

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2001 -1 REV:04/25/88

ASSEMBLY : APT PCA-1 CRIT. FUNC: 1R
 P/N RI : JANTX1N1204RA CRIT. HDW: 3
 P/N VENDOR: VEHICLE 102 103 104
 QUANTITY : 2 EFFECTIVITY: X X X
 : TWO PHASE(S): PL LO X OO DO LS
 :

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

PREPARED BY: APPROVED BY: APPROVED BY (NASA):
 DES J.B. J BROWN DES R. Brown EPDC SSM Initial testing for use. 5/2/88
 REL F DEFENSOR REL Nelson Carter 5/6/88 MPS SSM 5/2/88
 QE g.c. for D MASAI QE J.J. Conner 5-6-88 EPDC REL 5/6/88
 MPS REL 5/3/88

ITEM:

DIODE, BLOCKING, (12 AMP), LH2 RTLS INBOARD/OUTBOARD DUMP VALVE (PV17/18), OPEN COMMAND A RPC OUTPUT.

FUNCTION:

ISOLATES REDUNDANT MAIN BUS POWER TO LH2 RTLS INBOARD/OUTBOARD DUMP VALVE SOLENOID (LV72/LV73). LOCATED AT OPEN COMMAND A RPC OUTPUT AHEAD OF OPEN COMMAND B HDC. 40V76A27A4CR7, A4CR8.

FAILURE MODE:

OPENS, 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 LH2 RTLS INBOARD OR OUTBOARD DUMP VALVE OPEN SOLENOID. DEGRADATION OF REDUNDANCY AGAINST INADVERTENT DEACTUATION OF OPEN SOLENOID.

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

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- (E) 1R/3, 2 SUCCESS PATHS AFTER FIRST FAILURE.
TIME FRAME - POST MECO, PRE DUMP.
- 1) DIODE FAILS OPEN.
 - 2) PARALLEL POWER PATH FAILS "OFF" (HDC, RPC, DIODE) CAUSING ONE OF TWO SERIES LH2 RTLS INBOARD/OUTBOARD DUMP VALVES (PV17/18) TO CLOSE. ALTERNATE PATH AVAILABLE THROUGH LH2 FEEDLINE RELIEF SYSTEM.
 - 3) LH2 FEEDLINE RELIEF SYSTEM FAILS TO RELIEVE.

FOR OI-8C, RESULTS IN LACK OF RELIEF CAPABILITY*. POSSIBLE RUPTURE OF THE LH2 MANIFOLD CAUSING LH2 LEAKAGE INTO THE APT COMPARTMENT, OVERPRESSURIZATION, AND FIRE/EXPLOSION HAZARD. POSSIBLE LOSS OF CRITICAL ADJACENT COMPONENTS DUE TO CRYOGENIC EXPOSURE. POSSIBLE LOSS OF CREW/VEHICLE.

*NOTE: FOR OI-8B, ORBITER SOFTWARE OPENS RTLS DUMP VALVES FROM MECC +10 TO MECO +40 SECONDS. VENTING IS NOT CONSIDERED REDUNDANT TO RELIEF SYSTEM SINCE MANIFOLD PRESSURE INCREASES TO RELIEF SETTING REGARDLESS OF RTLS VALVE OPERATION. FOR OI-8C, APPROVED SOFTWARE CHANGE CR 89399 EXTENDS RTLS DUMP VALVE OPEN TIME TO MECO +90 SECONDS FOR ALL MISSIONS EXCEPT RTLS. THIS CHANGE WILL ALLOW SUFFICIENT DURATION TO PROVIDE A REDUNDANT MANIFOLD RELIEF PATH PRIOR TO THE INITIATION OF DUMP.

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, POWER-STUD MOUNTED.

(E) GROUND TURNAROUND TEST

COMPLETE ELECTRICAL VERIFICATION V41ABO.180D, V41ABO.190D EVERY FLIGHT.

(E) OPERATIONAL USE

LH2 MANIFOLD PRESSURE IS ON CAUTION AND WARNING.

POST MECO/PRE DUMP: START MPS PROPELLANT DUMP AS SOON AS POSSIBLE.

POST DUMP: OPEN THE LH2 FILL AND DRAIN VALVES.