

## FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL HARDWARE

NUMBER: M5-6MB-2031-G -X

SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC

REVISION: 9 09/09/02

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**PART DATA**


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	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	: PANEL R1A2	V070-730276
SRU	: SWITCH, TOGGLE	ME452-0102-7205

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**

SWITCH, TOGGLE, 2P3P, MOMENTARY - H2 MANIFOLD VALVES 1 AND 2

**REFERENCE DESIGNATORS:** 32V73A1A2S3  
32V73A1A2S6

**QUANTITY OF LIKE ITEMS:** 2  
TWO, ONE PER H2 MANIFOLD VALVE CIRCUIT

**FUNCTION:**

PROVIDES CREW WITH CAPABILITY TO MANUALLY "OPEN" OR "CLOSE" H2 MANIFOLD VALVES 1 AND 2.

FAILURE MODES EFFECTS ANALYSIS FMEA - CIL FAILURE MODE

NUMBER: M5-6MB-2031-G- 01

REVISION#: 9 04/18/96

SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC

LRU: PANEL R1A2

CRITICALITY OF THIS

ITEM NAME: SWITCH, TOGGLE

FAILURE MODE: 1R2

FAILURE MODE:

FAILS OPEN ON VALVE "CLOSING" SIDE, CONTACT-TO-CONTACT SHORT ON VALVE "OPENING" SIDE

MISSION PHASE: LO LIFT-OFF  
DO DE-ORBIT

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

CAUSE:

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

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS  
B) FAIL  
C) PASS

PASS/FAIL RATIONALE:

A)

B)

REDUNDANCY SCREEN "B" FAILS EVEN THOUGH THE FAILURE OF THIS SWITCH IS DETECTABLE BECAUSE THE TIME FOR CORRECTIVE ACTION (ELECTRICAL LOAD RECONFIGURATION) EXCEEDS THE TIME TO EFFECT (MANIFOLD GROSS EXTERNAL LEAK STARVES TWO FCP'S DURING ASCENT/DESCENT.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

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LOSS OF FUNCTION - 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) SWITCH FAILS (LOSE ABILITY TO CLOSE MANIFOLD VALVE), AND 2) 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 A, ITEM NO. 1 - TOGGLE SWITCH

**(B) TEST:**  
GROUND TURNAROUND TEST  
ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD. THE OMRSD DATA PROVIDED BELOW IS NO LONGER BEING KEPT UP-TO-DATE. IF THERE IS ANY DISCREPANCY BETWEEN THE GROUND TESTING DATA PROVIDED BELOW AND THE OMRSD, THE OMRSD IS THE MORE ACCURATE SOURCE OF THE DATA.

SWITCH OPERATION IS VERIFIED DURING FLIGHT. PERFORM GROUND TURNAROUND TEST WHEN VALID VERIFICATION IS UNOBTAINABLE IN FLIGHT OR AFTER LRU REPLACEMENT.

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(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.

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

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- APPROVALS -

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PRODUCT ASSURANCE MGR	: P. STENGER-NGUYEN	: <u><i>P. Stenger-Nguyen</i></u>
PAE MANAGER	: J. NGUYEN	: <u><i>J. Nguyen</i></u>
DESIGN ENGINEERING	: T. D. NGUYEN	: <u><i>T. D. Nguyen</i></u>
EDITORIALLY APPROVED	: JSC	: <u><i>JSC</i></u>
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 06-CIL-012_M5-6MB