

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPO&C - MAIN PROP. FMEA NO 05-6J -2224 -2 REV: 04/25/88
 ASSEMBLY : AFT LCA-1 CRIT. FUNC: 1R
 P/N RI : MC477-0263-0002 CRIT. HDW: 3
 P/N VENDOR: VEHICLE 102 103 104
 QUANTITY : 1 EFFECTIVITY: X X X
 : ONE PHASE(S): PL LO X OO DO LS
 :

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):
 DES *JNB* J BROWN DES *[Signature]* EPDC SSM *[Signature]*
 REL F DEFENSOR *[Signature]* REL *[Signature]* 5-6-88 EPDC REL *[Signature]*
 QE *[Signature]* D MASAI QE *[Signature]* 5-6-88 MPS REL *[Signature]*
 QE *[Signature]* *[Signature]*

ITEM:

CONTROLLER, HYBRID DRIVER (HDC), TYPE III, LH2 RECIRCULATION VALVE OPEN SOLENOID (LV 36).

FUNCTION:

CONDUCTS PRE-FLIGHT TEST BUS POWER TO LH2 RECIRCULATION OPEN SOLENOID UPON GSE MDM COMMAND. 54V76A121J1(39)-J10(Y).

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) DEGRADATION OF REDUNDANCY AGAINST INADVERTENT POWER TO LH2 RECIRCULATION OPEN SOLENOID.

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

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- (E) 1R/3, 3 SUCCESS PATHS AFTER FIRST FAILURE. TIME FRAME - ASCENT.
- 1) HDC FAILS "ON".
 - 2,3) DIODES FEEDING ESSENTIAL BUS FROM PRE-FLIGHT TEST BUS SHORT, ENERGIZING PRE-FLIGHT TEST BUS AND CAUSING LH2 RECIRCULATION VALVES (PV14, 15, 16) TO OPEN.
 - 4) ENGINE SHUTDOWN WITH UNCONTAINED DAMAGE (ASSUMES ENGINE IS DAMAGED ONLY TO THE EXTENT THAT ISOLATION OF THE DAMAGE WILL SAVE THE SYSTEM).

RESULTS IN LH2/GH2 LEAKAGE INSIDE THE AFT COMPARTMENT. POSSIBLE AFT COMPARTMENT OVERPRESSURIZATION AND FIRE/EXPLOSION HAZARD. POSSIBLE LOSS OF ADJACENT CRITICAL FUNCTIONS DUE TO CRYO EXPOSURE. POSSIBLE LOSS OF CREW/VEHICLE.

FAILS B SCREEN BECAUSE PRE-FLIGHT TEST BUS IS NOT POWERED DURING FLIGHT.

CRITICALITY 1/1 FOR PAD ABORT. PRE-FLIGHT TEST BUS IS NOT DEENERGIZED PRIOR TO LIFTOFF. FAILURE OF HDC WILL IMMEDIATELY CAUSE LH2 RECIRCULATION VALVES (PV14, 15, 16) TO OPEN PREVENTING ISOLATION OF A SHUTDOWN ENGINE WITH UNCONTAINED DAMAGE.

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 COMMAND VERIFICATION V41ABO.140 EVERY FLIGHT.

(E) OPERATIONAL USE

FLIGHT: NO CREW ACTION CAN BE TAKEN.

GROUND: OMI S1004 (LH2 SYSTEM) SEQUENCE TITLED "EMERGENCY PROCEDURE FOR MAJOR LEAK OR FIRE IN THE ORBITER AFT FUSELAGE" CONTAINS SAFING SEQUENCE OF EVENTS FOR MAJOR LEAKS IN THE HYDROGEN SYSTEM.