

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

NUMBER: M5-6MB-2078-G -X

SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC

REVISION: 9 09/09/92

## PART DATA

| PART NAME        | PART NUMBER   |
|------------------|---------------|
| VENDOR NAME      | VENDOR NUMBER |
| LRU : PANEL R1A2 | V070-730276   |
| SRU : RESISTOR   | RWR80S1211FR  |

## EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

RESISTOR, CURRENT LIMIT, 1.2K OHM, 2 WATT - H2 MANIFOLD VALVE, TANKS 1 AND 2

REFERENCE DESIGNATORS: 32V73A1A2A1R3  
 32V73A1A2A1R7  
 32V73A1A2A1R12  
 32V73A1A2A1R15

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

## FUNCTION:

PROVIDES CURRENT LIMIT/CIRCUIT PROTECTION FOR THE CONTROL CIRCUIT OF H2  
 MANIFOLD ISOLATION VALVES 40V45LV031 AND 40V45LV041.

## FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE

NUMBER: M5-6MB-2078-G- 01

REVISION#: 9 04/16/96

SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC

LRU: PANEL R1A2

CRITICALITY OF THIS

ITEM NAME: RESISTOR

FAILURE MODE: 1R2

## FAILURE MODE:

OPEN

## MISSION PHASE:

LO LIFT-OFF  
 OO ON-ORBIT  
 DO DE-ORBIT

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

## CAUSE:

STRUCTURAL FAILURE (MECHANICAL STRESS, VIBRATION), ELECTRICAL STRESS,  
 THERMAL STRESS, 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 RESISTOR 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:

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

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LOSS OF ABILITY TO OPEN AFFECTED MANIFOLD VALVE AFTER INADVERTENT OR  
COMMANDED VALVE CLOSURE.

**(B) INTERFACING SUBSYSTEM(S):**  
SAME AS (A)

**(C) MISSION:**  
(CRIT 2/2) POSSIBLE LOSS OF MISSION DUE TO ASSOCIATED MANIFOLD VALVE FAILING  
CLOSED RESULTING IN ONE TANK BEING ISOLATED TO A SINGLE FUEL CELL. MISSION  
TERMINATED WHEN THE HYDROGEN IN THAT TANK IS CONSUMED.

**(D) CREW, VEHICLE, AND ELEMENT(S):**  
NO EFFECT - FIRST FAILURE

**(E) FUNCTIONAL CRITICALITY EFFECTS:**  
(CRIT 1R2) POSSIBLE LOSS OF CREW/VEHICLE DUE TO THE FOLLOWING SCENARIO:  
1) RESISTOR OPENS (VALVE REMAINS OPEN), 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 E, ITEM NO. 3 - RESISTOR

**(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.

RESISTOR INTEGRITY IS FUNCTIONALLY 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 E, ITEM NO. 3 - RESISTOR

(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 E 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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|------------------------|---------------------|----------------------------|
| PAE MANAGER            | : P. STENGER-NGUYEN | : <i>P. Stenger-Nguyen</i> |
| PRODUCT ASSURANCE ENGR | : J. NGUYEN         | : <i>J. Nguyen</i>         |
| DESIGN ENGINEERING     | : T. D. NGUYEN      | : <i>T. D. Nguyen</i>      |
| EDITORIALLY APPROVED   | : JSC               | : <i>J. Stacey</i>         |
| TECHNICAL APPROVAL     | : VIA APPROVAL FORM | : 96-CIL-012_M5-6MB        |