SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - MAIN PROP. FMEA NO 05-6J -2094 -1 REV: 5/5 04/26/88 DCP 5-13

ASSEMBLY :AFT PCA-2 CRIT. FUNC: 1R
P/N RI :JANTX1N1204RA CRIT. HDW: 2
P/N VENDOR:
QUANTITY :1 :ONE :

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

PHASE(S): PL X LO X 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
QE

APPROVED BY (NASA):
EPDC SSM
MPS SSM
EPDC REL
MPS REL
QE

ITEM:
DIODE, BLOCKING (12 AMP), LO2 OVERBOARD BLEED VALVE CLOSE SOLENOID (LV76) CLOSE COMMAND B RPC OUTPUT.

FUNCTION:
ISOLATES REDUNDANT MAIN BUS POWER TO LO2 OVERBOARD BLEED VALVE CLOSE SOLENOID. LOCATED AT RPC B OUTPUT AHEAD OF CLOSE COMMAND C HDC. 55V76A132A3CR14.

FAILURE MODE:
OPEN, FAILS TO CONDUCT.

CAUSE(S):
STRUCTURAL FAILURE (MECHANICAL STRESS, VIBRATION), ELECTRICAL STRESS, THERMAL STRESS, PROCESSING ANOMALY.

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

(A) LOSS OF ONE OF TWO POWER PATHS TO LO2 OVERBOARD BLEED VALVE CLOSE SOLENOID. DEGRADATION OF REDUNDANCY AGAINST INADVERTENT DEACTUATION OF CLOSE SOLENOID.

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

(E) CASE I: 1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE.
TIME FRAME - PRELAUNCH.
1) DIODE FAILS OPEN.
2) PARALLEL POWER PATH FAILS "OFF" (HDC, RPC, DIODE) CAUSING LO2 OVERBOARD BLEED VALVE (PV19) TO OPEN.

FAILURES WILL RESULT IN CONTINUED BLEED FLOW RESULTING IN LOSS OF LO2 OVERBOARD WITH FAILURE OF BLEED DISCONNECT (PD13) TO CLOSE. BLEED DISCONNECT IS NOT CERTIFIED FOR CLOSURE UNDER FLOW CONDITIONS AND CANNOT BE CONSIDERED A REDUNDANT INHIBIT AGAINST OVERBOARD FLOW. POSSIBLE RUPTURE OF DISCONNECT HOUSING AND/OR DOWNSTREAM BLEED SYSTEM DUE TO WATER HAMMER. RESULTS IN LOSS OF APPROXIMATELY 3000 LBS OF PROPELLANT WHICH IS INSUFFICIENT TO CAUSE PREMATURE SSME SHUTDOWN.

POSSIBLE AFT COMPARTMENT OVERPRESSURIZATION. FIRE/EXPLOSIVE HAZARD BOTH INTERIOR AND EXTERIOR TO THE VEHICLE. NO LCC EXISTS FOR VERIFICATION OF VALVE POSITION PRIOR TO T-0. POSSIBLE LOSS OF CREW/VEHICLE.

FAILS B SCREEN BECAUSE PARALLEL POWER PATH MASKS FAILURE.

CASE II: 1R/3, 2 SUCCESS PATHS AFTER FIRST FAILURE.
TIME FRAME - ASCENT.
1) DIODE FAILS OPEN.
2) PARALLEL POWER PATH FAILS "OFF" (HDC, RPC, DIODE) CAUSING LO2 OVERBOARD BLEED VALVE (PV19) TO OPEN.
3) BLEED DISCONNECT (PD13) FAILS TO CLOSE/REMAIN CLOSED.

RESULTS IN LOSS OF APPROXIMATELY 3000 LBS. OF PROPELLANT WHICH IS NOT ENOUGH TO CAUSE PREMATURE SSME SHUTDOWN. POSSIBLE FIRE/EXPLOSION HAZARD IN FLIGHT. POSSIBLE LOSS OF CREW/VEHICLE.

FAILS B SCREEN BECAUSE PARALLEL POWER PATH MASKS 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. 2 - DIODE, STUD-MOUNT.

(B) GROUND TURNAROUND TEST
COMPLETE ELECTRICAL VERIFICATION V41ABO.200D EVERY FLIGHT.

(E) OPERATIONAL USE
NO CREW ACTION CAN BE TAKEN.

INSERT
DEF 5-13

INSERT FOR CIL 05-6J-2094-1

EFFECTS SECTION (E)

IF THE LO2 BLEED VALVE FAILS TO CLOSE BEFORE T-0 THE LO2 BLEED DISCONNECT WOULD BE CLOSING WITH AN OXYGEN FLOW OF 4.1 LBS/SEC. THIRTY-TWO PERCENT OF THIS FLOW WILL BE VAPOR. THE LO2 BLEED DISCONNECT IS NOT CERTIFIED FOR CLOSURE UNDER FLOW. HOWEVER, THE CLOSURE IS AT ONE "G" ACCELERATION RATE (T-0 UMBILICAL SEPARATION RATE) WHICH LIMITS THE IMPACT ENERGY ON THE VESPEL SEAL TO A LEVEL WHICH IS BELOW THE LO2/VESPEL IGNITION LEVEL (NOT PREVIOUSLY TESTED WITH THIS CONDITION). THE WATER HAMMER TOWARDS EFFECT GENERATED DURING THIS CLOSURE HAS BEEN CALCULATED TO BE APPROXIMATELY 60 PSIG. SYSTEM PROOF PRESSURE LEVEL IS 286 PSIG.