PRINT DATE: 04/17/96

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 05-6MA-2040 -X

SUBSYSTEM NAME: EPD&C - ELEC PWR GENERATION:FUEL CELL (04-1A)
REVISION: 0 04/16/96

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: PANEL O14	V070-730394
LRU	: PANEL O15	V070-730395
LRU	: PANEL O16	V070-730396
SRU	: SWITCH, TOGGLE	ME452-0102-7101

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
SWITCH, TOGGLE (SPDT) FCP NO. 1, 2 AND 3 CONTROL POWER

REFERENCE DESIGNATORS: 33V73A14S12
33V73A15S11
33V73A16S11

QUANTITY OF LIKE ITEMS: 3
THREE, 1/FCP CONTROL POWER CIRCUIT

FUNCTION:
WHEN SWITCHED TO THE "ON" POSITION PRIOR TO START OF A FUEL CELL POWER PLANT (FCP), IT SUPPLIES POWER FROM AN ESS BUS TO THE ECU OF THE FCP. AFTER SHUTDOWN OF FCP, SWITCHING TO THE "OFF" POSITION SHUTS OFF POWER TO THE ECU.

PRINT DATE: 04/17/96

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE
NUMBER: 05-6MA-2040- 01

REVISION#: 0 04/16/96
SUBSYSTEM NAME: EPD&C - ELEC PWR GENERATION:FUEL CELL (04-1A)
LRU: PANEL O14, O15, O16
ITEM NAME: SWITCH, TOGGLE
CRITICALITY OF THIS FAILURE MODE: 1R2

FAILURE MODE:
FAILS OPEN, FAILS TO CLOSE, FAILS TO CONDUCT, SHORT TO CASE (GROUND).

MISSION PHASE: LO LIFT-OFF

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

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

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN
A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:
A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF ASSOCIATED FUEL CELL CONTROL POWER

(B) INTERFACING SUBSYSTEM(S):

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NUMBER: 05-6MA-2040- 01

LOSS OF POWER TO COOLANT PUMP AND H2 PUMP LEADING TO FCP OVERHEATING/ FLOODING AND OUTPUT VOLTAGE DEGRADATION. TIME CRITICAL

(C) MISSION:
NO EFFECT. MINIMUM DURATION FLIGHT. LOSS OF FUEL CELL REDUNDANCY (CAPABILITY EXISTS FOR SAFE RETURN ON ONE OF THREE FCP).

(D) CREW, VEHICLE, AND ELEMENT(S):
FIRST FCP LOSS NO EFFECT - SECOND FCP SHUTDOWN DURING ASCENT LOSES CRITICAL FUNCTIONS AND MAY RESULT IN CREW/VEHICLE LOSS. FAILURE TO REMOVE LOAD FROM AFFECTED FCP WITHIN 9 MINUTES MAY RESULT IN OVERTEMP AND SUB-SEQUENT EXTERNAL REACTANT LEAKAGE, CAUSING POSSIBLE VEHICLE/CREW LOSS.

(E) FUNCTIONAL CRITICALITY EFFECTS:
FIRST FCP LOSS NO EFFECT - SECOND FCP SHUTDOWN DURING ASCENT LOSES CRITICAL FUNCTIONS AND MAY RESULT IN CREW/VEHICLE LOSS. FAILURE TO REMOVE LOAD FROM AFFECTED FCP WITHIN 9 MINUTES MAY RESULT IN OVERTEMP AND SUBSEQUENT EXTERNAL REACTANT LEAKAGE, CAUSING POSSIBLE VEHICLE/CREW LOSS.

-DISPOSITION RATIONALE-

(A) DESIGN:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

(B) TEST:
GROUND TURNAROUND TEST
ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

(C) INSPECTION:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

(D) FAILURE HISTORY:
CURRENT DATA ON TEST FAILURES, FLIGHT FAILURES, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN THE PRACA DATA BASE. THE FAILURE HISTORY DATA PROVIDED IN APPENDIX A IS NO LONGER BEING KEPT UP-TO-DATE.

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FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE
NUMBER: 05-6MA-2040- 01

(E) OPERATIONAL USE:
CREW ACTION REQUIRED TO SHUTDOWN AFFECTED FCP DURING FLIGHT. ONBOARD PROCEDURES MANAGE POWER FOR LOSS OF ONE FCP.

- APPROVALS -

PAE MANAGER	: P. STENGER-NGUYEN	:
PRODUCT ASSURANCE ENGR	: J. NGUYEN	:
DESIGN ENGINEERING	: T. D. NGUYEN	:
EDITORIALLY APPROVED	: JSC	:
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 96-CIL-012_05-6MA