

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2270 -2 REV:04/25/88

ASSEMBLY : APT LCA-1 CRIT. FUNC: 1R
 P/N RI : JANTXV1N5551 CRIT. HDW: 3
 P/N VENDOR: VEHICLE 102 103 104
 QUANTITY : 1 EFFECTIVITY: X X X
 : ONE PHASE(S): PL X LO X CO DO LS
 :

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS

PREPARED BY: APPROVED BY: APPROVED BY (NASA):
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 REL F DEFENSOR REL [Signature] 5-6-88 MPS SSM [Signature] 5-17-88
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ITEM:

DIODE, BLOCKING (3 AMP), LH2 INBOARD FILL/DRAIN VALVE, CLOSE MANUAL SWITCH COMMAND.

FUNCTION:

ISOLATES MDM CLOSE COMMAND FROM MANUAL SWITCH CLOSE COMMAND. CONDUCTS MANUAL SWITCH CLOSE COMMAND TO HDC FOR CONTROL OF LH2 INBOARD FILL/DRAIN VALVE. 54V76A121J3(58).

FAILURE MODE:

SHORT (END TO END).

CAUSE(S):

STRUCTURAL FAILURE (MECHANICAL STRESS, VIBRATION), CONTAMINATION, ELECTRICAL STRESS, THERMAL STRESS, PROCESSING ANOMALY.

EFFECT(S) ON:

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

(A) DEGRADATION OF REDUNDANCY AGAINST INADVERTENT DEACTUATION OF OPEN SOLENOID.

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

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(E) CASE I: 1R3, 2 SUCCESS PATHS AFTER FIRST FAILURE.
TIME FRAME - PRELAUNCH.

- 1) DIODE SHORTS.
- 2) CLOSE MDM COMMAND FAILS ON, INHIBITING FILL/DRAIN OPEN SOLENOID POWER. NO EFFECT - BISTABLE FEATURE MAINTAINS VALVE IN OPEN POSITION. GROUND OPEN COMMAND INHIBITS CLOSE HDC.
- 3) LOSS OF GROUND OPEN COMMAND RESULTS IN INADVERTENT CLOSURE OF FILL/DRAIN VALVE.

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.

FAILS B SCREEN BECAUSE NO INSTRUMENTATION IS AVAILABLE TO DETECT FAILURE WHILE MDM CLOSE COMMAND IS OFF.

CASE II: 1R3, 2 SUCCESS PATHS AFTER FIRST FAILURE.
TIME FRAME - LH2 VACUUM INERT.

- 1) DIODE SHORTS.
- 2) CLOSE COMMAND FAILS ON, INHIBITING FILL/DRAIN OPEN SOLENOID POWER.
- 3) RELIEF SHUTOFF VALVE (PVS) 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.

FAILS B SCREEN BECAUSE NO INSTRUMENTATION IS AVAILABLE TO DETECT FAILURE WHILE MDM CLOSE COMMAND IS OFF.

DISPOSITION & RATIONALE:

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

(A-D) FOR DISPOSITION AND RATIONALE:

REFER TO APPENDIX F, ITEM NO. 4 - DIODE, AXIAL LEAD.

(B) GROUND TURNAROUND TEST

COPPER PATH VERIFICATION, V41AB0.121E 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: NONE.

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