

PAGE: 1

PRINT DATE: 04/13/95

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE  
 NUMBER: 05-6EE-2016 -X

SUBSYSTEM NAME: EPD&amp;C - ADP DEPLOY &amp; HTR (02-4E)

REVISION: 1 02/06/95

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: FWD PCA 1	V070-763320
LRU	: FWD PCA 2	V070-763340
LRU	: FWD PCA 3	V070-763360
SRU	: CONTROLLER, REMOTE POWER	MC450-0017-1100 -1500
SRU	: CONTROLLER, REMOTE POWER	MC450-0017-2100 -2150
SRU	: CONTROLLER, REMOTE POWER	MC450-0017-3100 -3150
SRU	: CONTROLLER, REMOTE POWER	MC450-0017-4100 -4150

---

**PART DATA**


---

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
 CONTROLLER, REMOTE POWER, RPC (10 AMP AND 15 AMP) - AIR DATA PROBE (ADP),  
 LEFT AND RIGHT SENSOR HEATER POWER CIRCUIT

**REFERENCE DESIGNATORS:** 81V76A22RPC13  
 81V76A22RPC14  
 81V76A22RPC15  
 82V76A23RPC12  
 82V76A23RPC13  
 82V76A23RPC14  
 82V76A23RPC43  
 82V76A23RPC44  
 82V76A23RPC45  
 83V76A24RPC13  
 83V76A24RPC14  
 83V76A24RPC15

**QUANTITY OF LIKE ITEMS:** 12  
 TWELVE

**FUNCTION:**  
 PROVIDES CONTROL OF POWER TO HEATERS FOR THE LEFT AND RIGHT AIR DATA  
 SENSOR ASSEMBLIES.

PAGE: 2

PRINT DATE: 04/13/95

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL FAILURE MODE  
NUMBER: 05-6EE-2015 -X

- APPROVALS -

FAS MANAGER	:	K. L. PRESTON
PRODUCT ASSURANCE ENGR	:	N. HAFEZIZADEH
DESIGN ENGINEERING	:	D. SOVEREIGN
NASA EPD&C SUBSYS MGR	:	
NASA SUBSYS MGR	:	
NASA EPD&C SSMA	:	
NASA SSMA	:	

<i>K.L. Preston 4/13/95</i>
<i>N. Hafezizadeh</i>
<i>D. Sovereign</i>
<i>Responsible for FMEAs 3/16/95</i>
<i>PIA</i>
<i>David B. ... 3-16-95</i>
<i>N/A</i>

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - ADP DEPLOY & HTR FMEA NO 05-6EE-2016 -2 REV: 05/11/90

ASSEMBLY	: F-PCA-1,2,3	CRIT. FUNC:	1R
P/N RI	: MC450-0017-1100/2100/3100, -1150/2150/3150	CRIT. HDW:	3
P/N VENDOR:		VEHICLE	102 103 104
QUANTITY	: 12	EFFECTIVITY:	X X X
	: TWELVE	PHASE(S):	PL LO OO DO X LS X

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS

PREPARED BY: DES J KRAGER APPROVED BY: DES J. Kimura 5-30-90

REL T KIMURA REL T. Kimura 6-2-90

QE E GUTIERREZ QE E. Gutierrez 6-5-90

APPROVED BY (NASA): SSM R. Balcer 7/17

REL R. Balcer

QE R. Balcer

EPDC as of 6-2-90

EPDC as of 6-5-90

ITEM: CONTROLLER, REMOTE POWER, RPC (10 AMP AND 15 AMP) - AIR DATA PROBE (ADP) LEFT AND RIGHT SENSOR HEATER POWER CIRCUIT

FUNCTION: PROVIDES CONTROL OF POWER TO HEATERS FOR THE LEFT AND RIGHT AIR DATA SENSOR ASSEMBLIES. 81V76A22RPC13, 14, 15; 82V76A23RPC12, 13, 14, 43, 44; 83V76A24RPC13, 14, 15

FAILURE MODE: INADVERTENT OUTPUT, FAILS "ON"

CAUSE(S): PIECE PART FAILURE, CONTAMINATION; VIBRATION, MECHANICAL SHOCK; PROCESSING ANOMALY, THERMAL STRESS

EFFECT(S) ON: (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE (E) FUNCTIONAL CRITICALITY EFFECT:

(A,B) LOSS OF SERIES REDUNDANCY FOR THE CONTROL OF POWER TO ONE OF THE THREE HEATERS FOR THE LEFT OR RIGHT AIR DATA SENSOR ASSEMBLY.

(C,D) NO EFFECT - FIRST FAILURE

(E) POSSIBLE LOSS OF CREW/VEHICLE AFTER TWO OTHER FAILURES (FAIL CLOSE OF ONE CONTACT OF ASSOCIATED TOGGLE SWITCH AND LIMIT SWITCH OR RELAY, C FAILURE OF TWO RELAYS) DUE TO LOSS OF CAPABILITY TO OBTAIN AIR PRESSURE DATA REQUIRED FOR SAFE DESCENT. PROPER LIMIT SWITCH INDICATIONS WITH ERRONEOUS DATA TO ADP CAN CAUSE A SIDE-TO-SIDE DILEMMA AND THE SOFTWARE DOWNMODES TO USING DEFAULT GAINS. ONE OF THE THREE HEATER ELEMENTS FOR ONE ADP CAN FAIL ON AFTER THREE FAILURES AND THERMALLY DAMAGE THE ADP WHEN STOWED.

FIRST FAILURE IS NOT DETECTABLE IN FLIGHT SINCE THE OPERATIONAL STATUS OF THIS CONTROLLER IS NOT MONITORED.

**DISPOSITION & RATIONALE:**

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A-D) FOR DISPOSITION AND RATIONALE

REFER TO APPENDIX B, ITEM NO. 2 - REMOTE POWER CONTROLLER

(B) TEST

GROUND TURNAROUND TEST -

"RH ADP HTR CK", TESTS RIGHT HAND ADP HEATER RELAYS FOR SYSTEMS 1 AND 2.

"LH ADP HTR CK", TESTS LEFT HAND ADP HEATER RELAYS FOR SYSTEMS 1 AND 2.

TESTS LISTED ABOVE ARE TO BE PERFORMED FOR THE NEXT FLIGHT FOR ALL VEHICLES AND INTERVALS OF TEN FLIGHTS THEREAFTER OR AFTER LRU REPLACEMENT WITH PROBE DEPLOYED AND ASSOCIATED SWITCHES IN THE PROPER POSITIONS.

(E) OPERATIONAL USE

THE PROBE FAILURE CAUSES A SIDE-TO-SIDE DILEMMA AND THE SOFTWARE DOWNMODES TO USING DEFAULT GAINS. THE CREW MUST MAINTAIN PITCH ATTITUDE WITHIN THETA LIMITS DISPLAYED ON CRT. CRT DISPLAYS ALPHA, MACH, AND ALTITUDE FROM EACH ADTA TO THE CREW. IF THE NAV DERIVED ALPHA, MACH, AND ALTITUDE DISPLAYED ON DEDICATED DISPLAYS (AMI, AVVI) ARE CORRECT, THE CREW CAN COMPARE THE ADTA DATA WITH THE NAV DERIVED DATA TO RESOLVE THE DILEMMA.