

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

NUMBER: MS-6MB-2205-G -X

SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC

REVISION: 0 09/09/92

**PART DATA**

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

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**

CONTROLLER, HYBRID DRIVER (HDC), TYPE III - O2 MANIFOLD 1 AND 2 ISOLATION VALVES - OPEN POSITION

**REFERENCE DESIGNATORS:** 40V76A25AR15  
 40V76A25AR16  
 40V76A26AR15  
 40V76A26AR16

**QUANTITY OF LIKE ITEMS:** 4  
 FOUR, TWO PER O2 MANIFOLD VALVE CIRCUIT

**FUNCTION:**

CONTROLS POWER TO OPEN O2 MANIFOLD 1 AND 2 ISOLATION VALVES. CONTROL CIRCUITRY IS INDEPENDENT FOR EACH MANIFOLD VALVE.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
 NUMBER: M5-6MB-2205-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  
 DO DE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:	102	COLUMBIA
	:	103
	:	104
	:	105
		DISCOVERY
		ATLANTIS
		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 O2 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 O2 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

PRINT DATE: 09/09/92

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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	:	<u>T. J. Eavenson 9/14/92</u>
PRODUCT ASSURANCE ENG	:	T. K. KIMURA	:	<u>T.K. Kimura 9/14/92</u>
DESIGN ENG TEAM LEADER	:	G. M. ANDERSON	:	<u>G.M. Anderson 9/15/92</u>
DESIGN ENGINEERING	:	T. D. NGUYEN	:	<u>T. D. Nguyen 9/15/92</u>
NASA RELIABILITY	:		:	<u>William B. Stainliger 12/16/92</u>
NASA SUBSYSTEM MANAGER	:		:	<u>Thomas J. H. ... 12/16/92</u>
NASA EPD&C RELIABILITY	:		:	<u>David L. ... S. Woodard 12/17/92</u>
NASA QUALITY ASSURANCE	:		:	<u>HW KO ... 12/17/92</u>
NASA EPD&C SUBSYS MGR	:		:	<u>... F. ... 14 Dec 92</u>