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PRINT DATE: 05/30/90

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE  
NUMBER: 05-6VE-2001-X

SUBSYSTEM NAME: EPD&C - ECLSS - WASTE WATER MANAGEMENT  
REVISION : 2 05/30/90

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	PANEL ML868	VS70-733902
SRU :	CIRCUIT BREAKER	MC454-0026-2030

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
CIRCUIT BREAKER (3 AMP) - WASTE WATER DUMP VALVE/NOZZLE HEATER

REFERENCE DESIGNATORS: 80V73A130 CB65

QUANTITY OF LIKE ITEMS: 1  
ONE PER SYSTEM  
ONE PER VEHICLE

FUNCTION:  
PROVIDES CIRCUIT PROTECTION BETWEEN MAIN BUS AND WASTE WATER DUMP VALVE  
AND NOZZLE HEATER.

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FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
 NUMBER: 05-6VE-2001-01

REVISION# 2 05/30/90 R  
 SUBSYSTEM: EPD&C - ECLSS - WASTE WATER MANAGEMENT  
 LRU :PANEL ML86B  
 ITEM NAME: CIRCUIT BREAKER  
 CRITICALITY OF THIS  
 FAILURE MODE:2/2

FAILURE MODE:  
 FAILS OPEN, FAILS TO CONDUCT, FAILS TO CLOSE

MISSION PHASE:  
 00 ON-ORBIT

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

CAUSE:  
 STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS,  
 VIBRATION, PROCESSING ANOMALY

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

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

PASS/FAIL RATIONALE:

A)  
 B)  
 C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

WASTE WATER STOWAGE CAPABILITY - 2/2  
 LOSS OF POWER TO WASTE WATER DUMP VALVE AND NOZZLE HEATER.

EFFECTS ON SUPPLY WATER CONTINGENCY DUMP CAPABILITY - 1R/3  
 LOSS OF POWER TO WASTE WATER DUMP VALVE AND NOZZLE HEATER.

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**(B) INTERFACING SUBSYSTEM(S):**

WASTE WATER STOWAGE CAPABILITY - 2/2  
LOSS OF CAPABILITY TO DUMP WATER THROUGH THE WASTE WATER DUMP VALVE  
AND NOZZLE.

EFFECTS ON SUPPLY WATER CONTINGENCY DUMP CAPABILITY - 1R/3  
LOSS OF CAPABILITY TO DUMP WATER THROUGH THE WASTE WATER DUMP VALVE AND  
NOZZLE.

**(C) MISSION:**

WASTE WATER STOWAGE CAPABILITY - 2/2  
MISSION DURATION IS LIMITED BECAUSE OF LOSS OF WASTE WATER DUMP  
CAPABILITY AND LOSS OF USE OF CONTINGENCY WATER CONTAINER IF THE  
VALVE IS IN THE OPEN POSITION WHEN THE CB FAILS OPEN.

EFFECT ON SUPPLY WATER CONTINGENCY DUMP CAPABILITY - 1R/3  
NO EFFECT - FIRST FAILURE

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

WASTE WATER STOWAGE CAPABILITY - 2/2  
NO EFFECT.

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

POSSIBLE LOSS OF CREW/VEHICLE BASED UPON THE FOLLOWING SCENARIO:

- (1) FAILURE OF THE WASTE DUMP CAPABILITY (CB OPEN/DUMP VALVE OPEN OR  
CLOSED.)
- (2) LOSS OF SUPPLY WATER DUMP CAPABILITY
- (3) LOSS OF TOPPING EVAPORATOR DUMP CAPABILITY
- (4) LOSS OF VENTING THROUGH THE FUEL CELL WATER RELIEF VALVES

THESE FAILURES RESULT IN THE LOSS OF ELECTRICAL POWER DUE TO FUEL CELL  
FLOODING.

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- DISPOSITION RATIONALE -  
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**(A) DESIGN:**

REFER TO APPENDIX D, ITEM NO. 1 - CIRCUIT BREAKER.

**(B) TEST:**

REFER TO APPENDIX D, ITEM NO. 1 - CIRCUIT BREAKER.

VALVE AND HEATER OPERATION VERIFIED IN FLIGHT EVERY FLOW.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
NUMBER: 05-6VE-2001-01

(C) INSPECTION:  
REFER TO APPENDIX D, ITEM NO. 1 - CIRCUIT BREAKER.

(D) FAILURE HISTORY:  
REFER TO APPENDIX D, ITEM NO. 1 - CIRCUIT BREAKER.

(E) OPERATIONAL USE:  
IF THE DUMP VALVE IS FAILED CLOSED, THE CREW WILL FILL THE WASTE WATER TANK AND THEN USE THE CONTINGENCY WATER CONTAINER TO EXTEND THE MISSION.

IF THE DUMP VALVE IS FAILED OPEN, THE CREW WILL CLOSE THE DUMP ISOLATION VALVE AND RETURN TO THE PRIMARY LANDING SITE BEFORE THE WASTE WATER TANK BECOMES HARD FILLED.

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- APPROVALS -  
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RELIABILITY ENGINEERING:	D. ANVARI	:	<i>D.A. Anvari</i>	5-31-90
DESIGN ENGINEERING	: J. L. PECK	:	<i>J. L. Peck</i>	
DESIGN SUPERVISOR	: G. ANDERSON	:	<i>G. Anderson</i>	5-31-90
QUALITY SUPERVISOR	: J. COURSEN	:	<i>J. Courson</i>	6-5-90
NASA RELIABILITY	:	:	<i>J.P. Bell</i>	6-14-90
NASA SUBSYSTEM MANAGER	:	:	<i>J. Staudinger</i>	6/15/90
NASA EPD&C RELIABILITY	:	:	<i>Robert G. Zeman</i>	6-21-90
NASA QUALITY ASSURANCE	:	:	<i>Dr. C. Stephen</i>	12-5-90
NASA EPD&C SUBSYS MGR	:	:	<i>Samuel Johnson</i>	for E. P. K. S. 5 June 90