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

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL FAILURE MODE
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	:	

1541

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6IA-2176-02

REVISION# 2 07/23/90 R

SUBSYSTEM: EPD&C - REMOTE MANIP. ARM
LRU :MID PCA 1
ITEM NAME: CONTROLLER, REMOTE POWER

CRITICALITY OF THIS FAILURE MODE:1R3

■ FAILURE MODE:
INADVERTENT OUTPUT, FAILS "ON", FAILS TO TURN "OFF"

MISSION PHASE:
OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 103 DISCOVERY
: 104 ATLANTIS
105 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)
FAILURE DUE TO LACK OF TELEMETRY AND FAILURE MASKING BY OPERATIONAL THERMOSTATS. INITIAL FAILURE WOULD NOT BE DETECTED SINCE THERMOSTATS WITHIN THE HEATER CIRCUIT FUNCTION TO REGULATE THE HEATING ELEMENTS TO MAINTAIN PROPER TEMPERATURE.

C)

- FAILURE EFFECTS -

■ (A) SUBSYSTEM:
FAILURE WILL RESULT IN AFFECTED HEATER CIRCUIT BEING CONTINUOUSLY POWERED.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6IA-2176-02

- (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 DUAL THERMOSTAT FAILURE IN AFFECTED HEATER CIRCUIT WILL ENABLE HEATING ELEMENTS TO BE CONTINUOUSLY POWERED AND FOR HIGH BETA ANGLE ORBITS, MAY INCREASE TEMPERTURES SUFFICIENTLY TO PREVENT RMS JOINT MOVEMENTS. POSSIBLE LOSS OF MISSION (2R3) DUE TO INABILITY TO MANUEVER THE RMS CAUSED BY FROZEN RMS JOINT(S). POSSIBLE LOSS OF CREW/VEHICLE (1R3) DUE TO UNCOMMANDED RMS OR PAYLOAD MOTION CAUSED BY FROZEN RMS 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:
  AFTER THIRD FAILURE ATTEMPT TO MANUALLY STRAIGHTEN THE ARM USING EVA

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6IA-2176-02

TECHNIQUES FOR MARGINAL CASES. WORST CASE FAILURE WILL REQUIRE JETTISON OF RMS TO ALLOW PLB DOOR CLOSURE FOR SAFE ENTRY.

- APPROVALS -

RELIABILITY ENGINEERING	T. AI	
DESIGN ENGINEERING	D. SOVEREIGN	
QUALITY SUPERVISOR	J. COURSEN	
NASA RELIABILITY	J. Grisham	
NASA SUBSYSTEM MANAGER	G. Glenn	
NASA EPD&C RELIABILITY		
NASA QUALITY ASSURANCE		
NASA EPD&C SUBSYS MGR	F. ALANIS	
NASA RMS Operations	D. Pallesen	D Pallesen