FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL HARDWARE
NUMBER: 05-5IA-2176 -X

SUBSYSTEM NAME: EPD&C - REMOTE MANIP. ARM
REVISION: 3 02/05/95

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	MID PCA 1	V070-764430
LRU	MID PCA 2	V070-764430
SRU	CONTROLLER, REMOTE POWER	MC450-0017-1200
SRU	CONTROLLER, REMOTE POWER	MC450-0017-2200
SRU	CONTROLLER, REMOTE POWER	MC450-0017-3200
SRU	CONTROLLER, REMOTE POWER	MC450-0017-4200

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CONTROLLER, REMOTE POWER RPC 20 AMP, PORT/STARBOARD RMS HEATERS MAIN BUSES A & B

REFERENCE DESIGNATORS: 40V76A25RPC25
40V76A25RPC27
40V76A26RPC29
40V76A26RPC28

QUANTITY OF LIKE ITEMS: 4
FOUR

FUNCTION:
FOLLOWING A CREW-INITIATED COMMAND THE RPC PROVIDES HEATER POWER FROM MAIN A AND B BUSES TO THE PORT AND STARBOARD REMOTE MANIPULATOR ARMS. THE RPC DESIGN INCORPORATES OVERCURRENT TRIP PROTECTION PLUS TIMED CURRENT LIMITING FOR TRANSIENT CONDITIONS. RESET IS ACCOMPLISHED THROUGH CONTROL SIGNAL REMOVAL AND REAPPLICATION.

 PRINT DATE: 04/13/95

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NUMBER: 05-6IA-2176 -X

- APPROVALS -

PAE MANAGER	: K. L. PRESTON	K.L. Preston 4/21/95
PRODUCT ASSURANCE ENGR	: N. HAFEZ'ZADEH	
DESIGN ENGINEERING	: D. SOVEREIGN	3/16/95
NASA EPD&C SUBSYS MGR	:	N/A
NASA SUBSYS MGR	:	
NASA EPD&C SSMA	:	N/A
NASA SSMA	:	

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6IA-2176-01

REVISION# 2 07/23/90 R

SUBSYSTEM: EPD&C - REMOTE MANIP. ARM
LRU :MID PCA I
ITEM NAME: CONTROLLER, REMOTE POWER

CRITICALITY OF THIS FAILURE MODE:1R2

■ FAILURE MODE:
LOSS OF OUTPUT, FAILS TO CONDUCT, FAILS TO TURN "ON"

MISSION PHASE:
OO - ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 103 DISCOVERY
: 104 ATLANTIS
ic-5 Endeavor

■ 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)
RPC FAILS SCREEN B DUE TO UNAVAILABILITY OF TELEMETRY ON BOTH SYSTEMS AND NEED FOR ONLY ONE HEATER SYSTEM TO MAINTAIN REQUIRED TEMPERATURES DURING OPERATIONAL PHASES. (BOTH ARE ENABLED, ONE CAN FAIL AND NOT BE DECTECTED).

C)

- FAILURE EFFECTS -

■ (A) SUBSYSTEM:
FAILURE WILL RESULT IN LOSS OF AFFECTED HEATER CIRCUIT ON AFFECTED RMS.

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■ (B) INTERFACING SUBSYSTEM(S):
FIRST FAILURE - NO EFFECT

■ (C) MISSION:
FIRST FAILURE - NO EFFECT

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

■ (E) FUNCTIONAL CRITICALITY EFFECTS:
SUBSEQUENT FAILURE IN OPPOSITE HEATER CIRCUIT MAY ALLOW TEMPERATURES DECLINE SUFFICIENTLY TO PREVENT RMS JOINT MOVEMENTS. POSSIBLE LOSS OF MISSION (2R3) DUE TO INABILITY TO MANEUVER THE RMS. POSSIBLE LOSS OF CREW/VEHICLE (1R2) DUE TO UNCOMMANDED RMS OR PAYLOAD MOTION CAUSED BY FROZEN JOINT(S).

- DISPOSITION RATIONALE -

■ (A) DESIGN:
REFER TO APPENDIX B, ITEM NO. 2 - REMOTE POWER CONTROLLER

■ (B) TEST:
REFER TO APPENDIX B, ITEM NO. 2 - REMOTE POWER CONTROLLER

GROUND TURNAROUND TEST
CIRCUIT VERIFIED ON-LINE PER PARAGRAPHS:
- V54AN0.010 "HEATER BUS A VERIF"
- V54AN0.011 "HEATER BUS B VERIF"
- V54AN0.044 "STBD HEATER BUS A DEADFACE VERIF"
- V54AN0.045 "STBD HEATER BUS B DEADFACE VERIF"
PRIOR TO MECHANICAL ARM INSTALLATION,
- V54AT0.168 "HEATER BUS A VERIF"
- V54AT0.170 "HEATER BUS B VERIF"
FOR EVERY RMS FLIGHT, AND LRU RETEST PER TABLE V54Z00.000.

■ (C) INSPECTION:
REFER TO APPENDIX B, ITEM NO. 2 - REMOTE POWER CONTROLLER

(D) FAILURE HISTORY:
REFER TO APPENDIX B, ITEM NO. 2 - REMOTE POWER CONTROLLER

(E) OPERATIONAL USE:
BOTH HEATER SYSTEMS ARE ENABLED DURING RMS OPERATIONS. A FAILURE AT THIS POINT WOULD NOT BE DETECTABLE SINCE THE TEMPERATURES WOULD BE KEPT WITHIN LIMITS BY THE REMAINING SYSTEM. DURING OTHER (NON-RMS) ON-ORBIT

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MISSION PHASES, THE SYSTEMS ARE CYCLED TO DETERMINE OPERATIONAL STATUS. A FAILURE AT THIS POINT WOULD ALLOW TEMPERATURES TO DECREASE SUFFICIENTLY TO SET OFF ON-BOARD FAULT ANNUNCIATION.

- APPROVALS -

RELIABILITY ENGINEERING	T. AI	
DESIGN ENGINEERING	D. SOVEREIGN	
QUALITY SUPERVISOR	J. COURSEN	
NASA RELIABILITY	J. Grisham	9/25/90
NASA SUBSYSTEM MANAGER	G. Glenn	10/10/90
NASA EPD&C RELIABILITY		M. Saleem Dyson 9/24/90
NASA QUALITY ASSURANCE		for Grant Gentnet 9/10/90
NASA EPD&C SUBSYS MGR	F. ALANIS	for FA 10-16-90
NASA RMS Operations	D. Pallesen	D. Pallesen