SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - MAIN PROP. FMEA NO 05-6J -2004 -1 REV:04/25/88

ASSEMBLY :AFT LCA-1, 3
P/N RI :MC477-0263-0002
P/N VENDOR:
QUANTITY :4
:FOUR
:

CRIT. FUNC: 1R
CRIT. HDW: 3

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

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 BROWN	DES	EPDC SSM
			MPS SSM
REL	F DEFENSOR	REL	EPDC REL
			MPS REL
QE	D MASAI	QE	QE

ITEM:
CONTROLLER, HYBRID DRIVER (HDC), TYPE III, LH2 RTLS INBOARD/OUTBOARD DUMP VALVES OPEN SOLENOID (LV72/LV73).

FUNCTION:
CONDUCTS POWER TO OPEN SOLENOID IN EACH REDUNDANT CIRCUIT FOR LH2 RTLS DUMP VALVE. HDC IS IN SERIES WITH A DIODE AND A RPC IN EACH CIRCUIT. 54V76A121AR J3(63), J3(64). 56V76A123AR J3(63), J3(64).

FAILURE MODE:
LOSS OF OUTPUT, FAILS TO CONDUCT, FAILS TO TURN "ON".

CAUSE(S):
PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY, THERMAL STRESS.

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.

(8) 1R/3, 2 SUCCESS PATHS AFTER FIRST FAILURE.
TIME FRAME - POST MECO, PRE DUMP.
1) HDC FAILS "OFF".
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 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 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 B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER.

(B) GROUND TURNAROUND TEST
COMPLETE ELECTRICAL VERIFICATION V41ABO.180C,D; V41ABO.190C,D 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.