SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - MAIN PROP. FMEA NO 05-6J -2266 -2 REV:04/25/88

ASSEMBLY :AFT LCA-1
P/N RI :JANTXV1N5551
P/N VENDOR:
QUANTITY :2
:TWO
:

CRIT. FUNC: 1R
CRIT. HDW: 3

VEHICLE EFFECTIVITY:	102	103	104
PHASE(S):	PL X LO	OO	DO LS

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

PREPARED BY:
DES J BROWN
REL F DEFENSOR
QE D MASAI

APPROVED BY:
DES
REL 5-6-88
QE 5-6-88

APPROVED BY (NASA):
EPDC SSM
MPS SSM 5-13-88
EPDC REL
MPS REL
QE

ITEM:
DIODE, BLOCKING (3 AMP), LH2 INBOARD FILL/DRAIN AND TOPPING VALVES, CLOSE SWITCH SCAN.

FUNCTION:
ISOLATES CONTROL BUSES AND CLOSE COMMANDS IN THE SWITCH SCAN CIRCUIT. 54V76A121J3(56), J3(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) LOSS OF MANUAL SWITCH CLOSE COMMAND AND CONTROL BUS ISOLATION. DEGRADATION OF REDUNDANCY AGAINST INADVERTENT POWER TO CLOSE SOLENOID OF THE LH2 INBOARD FILL/DRAIN VALVE.

(B) FIRST FAILURE - NO EFFECT.

(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) SWITCH CONTACT-TO-CONTACT SHORT OF CLOSE TOPPING VALVE COMMAND.
3) 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.

FAILS B SCREEN BECAUSE NO INSTRUMENTATION IS AVAILABLE TO DETECT FAILURE.

CASE II: 1R3, 2 SUCCESS PATHS AFTER FIRST FAILURE.
TIME FRAME - LH2 VACUUM INERT.
1) DIODE SHORTS.
2) SWITCH CONTACT-TO-CONTACT SHORT OF CLOSE TOPPING VALVE COMMAND CAUSING INADVERTENT CLOSURE OF LH2 INBOARD FILL/DRAIN VALVE.
3) RELIEF SHUTOFF VALVE (PV8) 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.

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
D & C CONTROL BUS REDUNDANCY, V41AF0.020H,I 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.