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PRINT DATE: 04/09/91

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 05-61A-2028-X

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SUBSYSTEM NAME: EPD&C - REMOTE MANIP. ARM

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| | PART NAME VENDOR NAME | PART NUMBER VENDOR NUMBER |
|---------|--------------------------|------------------------------|
| ■ LRU : | PANEL ABA2 | V082-730150 |
| ■ SRU : | SWITCH, TOGGLE | ME452-0102-7403 |

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
SWITCH, TOGGLE 4 POLE 3 POSITION RMS POWER

REFERENCE DESIGNATORS: 36V73A8A254

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:
PROVIDES THE MANUAL PRIMARY/BACKUP CAPABILITY TO REMOTELY CONTROL
POWER FROM THE 28VDC MAIN A AND B BUSES AND 115VAC AC1 AND AC2 BUSES TO
SYSTEM 1 AND 2.

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

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CRITICALITY OF THIS
FAILURE MODE:1R2

- FAILURE MODE:
FAILS CLOSED, PREMATURE CLOSURE

MISSION PHASE:
00 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

REDUNDANCY SCREEN A) PASS
B) FAIL
C) PASS

PASS/FAIL RATIONALE:

A)

- B)
IN FLIGHT - LACK OF TELEMETRY, SINGLE BACKUP CONTACT FAILURE WHEN PRIME SELECTED IS NOT DETECTABLE.

C)

- FAILURE EFFECTS -

- (A) SUBSYSTEM:
WORST CASE FAILURE WILL RESULT IN PRESENCE OF SIMULTANEOUS PRIMARY AND BACKUP DC POWER TO SELECTED RMS (PRIME AND BACKUP BOTH ENABLED).

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- (B) INTERFACING SUBSYSTEM(S):
FAILURE WILL RESULT IN SIMULTANEOUS ROUTING OF PRIMARY AND BACKUP POWER TO THE SELECTED RMS.
- (C) MISSION:
FIRST FAILURE - NO EFFECT
- (D) CREW, VEHICLE, AND ELEMENT(S):
FIRST FAILURE - NO EFFECT
- (E) FUNCTIONAL CRITICALITY EFFECTS:
POSSIBLE LOSS OF MISSION (2R3) DUE TO LOSS OF ALL PAYLOAD CAPTURE CAPABILITY AFTER SUBSEQUENT FAILURE OF BACKUP CIRCUITRY. POSSIBLE LOSS OF CREW/VEHICLE (1R2) DUE TO UNCOMMANDED RELEASE OF A CAPTURED PAYLOAD OR UNCOMMANDED MOTION OF THE RMS AFTER SECOND FAILURE (BACKUP CIRCUITRY FAILS).

 - DISPOSITION RATIONALE -

- (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
CIRCUITS VERIFIED ON-LINE PER PARAGRAPHS:
- V54AND.012 "PORT MN A (PRIMARY) POWER VERIF"
- V54AND.013 "PORT MN B (BACKUP) POWER VERIF"
PRIOR TO MECHANICAL ARM INSTALLATION,
- V54ATO.000 "SYSTEM TURNAROUND VERIFICATION"
- V54ATO.001 "CONFIGURATION AND CHECKOUT"
FOR EVERY RMS FLIGHTS, 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:
FAILURE OF THE PRIMARY DC CONTACTS WILL ALLOW THE MCIU TO BE CONTINUALLY POWERED. FAILURE OF THE PRIMARY OR BACKUP AC CONTACTS WILL ALLOW THE ABA1(A8U) PANEL LIGHTING TO BE CONTINUALLY POWERED. FAILURE

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OF THE BACKUP DC CONTACT WILL NOT BE DETECTABLE TO THE CREW WITHOUT ATTEMPTING TO DRIVE THE RMS USING THE BACKUP DRIVE SWITCH. MCC CAN DETECT PRESENCE OF SIMULTANEOUS PRIMARY AND BACKUP DC SELECTION. FAILURE WITHIN ANY DETECTABLE CONTACTS WILL NOT BE APPARENT TO CREW UNTIL THE SWITCH IS COMMANDED OFF.

IF POSSIBLE, PAYLOADS SHOULD BE CAPTURED/RELEASED IN POSITIONS WHERE INCOMPLETE RIGIDIZATION OR RELEASE WILL NOT ALLOW THE PAYLOAD TO ROTATE INTO ORBITER STRUCTURE.

- APPROVALS -

RELIABILITY ENGINEERING: T. AI
DESIGN ENGINEERING : D. SOVEREIGN
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NASA RELIABILITY : J. Grisham
NASA SUBSYSTEM MANAGER : G. M. Galan
NASA EPO&C RELIABILITY :
NASA QUALITY ASSURANCE :
NASA EPO&C SUBSYS MGR :

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: D S *by* *Dr* 5-22-91
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: *T. E. ...* 5/7/91
: *...* 2/7/91
: *M. ...* 5/7/91
: *BO Brent ...* 6/19/91
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