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PRINT DATE: 04/09/91

FAILURE MODES EFFECTS ANALYSIS (FMEA) — CRITICAL HARDWARE

NUMBER: 05-61A-2029-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 A8A2	V082-730150
▣ SRU :	SWITCH, TOGGLE	ME452-0102-7203

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PART DATA

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EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
SWITCH, TOGGLE 2 POLE 3 POSITION STARBOARD AND PORT REMOTE MANIPULATOR  
ARM

REFERENCE DESIGNATORS: 36V73A8A2S1

QUANTITY OF LIKE ITEMS: 1  
ONE

FUNCTION:  
PROVIDES THE MANUAL SELECT CAPABILITY TO CONTROL THE 28VDC MAIN  
BUSES A AND B INPUT POWER TO THE STARBOARD OR PORT REMOTE MANIPULATOR  
ARM.

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SUBSYSTEM: EPD&C - REMOTE MANIP. ARM  
LRU :PANEL A8AZ  
ITEM NAME: SWITCH, TOGGLE

CRITICALITY OF THIS  
FAILURE MODE:1/1

- FAILURE MODE:  
FAILS CLOSED, PREMATURE CLOSED, CONTACT-TO-CONTACT SHORT, POLE-TO-POLE SHORT

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) N/A  
B) N/A  
C) N/A

PASS/FAIL RATIONALE:  
A)  
B)  
C)

- FAILURE EFFECTS -

- (A) SUBSYSTEM:  
WORST CASE FAILURE MAY ALLOW FREE FLOATING SPRING AND ROLLER TO SPAN SUFFICIENT CONTACTS SUCH THAT BOTH PORT AND STARBOARD RMS ARE ENABLED SIMULTANEOUSLY.

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## ■ (B) INTERFACING SUBSYSTEM(S):

WORST CASE FAILURE WILL RESULT IN BOTH ARMS AND END EFFECTORS RESPONDING SIMULTANEOUSLY TO THE COMMAND INPUTS.

## ■ (C) MISSION:

WORST CASE FAILURE WILL HAVE NO EFFECT FOR SINGLE RMS MANIFESTED FLIGHTS. FOR DUAL RMS MANIFESTED FLIGHTS, WORST CASE FAILURE WILL RESULT IN LOSS OF MISSION DUE TO POTENTIAL PAYLOAD BAY ENVELOPE BLOCKAGE AND INABILITY TO UNCOUPLE RMS MOTIONS.

## ■ (D) CREW, VEHICLE, AND ELEMENT(S):

WORST CASE FAILURE WILL HAVE NO EFFECT FOR SINGLE RMS MANIFESTED FLIGHTS. FOR DUAL RMS MANIFESTED FLIGHTS, WORST CASE FAILURE WILL RESULT IN LOSS OF CREW/VEHICLE DUE TO UNINTENDED MOTION OF THE RMS NOT INTENTIONALLY COMMANDED.

## (E) FUNCTIONAL CRITICALITY EFFECTS:

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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

CIRCUITS VERIFIED ON-LINE PER PARAGRAPHS:

- V54ANO.040 "STBD PRIMARY POWER DEADFACE VERIF"
- V54ANO.041 "PORT PRIMARY POWER DEADFACE VERIF"
- V54ANO.042 "PORT B/U POWER DEADFACE VERIF"
- V54ANO.043 "STBD B/U POWER DEAFFACE VERIF"

PRIOR TO MECHANICAL ARM INSTALLATION.

- V54ATO.001 "CONFIGURATION AND CHECKOUT"

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:

FOR SINGLE RMS MANIFESTED FLIGHTS, FAILURE WILL HAVE NO IMPACT TO

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OPERATIONS OR BE APPARENT TO CREW OR MCC, AND WILL HAVE CRITICALITY 3/3. FOR DUAL RMS MANIFESTED FLIGHTS, FAILURE WILL HAVE NO IMPACT TO OPERATIONS OR BE APPARENT TO CREW OR MCC WHEN OPERATING IN PRIMARY POWER MCIU SUPPORTED MODES. HOWEVER, MANUAL COMMANDS ISSUED TO EITHER ARM IN DIRECT OR BACKUP MODES WILL BE APPLIED TO BOTH MANIPULATOR ARMS SIMULTANEOUSLY AND UNEXPECTED MOTION WILL OCCUR ON THE ARM NOT BEING COMMANDED. THE RMS D&C IFM KIT MAY BE INSTALLED TO REGAIN INDEPENDENT COMMAND CAPABILITY FOR DIRECT MODE ON THE PORT RMS.

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

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 - APPROVALS -  
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 NASA EPD&C RELIABILITY :  
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