

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE

NUMBER: M5-6MB-2076-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 - FUEL CELL POWER PLANT (FCP) 1, 2, AND 3 REACTANT SUPPLY CONTROL

REFERENCE DESIGNATORS: 32V73A1A2A1R1
 32V73A1A2A1R5
 32V73A1A2A1R11
 32V73A1A2A1R14
 32V73A1A2A2R10
 32V73A1A2A2R32

QUANTITY OF LIKE ITEMS: 6
 SIX

FUNCTION:

PROVIDES CURRENT LIMITING PROTECTION FOR THE CONTROL CIRCUITRY OF FCP'S 1, 2, AND 3 REACTANT SUPPLY VALVES.

FAILURE MODES EFFECTS ANALYSIS FMEA - CIL FAILURE MODE

NUMBER: ME-SMB-2076-G-02

REVISION#: 9 04/16/96

SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC

LRU: PANEL R1A2

CRITICALITY OF THIS

ITEM NAME: RESISTOR

FAILURE MODE: 1R3

FAILURE MODE:
SHORT (END TO END)

MISSION PHASE:	LO	LIFT-OFF
	OO	ON-ORBIT
	DO	DE-ORBIT
	LS	LANDING/SAFING

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

CAUSE:
STRUCTURAL FAILURE (MECHANICAL STRESS, VIBRATION), CONTAMINATION,
ELECTRICAL STRESS, THERMAL STRESS, PROCESSING ANOMALY

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

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

PASS/FAIL RATIONALE:

A)
REDUNDANCY SCREEN "A" FAILS BECAUSE THERE IS NO TEST THAT CAN BE DEVELOPED TO DETECT THE SHORT (END TO END) FAILURE MODE OF THIS RESISTOR WITHOUT USING INVASIVE PROCEDURES.

B)
REDUNDANCY SCREEN "B" N/A BECAUSE TWO OTHER FAILURES, SWITCH SHORT AND ASSOCIATED HDC FAILING OPEN, ARE DETECTABLE.

C)

- FAILURE EFFECTS -

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL FAILURE MODE

NUMBER: M5-EMB-2076-G-02

(A) SUBSYSTEM:

LOSS OF ABILITY TO LIMIT THE CURRENT DRAWN FROM ITS ASSOCIATED CONTROL BUS.

(B) INTERFACING SUBSYSTEM(S):

NO EFFECT - FIRST FAILURE

(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) RESISTOR FAILS SHORT, 2) MAIN FUEL CELL REACTANT VALVE SWITCH SHORTS TO STRUCTURE CAUSING THE LOSS OF ASSOCIATED CONTROL BUS POWER WHICH CAUSES THE LOSS OF ONE OF TWO REDUNDANT CONTROL PATHS TO H2 AND O2 SUPPLY VALVES OF TWO DIFFERENT FUEL CELLS, 3) REDUNDANT VALVE CLOSURE CIRCUIT FAILS TO OPERATE - LOSS OF ABILITY TO CLOSE AFFECTED FUEL CELL H2 OR O2 SUPPLY VALVE, AND 4) FAILURE OF REACTANT CROSSOVER (REF. CIL 04-0101-09) OR EXTERNAL LEAKAGE OF REACTANTS (REF. CIL 04-1A-0101-04) OCCURRING IN THE ASSOCIATED FUEL CELL.

-DISPOSITION RATIONALE-

(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.

(C) INSPECTION:

REFER TO APPENDIX E, ITEM NO. 3 - RESISTOR

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(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:

EGIL CONSOLE HANDBOOK SHUTTLE CONSOLE PROCEDURES (SCP) 2.22 "LFO1 MULTIPLEXER/DEMUTIPLEXER WORKAROUND" REFERS TO THE INFLIGHT MAINTENANCE (IFM) CHECKLIST WHICH CONTAINS A PROCEDURE (PREFLIGHT TEST BUS SETUP) TO PERFORM CONTINGENCY POWERUP OF A FUEL CELL IN THE EVENT THAT POWER IS LOST TO A FUEL CELL ELECTRONIC CONTROL UNIT (ECU). THIS PROCEDURE USES THE LAUNCH MULTIPLEXER/DEMUTIPLEXER (MDM) LFO1 GROUND SWITCHING CAPABILITY AS A WORKAROUND BY ISSUING COMMANDS BY JUMPING PIN TO P1N. THIS SAME PROCEDURE CAN BE USED TO ISSUE THE FUEL CELL REACTANT VALVE CLOSE COMMANDS. NOTE - THIS PROCEDURE REQUIRES APPROXIMATELY ONE HOUR TO PERFORM.

• APPROVALS •

FAE MANAGER	:	P. STENGER-NGUYEN	: <u><i>P. Stenger-Nguyen</i></u>
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NASA EPD&C SSMA	:		: <u><i>[Signature]</i></u>
NASA EPD&C SUBSYSTEM MGR	:		: <u><i>[Signature]</i></u> 6/17/97
NASA SSMA	:		: <u><i>[Signature]</i></u> 6/16/97
NASA SUBSYSTEM MANAGER	:		: <u><i>[Signature]</i></u> 6/16/97
NASA MOD	:		: <u><i>[Signature]</i></u> 6/17/97