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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

REVISION : 2 04/02/91

	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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REVISION# 2 04/02/91 R

SUBSYSTEM: EPD&C - REMOTE MANIP. ARM
LRU :PANEL A8A2
ITEM NAME: SWITCH, TOGGLE

CRITICALITY OF THIS
FAILURE MODE:1/1

- FAILURE MODE:
FAILS OPEN, PREMATURE OPEN

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 WILL RESULT IN LOSS OF PRIMARY AND BACKUP DC POWER TO RMS AND LOSS OF PRIMARY AND BACKUP AC POWER TO A8A1 (A8U) PANEL LIGHTING AND RMS SHOULDER BRACE RELEASE MECHANISM.
- (B) INTERFACING SUBSYSTEM(S):
WORST CASE FAILURE WILL RESULT IN LOSS OF ABILITY TO RELEASE RMS

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SHOULDER BRACE OR MANUEVER RMS ON EITHER PRIMARY OR BACKUP POWER IF UNCRADLED. THE BRAKES WILL COME ON AND SAFING WILL BE INDICATED. NO ARM RELATED DATA WILL BE DISPLAYED ON THE O&C PANEL. END EFFECTOR TALKBACKS WILL BE BARBER POLE IF FAILURE OCCURS DURING OPERATION, ARM WILL STOP, ALL PRIME AND BACKUP MODES WILL BE LOST, AND END EFFECTOR PRIME AND BACKUP MODES WILL BE LOST. IF CAPTURING A PAYLOAD, INCOMPLETE RIGIDIZATION CAN OCCUR RESULTING IN UNEXPECTED MOTION.

- (C) MISSION:
WORST CASE FAILURE WILL CAUSE LOSS OF MISSION DUE TO LOSS OF ABILITY TO UNCRADLE OR DRIVE A PREVIOUSLY UNCRADLED RMS.

- (D) CREW, VEHICLE, AND ELEMENT(S):
FAILURE COULD RESULT IN LOSS OF CREW OR VEHICLE DUE TO UNEXPECTED RMS OR PAYLOAD MOTION DUE TO INCOMPLETE RIGIDIZATION.

(E) FUNCTIONAL CRITICALITY EFFECTS:

- 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:

- V54ANO.012 "PORT MN A (PRIMARY) POWER VERIF"
 - V54ANO.013 "PORT MN B (BACKUP) POWER VERIF"
- PRIOR TO MECHANICAL ARM INSTALLATION,
- V54ATO.001 "CONFIGURATION AND CHECKOUT"
 - V54ATO.182 "RELEASE VERIF"
 - V54ATO.184 "BACKUP RELEASE VERIF"
 - V54ATO.350 "SINGLE/DD SWITCH VERIF"
 - V54ATO.354 "BACKUP DRIVE SWITCH VERIF"
 - V54ATO.368 "PRIMARY ILLUMINATION CONTROL VERIF"
 - V54ATO.370 "BACKUP ILLUMINATION 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

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■ (E) OPERATIONAL USE:

FAILURE WILL RESULT IN LOSS OF ABILITY TO RELEASE THE RMS SHOULDER BRACE IF REQUIRED OR POWER THE RMS IN EITHER PRIMARY OR BACKUP MODES. A VALIDATED (IFM) PIN KIT PATCH MAY BE INSTALLED TO REGAIN PRIME DC POWER TO THE PORT RMS IF REQUIRED. INSTALLATION OF THE (IFM) PIN KIT WILL NOT RESTORE BACKUP MODE. IF REQUIRED, A SEPARATE (IFM) PIN KIT PATCH MAY BE INSTALLED TO RELEASE THE RMS SHOULDER BRACE. FAILURE WILL NOT PREVENT STOW/DEPLOY OF MPM AND LAT/REL OR PMRL. RMS MAY BE CRADLED VIA EVA OR JETTISONED IF REQUIRED TO ALLOW PLB DOOR CLOSURE FOR SAFE ENTRY.

WORST CASE FAILURE WILL REQUIRE EVA OR JETTISON OF RMS TO ALLOW PLB DOOR CLOSURE FOR SAFE ENTRY.

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
QUALITY SUPERVISOR for J. T. COURSEN
NASA RELIABILITY : J. Grisham
NASA SUBSYSTEM MANAGER : G. M. Glavin
NASA EPD&C RELIABILITY :
NASA QUALITY ASSURANCE :
NASA EPD&C SUBSYS MGR :

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: DS *[Signature]* 5-2-91
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: TLB *[Signature]* 5/7/91
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