

SHUTTLE CRITICAL ITEMS LIST - ORBITER

5/5

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2093 -1 REV: 04/26/88
 DEP 5-12
 ASSEMBLY : AFT PCA-3 CRIT. FUNC: 1R
 P/N RI : JANTX1N1204RA 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-FAIL C-PASS

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

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

FUNCTION:

ISOLATES REDUNDANT MAIN BUS POWER TO LO2 OVERBOARD BLEED VALVE CLOSE SOLENOID. LOCATED AT RPC C OUTPUT AHEAD OF CLOSE COMMAND B HDC. 56V76A133A2CR7.

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.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP.

FMEA NO 05-6J -2093 -1

REV: 04/26/88

SEP 5-13

(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.200C EVERY FLIGHT.

(E) OPERATIONAL USE

NO CREW ACTION CAN BE TAKEN.

INSERT
SEP 5-13

05-6J-170

INSERT FOR CIL 05-6J-2093-1
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.