

1526

PAGE: 1

PRINT DATE: 07/23/90

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 05-6IA-2076-X

SUBSYSTEM NAME: EPO&C - REMOTE MANIP. ARM

REVISION : 2 07/23/90

---

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
■ LRU	: PANEL ABA2	VOB2-730150
■ SRU	: RESISTOR	RWR80S1211FR ✓

---

PART DATA

---

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

RESISTOR, CURRENT LIMIT 1.2K OHM, 2W PORT AND STARBOARD RMS HEATER

REFERENCE DESIGNATORS: 36V73A8A2A3R2  
: 36V73A8A2A3R3  
: 36V73A8A2A2R2  
: 36V73A8A2A2R3

QUANTITY OF LIKE ITEMS: 4  
FOUR

FUNCTION:

PROVIDES CURRENT LIMITING/CIRCUIT PROTECTION FOR CONTROL CIRCUITS OF  
RPC'S WHICH ENERGIZE HEATER BUSES MAIN A & B INPUT POWER TO THE  
RELATED PORT AND STARBOARD MANIPULATOR ARM.

PAGE: 2

PRINT DATE: 07/23/90

1527

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
NUMBER: 05-6IA-2076-01

SUBSYSTEM: EPD&C - REMOTE MANIP. ARM  
LRU : PANEL ABA2  
ITEM NAME: RESISTOR

REVISION# 2 07/23/90 R

CRITICALITY OF THIS  
FAILURE MODE: 1R2

■ FAILURE MODE:  
OPEN

MISSION PHASE:  
OO ON-ORBIT

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

■ 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)  
RESISTOR FAILS SCREEN B DUE TO - (1) UNAVAILABILITY OF TELEMETRY ON BOTH  
SYSTEMS, (2) NON-REQUIREMENT OF BOTH SYSTEMS DURING OPERATIONS EVEN  
THOUGH BOTH SYSTEMS ARE KEPT ON (ONE SYSTEM CAN FAIL AND NOT BE  
DETECTED).

C)

- FAILURE EFFECTS -

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

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
NUMBER: 05-6IA-2076-01

- (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 (LOSS OF OPPOSITE HEATER) MAY RESULT IN FROZEN JOINT(S) AND ENSUING LOSS OF MISSION (2R3) DUE TO INABILITY TO MANUEVER RMS. POSSIBLE LOSS OF CREW/VEHICLE (1R2) DUE TO UNCOMMANDED RMS OR PAYLOAD MOTION CAUSED BY FROZEN RMS JOINT(S).

-----  
- DISPOSITION RATIONALE -  
-----

- (A) DESIGN:  
REFER TO APPENDIX E, ITEM NO. 3 - RESISTOR, WIRE WOUND
- (B) TEST:  
REFER TO APPENDIX E, ITEM NO. 3 - RESISTOR, WIRE WOUND  
  
GROUND TURNAROUND TEST  
CIRCUIT VERIFIED ON-LINE PER PARAGRAPHS:  
- V54ANO.010 "HEATER BUS A VERIF"  
- V54ANO.011 "HEATER BUS B VERIF"  
- V54ANO.044 "STBD HEATER BUS A DEADFACE"  
- V54ANO.045 "STBD HEATER BUS B DEADFACE"  
PRIOR TO MECHANICAL ARM INSTALLATION,  
- V54ATO.168 "HEATER BUS A VERIF"  
- V54ATO.170 "HEATER BUS B VERIF"  
FOR EVERY RMS FLIGHT, AND LRU RETEST PER TABLE V54Z00.000.
- (C) INSPECTION:  
REFER TO APPENDIX E, ITEM NO. 3 - RESISTOR, WIRE WOUND ✓
- (D) FAILURE HISTORY:  
REFER TO APPENDIX E, ITEM NO. 3 - RESISTOR, WIRE WOUND
- (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 MISSION PHASES, THE SYSTEMS ARE CYCLED TO DETERMINE OPERATIONAL STATUS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
NUMBER: 05-6IA-2076-01

A FAILURE AT THIS POINT WOULD ALLOW TEMPERATURES TO DECREASE  
SUFFICIENTLY TO SET OFF ON-BOARD FAULT ANNUNCIATION.

-----  
- APPROVALS -  
-----

RELIABILITY ENGINEERING:	T. AI	:	<u>T. AI</u>
DESIGN ENGINEERING	: D. SOVEREIGN	:	<u>D. J. Long 8-10</u>
QUALITY SUPERVISOR	: J. COURSEN	:	<u>J. Courson 8-10-90</u>
NASA RELIABILITY	: J. Grisham	:	<u>J. Grisham 9/26/90</u>
NASA SUBSYSTEM MANAGER	: G. Glean	:	<u>G. Glean 10/10/90</u>
NASA EPD&C RELIABILITY	:	:	<u>J. Coleman 9/26/90</u>
NASA QUALITY ASSURANCE	:	:	<u>K. B. Grant 9/10/90</u>
NASA EPD&C SUBSYS MGR	: F. ALANIS	:	<u>F. Alanis 10-16-90</u>
NASA RMS Operations	: D. Fallesen	:	<u>D. Fallesen</u>