

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ELECT POWER DIST & CONT FMEA NO 05-6 -2003 -2 REV:05/03/88

ASSEMBLY :MAIN DC DIST ASSY 1,2,3 CRIT.FUNC: 1R
 P/N RI :MC455-0126-0001 CRIT. HDW: 2
 P/N VENDOR: VEHICLE 102 103 104
 QUANTITY :3 EFFECTIVITY: X X X
 :THREE REQUIRED - ONE PER PHASE(S): FL X LO X OO X DO X LS X
 :FUEL CELL CIRCUIT

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):
 DES R PHILLIPS DES *P. Bylans* SSM *B. C. Stara 5/12/88*
 REL M HOVE REL *Mehrad M. Chahar 5/6/88* REL *[Signature] 5/14/88*
 QE J COURSEN QE *J. J. Courser 5/6/88* QE *[Signature]*

ITEM:
 CONTACTOR, POWER - FUEL CELL CONTACTOR - MOTOR DRIVEN (FUEL CELL 1, 2, AND 3)

FUNCTION:
 CONNECTS FUEL CELL TO OR ISOLATES FUEL CELL FROM THE MAIN DC BUS.
 40V76A31S2, 40V76A32S2, 40V76A33S2

FAILURE MODE:
 FAILS CLOSED OR INADVERTENTLY TRANSFERS CLOSED

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

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

(A) LOSS OF CAPABILITY TO ISOLATE ONE POWER SOURCE FROM ITS DEDICATED BUS.

(B,C) NO EFFECT. NORMAL OPERATING CONDITION.

(D) FIRST FAILURE - NO EFFECT.

(E) SECOND FAILURE (LOSS OF AN ASSOCIATED ESSENTIAL BUS) - POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO "SAFE" A FUEL CELL. LOSS OF THE ASSOCIATED ESSENTIAL BUS RESULTS IN LOSS OF THE ASSOCIATED FUEL CELL COOLANT PUMP AS WELL AS CONTROL OF THAT FUEL CELL'S REACTANT VALVES. THIS NECESSITATES REMOVAL OF ALL LOAD FROM THE FUEL CELL IN ORDER TO RENDER IT SAFE. INABILITY TO REMOVE THE BUS LOAD FROM THE FUEL CELL UNDER THESE CIRCUMSTANCES, WILL RESULT IN FUEL CELL OVERHEATING WITH SUBSEQUENT RUPTURE AND/OR EXPLOSION/FIRE. FAILS "B" SCREEN BECAUSE NORMAL OPERATING CONFIGURATION IS CONTACTOR CLOSED FOR ALL MISSION PHASES.

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE:

(A, B, C, D) DISPOSITION AND RATIONALE

REFER TO APPENDIX C, ITEM NO. 6 - POWER CONTACTOR

(B) GROUND TURNAROUND TEST

VERIFY POWER TRANSFER CAPABILITY FROM FUEL CELL 1 (2, 3) TO MAIN DC BUS A (B, C) RESPECTIVELY. CYCLE MAIN DC BUS A (B, C) ON/OFF SWITCH WHILE MONITORING STIMULI COMMANDS, DISCRETE EVENTS, FUEL CELL AND MAIN BUS VOLTAGES. TEST IS PERFORMED FOR ALL FLIGHTS.

(E) OPERATIONAL USE

NONE