

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2038 -4 REV: 04/25/88

ASSEMBLY : D & C PANEL R4 CRIT. FUNC: 1R
 P/N RI : ME452-0102-7356 CRIT. HDW: 2
 P/N VENDOR: VEHICLE 102 103 104
 QUANTITY : 1 EFFECTIVITY: X X X
 : ONE PHASE(S): PL X LO X OO DO LS
 :

REDUNDANCY SCREEN: A-PASS B-PASS C-PASS
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):
 DES J BROWN DES R Burns EPDC SSM Amended. Failure for unit 102
 REL F DEFENSOR REL John Clifton 5-6-88 MPS SSM 5-13-88
 QE D MASAI QE G.D. Lounser 5-6-88 EPDC REL 102 103 104
 MPS REL 102 103 104
 QE W. Williams

ITEM:
 TOGGLE SWITCH (THREE POLES, *THREE POSITIONS, LEVER LOCKED), LH2 INBOARD
 FILL/DRAIN, TOPPING, AND HIGH POINT BLEED VALVES. (PV 12, 13, 22).

FUNCTION:
 PROVIDES MANUAL CONTROL OF POWER TO LH2 INBOARD FILL/DRAIN, TOPPING, AND
 HIGH POINT BLEED VALVES. 32V73A4S9.

FAILURE MODE:
 FAILS CLOSED, CONTACT-TO-CONTACT SHORT, POLE-TO-POLE SHORT-"CLOSE"
 COMMAND CONTACTS.

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

EFFECT(S) ON:
 (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE (E) FUNCTIONAL
 CRITICALITY

(A) LOSS OF REDUNDANCY AGAINST INADVERTENT POWER TO LH2 INBOARD
 FILL/DRAIN VALVE CLOSE SOLENOID AND LOSS OF POWER TO OPEN SOLENOIDS OF
 LH2 INBOARD FILL/DRAIN AND TOPPING VALVES.

(B) TOPPING VALVE INADVERTENTLY CLOSES, PREVENTING TOPPING OF LH2 TANK.
 LH2 INBOARD FILL/DRAIN VALVE REMAINS OPEN. BISTABLE FEATURE MAINTAINS
 FILL/DRAIN VALVE IN OPEN POSITION AS LONG AS GROUND OPEN COMMAND INHIBITS
 CLOSE HDC.

(C,D) TOPPING VALVE CLOSURE WILL RESULT IN LAUNCH SCRUB.

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- (E) CASE I: 1R2, 1 SUCCESS PATH AFTER FIRST FAILURE.
TIME FRAME - PRELAUNCH
1) SWITCH FAILS CLOSED.
2) GROUND OPEN COMMAND FAILS OFF.

CLOSURE OF LH2 INBOARD FILL/DRAIN VALVE RESULTS IN TERMINATION OF PROPELLANT LOADING OR DETANKING WHICH MAY CAUSE A PRESSURE SPIKE AND POSSIBLE RUPTURE OF ORBITER FILL LINE, FEED LINE, AND/OR GSE INTERFACE/FACILITY LINES. POSSIBLE AFT COMPARTMENT OVERPRESSURIZATION AND FIRE/EXPLOSION HAZARD. POSSIBLE LOSS OF ADJACENT CRITICAL FUNCTIONS DUE TO CRYO EXPOSURE. POSSIBLE LOSS OF CREW/VEHICLE.

- CASE II: 1R2, 1 SUCCESS PATH AFTER FIRST FAILURE.
TIME FRAME - LH2 VACUUM INERT.
1) SWITCH FAILS CLOSED.
2) RELIEF SHUTOFF VALVE (PVB) FAILS TO OPEN/REMAIN OPEN.

RESULTS IN LACK OF RELIEF CAPABILITY. POSSIBLE RUPTURE OF THE LH2 MANIFOLD CAUSING LH2 LEAKAGE INTO AFT COMPARTMENT, OVERPRESSURIZATION, AND FIRE/EXPLOSION HAZARD. POSSIBLE LOSS OF CRITICAL ADJACENT COMPONENTS DUE TO CRYOGENIC EXPOSURE. 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 A, ITEM NO. 1 - TOGGLE SWITCH.

(B) GROUND TURNAROUND TEST

COPPER PATH VERIFICATION, V41ABO.121A EVERY FLIGHT.

(E) OPERATIONAL USE

FLIGHT: FOR OPS 1 VACUUM INERT OPERATIONS, THE CREW WOULD BE DIRECTED TO OPEN THE RTLS DUMP VALVE ON GROUND CALL.

GROUND: TBD.