FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 05-61A-2026-X

SUBSYSTEM NAME: EPD&C - REMOTE MANIP. ARM
REVISION : Z 04/02/91

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| | | PART NAME / VENDOR NAME | PART NUMBER / VENDOR NUMBER |
|---|---|---|---|
| ■ LRU | : | PANEL A8A2 | V082-730150 |
| ■ SRU | : | SWITCH, TOGGLE | ME452-0102-7101 |

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PART DATA

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EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
SWITCH, TOGGLE, SINGLE POLE, 2 POSITION, STARBOARD AND PORT RMS HEATER A, B

REFERENCE DESIGNATORS: 36V73A8A2S7
: 36V73A8A2S8
: 36V73A8A2S9
: 36V73A8A2S10

QUANTITY OF LIKE ITEMS: 4
FOUR

FUNCTION:
PROVIDES THE "AUTO/OFF" MANUAL CAPABILITY TO REMOTELY CONTROL THE HEATER BUSES MAIN A AND B INPUT POWER TO THE RELATED STARBOARD AND PORT REMOTE MANIPULATOR ARM.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-61A-2026-02



REVISION# 2 04/02/91 R

SUBSYSTEM: EPD&C - REMOTE MANIP. ARM
LRU :PANEL ABA2
ITEM NAME: SWITCH, TOGGLE

CRITICALITY OF THIS FAILURE MODE:1R3

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■ FAILURE MODE:
FAILS CLOSED, PREMATURE CLOSURE, CONTACT-TO-CONTACT SHORT

MISSION PHASE:
OO ON-ORBIT

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

■ CAUSE:
PIECE PART STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

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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)

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- FAILURE EFFECTS -

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

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

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- DISPOSITION RATIONALE -

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■ (A) DESIGN:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

■ (B) TEST:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

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 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 A, ITEM NO. 1 - TOGGLE SWITCH

■ (D) FAILURE HISTORY:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

■ (E) OPERATIONAL USE:
AFTER THIRD FAILURE ATTEMPT TO MANUALLY STRAIGHTEN THE ARM USING EVA TECHNIQUES. WORST CASE FAILURE WILL REQUIRE JETTISON OF RMS TO ALLOW

PRINT DATE: 04/09/91

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PLB DOOR CLOSURE FOR SAFE ENTRY.

- APPROVALS -

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|---|---|---|
| RELIABILITY ENGINEERING | T. AI | JA 5-31-91 |
| DESIGN ENGINEERING | D. SOVEREIGN | DS 5-28-91 |
| QUALITY SUPERVISOR | J. T. COURSEN | 6/3/91 |
| NASA RELIABILITY | Grisham | 8/7/91 |
| NASA SUBSYSTEM MANAGER | G. M. Glenn | 8/7/91 |
| NASA EPD&C RELIABILITY | | 8/7/91 |
| NASA QUALITY ASSURANCE | | KO 6/19/91 |
| NASA EPD&C SUBSYS MGR | | F. Hollowell |