

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2001 -2 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: DES J. BROWN APPROVED BY: DES R. Brown APPROVED BY (NASA):  
 REL F DEFENSOR gd REL Melvin Clarke 5-6-88 EPDC SSM Handwritten signature  
 QE 9/2 D MASAI kl QE J. J. Conner 5-6-88 EPDC REL Handwritten signature  
 MPS SSM Handwritten signature 5-12-88  
 MPS REL Handwritten signature 5/12/88  
 QE Handwritten signature

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:

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 MAIN BUS ISOLATION. 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 - ASCENT.
- 1) DIODE SHORTS.
  - 2) FAILURE OF MAIN BUS TO SERIES RPC TRIPS PARALLEL RPC (BY WAY OF HDC REVERSE BIAS DIODE) CAUSING ONE OF THE 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 AFT 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 MECO +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 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. 2 - DIODE, POWER-STUD MOUNTED.

(B) 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.