

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE**  
**NUMBER: 05-6-2211 -X**

**SUBSYSTEM NAME: ELECTRICAL POWER DISTRIBUTION & CONTROL**  
**REVISION: 0 05/03/88**

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**PART DATA**

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	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	: PANEL R1A1	V070-730275
SRU	: SWITCH, TOGGLE	ME452-0102-7105
SRU	: SWITCH, TOGGLE	ME452-0102-7355

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
 SWITCH, TOGGLE, MOMENTARY - FUEL CELL/MAIN DC BUS CONTACTOR

**REFERENCE DESIGNATORS:** 32V73A1A1S10  
 32V73A1A1S11  
 SPDT  
 32V73A1A1S12  
 DPDT

**QUANTITY OF LIKE ITEMS: 3**  
 THREE - ONE FOR EACH FUEL CELL

**FUNCTION:**  
 PROVIDES MANUAL CONTROLS FOR CONNECTING A FUEL CELL TO OR  
 DISCONNECTING A FUEL CELL FROM A MAIN DC BUS. APPLIES MOMENTARY POWER  
 TO DC POWER CONTACTOR FOR SWITCHING OF FUEL CELL POWER TO A DC BUS.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ELECT POWER DIST & CONT FMEA NO 05-6 -2211 -3 REV:05/03/88

ASSEMBLY :PANEL R1A1 ABORT: RTLS CRIT.FUNC: 1R  
 P/N RI :ME452-0102-7105/7355 CRIT. HDW: 2  
 P/N VENDOR: VEHICLE 102 103 104  
 QUANTITY :3 EFFECTIVITY: X X X  
 :THREE-ONE FOR EACH FUEL PHASE(S): PL LO X-OO DO X LS  
 :CELL

REDUNDANCY SCREEN: A-PASS B-PASS C-PASS  
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):  
 DES R PHILLIPS DES SM R. Burgess SSM R. C. Starn 5/16/88  
 REL M HOVE REL Michael Ch. 5-6-88 REL [Signature]  
 QE J COURSEN QE A. J. Conner 5/6/88 QE [Signature]

ITEM:

SWITCH, TOGGLE, MOMENTARY - FUEL CELL/MAIN DC BUS CONTACTOR

FUNCTION:

PROVIDES MANUAL CONTROLS FOR CONNECTING A FUEL CELL TO OR DISCONNECTING A FUEL CELL FROM A MAIN DC BUS. APPLIES MOMENTARY POWER TO DC POWER CONTACTOR FOR SWITCHING OF FUEL CELL POWER TO A DC BUS. 32V73A1A1S10, S11, SPDT, S12, DPDT

FAILURE MODE:

FAILS CLOSED IN "OFF" POSITION

CAUSE(S):

PIECE PART STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, PROCESSING ANOMALY

EFFECT(S) ON:

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

(A) LOSS OF POWER TO THE AFFECTED MAIN DC BUS.

(B) LOSS OF POWER TO LOADS CONNECTED EXCLUSIVELY TO THE AFFECTED BUS. TOTAL POWER CAPABILITY REDUCED BY ONE THIRD.

(C) POSSIBLE MISSION MODIFICATION.

(D) FIRST FAILURE - NO EFFECT. SECOND FAILURE DURING FIRST STAGE FLIGHT COULD RESULT IN LOSS OF SRB CONTROL. SECOND FAILURE DURING ASCENT OR ENTRY COULD RESULT IN UNDERVOLTAGE CONDITION TO CRITICAL LOADS. CRIT 1 FOR RTLS ABORT IF THE TIME REQUIRED TO PERFORM BUS TIE LEAVES INSUFFICIENT TIME AVAILABLE TO ACCOMPLISH A COMPLETE OMS FUEL DUMP THROUGH THE RCS JETS.

(E) POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF SECOND MAIN DC BUS OR CONTACTOR DURING ASCENT OR ENTRY. FOR ON-ORBIT MISSION PHASE THE HARDWARE CRITICALITY BECOMES CRIT 3 (FUNCTIONAL CRIT REMAINS CRIT 1R).

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SYSTEM :ELECT POWER DIST & CONT FMEA NO 05-6 -2211 -3 REV:05/03/88

DISPOSITION & RATIONALE:

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

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

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

1) 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.

2) OPERATIONAL USE

AFTER POST SRB SEPARATION, POWERDOWN AND RECONFIGURE ELECTRICAL LOADS. PRESENT FLIGHT RULES DO NOT PERMIT BUS TIEING TO A DEAD BUS UNTIL AFTER SRB SEPARATION. ONBOARD PROCEDURES MANAGE POWER FOR LOSS OF ONE FUEL CELL/MAIN DC BUS.