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

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

PART DATA

	PART NAME **VENDOR NAME**	**PART NUMBER** **VENDOR NUMBER**
LRU	: PANEL R1A1	V070-730275
SRU	: SWITCH, TOGGLE	ME452-0102-7105
SRU	: SWITCH, TOGGLE	ME452-0102-7355

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.

FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE
NUMBER: 05-6-2211- 01

REVISION#: 1 07/26/99

SUBSYSTEM NAME: ELECTRICAL POWER DISTRIBUTION & CONTROL
LRU: PANEL R1A1 **CRITICALITY OF THIS**
ITEM NAME: SWITCH, TOGGLE **FAILURE MODE:** 1R3

FAILURE MODE:
FAILS TO TRANSFER TO "OFF" POSITION, SHORT TO GROUND, FAILS CLOSED IN "ON" POSITION

MISSION PHASE:
LO LIFT-OFF
OO ON-ORBIT
DO DE-ORBIT
LS LANDING/SAFING

VEHICLE/PAYLOAD/KIT EFFECTIVITY:
102 COLUMBIA
103 DISCOVERY
104 ATLANTIS
105 ENDEAVOUR

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

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN
A) PASS
B) N/A
C) PASS

PASS/FAIL RATIONALE:
A)

B)
"B" SCREEN IS "N/A" BECAUSE SWITCH IS NOT NORMALLY OPERATED DURING FLIGHT.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF ABILITY TO CONNECT FUEL CELL TO BUS OR DISCONNECT FUEL CELL FROM BUS. SHORT TO GROUND WILL ALSO CAUSE LOSS OF ASSOCIATED MAIN BUS TIE

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CAPABILITY BECAUSE BOTH CIRCUIT BREAKERS FOR MAIN DC BUS CONTROL WILL TRIP. EITHER CASE RESULTS IN LOSS OF REDUNDANCY FOR FUEL CELL SAFING (CAPABILITY TO REMOVE MAIN DC BUS LOAD FROM FUEL CELL).

(B) INTERFACING SUBSYSTEM(S):
SAME AS (A)

(C) MISSION:
NO EFFECT - FIRST FAILURE

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT - FIRST FAILURE

(E) FUNCTIONAL CRITICALITY EFFECTS:
AFTER THIRD FAILURE (LOSS OF ASSOCIATED ESS BUS), POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO SAFE FUEL CELL WHEN FUEL CELL COOLING IS LOST (SECOND FAILURE: LOSS OF REDUNDANT REACTANT VALVE CLOSURE CAPABILITY). LOSS OF THE ASSOCIATED ESSENTIAL BUS RESULTS IN LOSS OF THE ASSOCIATED FUEL CELL COOLANT PUMP AS WELL AS REDUNDANT CONTROL OF THAT FUEL CELLS 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.

- APPROVALS -

EDITORIALLY APPROVED	: BNA	: J. Kimura 7-26-99
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 98-CIL-025_05-6