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PRINT DATE: 09/27/94

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE**

**NUMBER: 05-6WA-2051H-X**

**SUBSYSTEM NAME: EPD&C- WATER SPRAY BOILER**

**REVISION: 1 07/26/94**

	<b>PART NAME VENDOR NAME</b>	<b>PART NUMBER VENDOR NUMBER</b>
LRU	: PANEL R2	V070-730277
SRU	: SWITCH, TOGGLE	ME452-0102-7303

**PART DATA**

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
SWITCH, TOGGLE, 3 POLE, 3 POSITION, "APU/HYD BOILER CNTLR/HTR"

**REFERENCE DESIGNATORS:** 32V73A2S41  
32V73A2S42  
32V73A2S43

**QUANTITY OF LIKE ITEMS: 3**  
THREE

**FUNCTION:**  
PROVIDES POWER TRANSFER CONTROL FOR THE WATER SPRAY BOILER (WSB) CONTROLLERS AND RESPECTIVE HEATERS (WATER TANK, SPRAY BOILER AND STEAM OUTLET HEATERS ON CONTROLLERS "A" AND "B", AND INLET LINE HEATER ON CONTROLLER "A" ONLY) FOR WSB NO'S 1, 2 AND 3.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL FAILURE MODE**  
**NUMBER: 05-6WA-2051H-01**

REVISION# 1 07/26/94

SUBSYSTEM NAME: EPD&C-WATER SPRAY BOILER  
 LRU: PANEL R2  
 ITEM NAME: SWITCH, TOGGLE

CRITICALITY OF THIS  
 FAILURE MODE: 1R2

**FAILURE MODE:**  
 FAILS OPEN, SHORT-TO-CASE (GROUND)

**MISSION PHASE:**  
 LO LIFT-OFF  
 DO DE-ORBIT

**VEHICLE/PAYLOAD/KIT EFFECTIVITY:** 102 COLUMBIA  
 103 DISCOVERY  
 104 ATLANTIS  
 105 ENDEAVOUR  
 EFFECTIVE FOR WSB INLET LINE ELECTRICAL  
 HEATER MOD ONLY

**CAUSE:**  
 PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,  
 VIBRATION, PROCESSING ANOMALY, THERMAL STRESS

**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 FUNCTION - NO POWER IS TRANSFERRED TO CONTROLLERS A AND B. LOSS  
 OF ONE WATER SPRAY BOILER. LOSS OF POWER TO LINE HEATER

**(B) INTERFACING SUBSYSTEM(S):**  
 UNABLE TO PROVIDE THERMAL CONTROL FOR ONE APU/HYD LUBE OIL SYSTEM.  
 POSSIBLE LOSS OR LIMITED RUN TIME OF ONE APU/HYD SYSTEM DUE TO THE LOSS OF  
 COOLING. LIMITED RUN TIME MAY NOT ALLOW APU/HYD SYSTEM TO SUPPORT THE  
 ENTIRE POWERED FLIGHT OR ENTRY PHASE. LOSS OF HYDRAULIC CAPABILITY TO  
 THROTTLE ONE MAIN ENGINE, LOSS OF HYDRAULIC LANDING GEAR DEPLOY IF SYSTEM  
 ONE IS LOST, AND LOSS OF ONE OF THREE ET UMBILICAL RETRACT ACTUATORS FOR

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
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EACH UMBILICAL PLATE. LOSS OF REDUNDANT HYDRAULIC POWER SYSTEM FOR FOUR TVC ACTUATORS. LOSS OF ONE OF THREE HYDRAULIC POWER SYSTEMS TO FLIGHT CONTROL SURFACES AND BRAKES.

**(C) MISSION:**

POSSIBLE EARLY TERMINATION OF MISSION - REMAINING TWO SYSTEMS WILL PROVIDE SAFE RETURN

**(D) CREW, VEHICLE, AND ELEMENT(S):**

NO EFFECT - FIRST FAILURE

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

POSSIBLE LOSS OF CREW/VEHICLE WITH THIS FAILURE PLUS LOSS OF A SECOND APU/HYD SYSTEM, OR FAILURE OF TOGGLE SWITCH ON ANOTHER WSB.

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-DISPOSITION RATIONALE-

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**(A) DESIGN:**

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

**(B) TEST:**

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

**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:**

FAILURE HISTORY IS TRACKED IN THE PRACA SYSTEM.

**(E) OPERATIONAL USE:**

ASCENT - SHUT DOWN AFFECTED APU/HYD SYSTEM AT AN APPROPRIATE TIME BASED ON FLIGHT PHASE AND SYSTEM TEMPERATURE.

ENTRY - SHUT DOWN AFFECTED APU/HYD SYSTEM OR DELAY APU START IF FAILURE IS KNOWN PRIOR TO DEORBIT.

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- APPROVALS -

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