED DISCONNECT. THIS IS TO PREVENT ORBITER/ET RECONTACT DUE TO PROPULSIVE VENTING AT SEPARATION. POSSIBLE TILE AND DOOR DAMAGE AT THE ORBITER/ET UMBILICAL AREA DUE TO CRYO IMPACT. FOR RTLS, TAL, AND MISSIONS WHERE OMS BURN CANNOT BE DELAYED ET STRUCTURAL SEPARATION IS INITIATED IMMEDIATELY AND ORBITER/ET RECONTACT IS LIKELY. ALSO RESULTS IN LOSS OF HELIUM SUPPLY DURING MANIFOLD REPRESS CAUSING POSSIBLE LOSS OF CRITICAL AFT COMPARTMENT ENTRY PURGE. FAILS B SCREEN DUE TO SERIES CIRCUIT CONFIGURATION.

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

COMPLETE ELECTRICAL VERIFICATION, V41ABO.150B, 160B EVERY FLIGHT.

(E) OPERATIONAL USE

FOR NOMINAL MISSIONS, CREW WILL PERFORM MANUAL ET STRUCTURAL SEPARATION AFTER SIX MINUTE DELAY PERIOD. FOR RTLS, VEHICLE SOFTWARE PERFORMS ET STRUCTURAL SEPARATION AFTER A SIX SECOND (MAXIMUM) DELAY. FOR TAL OR MISSIONS WHERE OMS BURN CANNOT BE DELAYED CREW WILL MANUALLY INITIATE ET STRUCTURAL SEPARATION WITHOUT DELAY.

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