

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE  
 NUMBER: M5-6MB-2207-G-X

SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC  
 REVISION : 9 09/09/92

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: MID PCA 1	V070-764400
LRU	: MID PCA 2	V070-764430
SRU	: CONTROLLER, HYBRID DRIVER	MC477-0263-0002

- PART DATA -

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
 CONTROLLER, HYBRID DRIVER (HDC), TYPE III - H2 MANIFOLD 1 AND 2 ISOLATIC  
 VALVES - OPEN POSITION

REFERENCE DESIGNATORS: 40V76A25AR19  
 : 40V76A25AR20  
 : 40V76A26AR19  
 : 40V76A26AR20

QUANTITY OF LIKE ITEMS: 4  
 FOUR, TWO PER H2 MANIFOLD VALVE CIRCUIT

FUNCTION:  
 CONTROLS POWER TO OPEN H2 MANIFOLD 1 AND 2 ISOLATION VALVES. CONTR  
 CIRCUITRY IS INDEPENDENT FOR EACH MANIFOLD.

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FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
 NUMBER: M5-6MB-2207-G-02

SUBSYSTEM: ELECTRICAL POWER GENERATION - CRYO, GENERIC  
 LRU MID PCA 1  
 ITEM NAME: CONTROLLER, HYBRID DRIVER

REVISION# 9 09/09/92  
 CRITICALITY OF THIS  
 FAILURE MODE:1R3

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FAILURE MODE:  
 INADVERTENT OUTPUT, FAILS "ON", FAILS TO TURN "OFF"

MISSION PHASE:  
 LO LIFT-OFF  
 DC DE-ORBIT

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

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

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS  
 B) FAIL  
 C) PASS

PASS/FAIL RATIONALE:  
 A)

B)  
 SCREEN "B" FAILS BECAUSE THE SERIES DRIVER CONFIGURATION MASKS THE FAILURE  
 "ON" FAILURE MODE OF THE AFFECTED HDC.

C)

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 - FAILURE EFFECTS -  
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**(A) SUBSYSTEM:**

LOSS OF ABILITY TO MANUALLY CLOSE THE H2 MANIFOLD VALVE WITH THE PANEL SWITCH. NO EFFECT UNLESS FAILURE IN ASSOCIATED PLUMBING REQUIRES ISOLATION OF SUBASSEMBLY. INABILITY TO CLOSE VALVE FOLLOWING GROSS EXTERNAL LEAKAGE WOULD DEGRADE OR PRECLUDE OPERATION OF TWO FUEL CELL POWER PLANTS (FCP'S).

**(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:**

POSSIBLE LOSS OF CREW/VEHICLE DUE TO THE FOLLOWING SCENARIO: 1) FIRST SERIES HDC FAILS "ON", 2) SECOND SERIES HDC FAILS "ON" - AFFECTED H2 MANIFOLD VALVE CANNOT BE CLOSED, AND 3) GROSS EXTERNAL LEAK STARVES TWO FCP'S (LOSS OF TWO FCP'S DURING ASCENT LOSES CREW/VEHICLE. LOSS OF A SECOND FCP DURING DESCENT LOSES CREW/VEHICLE IF INSUFFICIENT TIME IS AVAILABLE FOR AN ELECTRICAL LOAD RECONFIGURATION RESULTING IN THE INABILITY OF THE SINGLE REMAINING FUEL CELL TO SUPPLY ADEQUATE ELECTRICAL POWER.)

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

REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER

**(B) TEST:**

REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER

CIRCUIT IS FUNCTIONALLY VERIFIED IN FLIGHT. PERFORM GROUND TURNAROUND TEST WHEN VALID VERIFICATION IS UNOBTAINABLE IN FLIGHT OR AFTER LRU REPLACEMENT

**(C) INSPECTION:**

REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER

**(D) FAILURE HISTORY:**

REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER

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(E) OPERATIONAL USE:  
 NO CREW ACTION AFTER FIRST FAILURE

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 - APPROVALS -  
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PRODUCT ASSURANCE MGR : T. J. EAVENSON  
 PRODUCT ASSURANCE ENG : T. K. KIMURA  
 DESIGN ENG TEAM LEADER : G. M. ANDERSON  
 DESIGN ENGINEERING : T. D. NGUYEN  
 NASA RELIABILITY :  
 NASA SUBSYSTEM MANAGER :  
 NASA EPD&C RELIABILITY :  
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 NASA EPD&C SUBSYS MGR :

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