FAILURE MODES EFFECTS ANALYSIS (FMEA) — CRITICAL HARDWARE
NUMBER: 05-61A-2029-X

SUBSYSTEM NAME: EPD&C - REMOTE MANIP. ARM

REVISION : 2 04/02/91

		PART NAME / VENDOR NAME	PART NUMBER / VENDOR NUMBER
■ LRU	:	PANEL A8A2	V082-730150
■ SRU	:	SWITCH, TOGGLE	ME452-0102-7203

PART DATA

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.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-61A-2029-05

REVISION# 2 07/23/90 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, SHORTS-TO-CASE (GROUND)

MISSION PHASE:
00 ON-ORBIT

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

■ 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 ABILITY TO ROUTE PRIMARY OR BACKUP DC POWER TO EITHER RMS.

(B) INTERFACING SUBSYSTEM(S):
WORST CASE FAILURE WILL RESULT IN LOSS OF ABILITY TO DRIVE ANY RMS IN ANY MODE. THE BRAKES WILL COME ON AND SAFING WILL BE INDICATED. NO ARM RELATED DATA WILL BE DISPLAYED ON THE D&C PANEL. END EFFECTOR

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6IA-2029-05

TALKBACKS WILL BE BARBER POLE. IF FAILURE OCCURS DURING OPERATION, ARM WILL STOP, ALL PRIME AND BACKUP MODES WILL BE LOST, AS WELL AS END EFFECTOR PRIME AND BACKUP MODES. 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:
- V54AN0.012 "PORT MN A (PRIMARY) POWER VERIF"
- V54AN0.013 "PORT MN B (BACKUP) POWER VERIF"
- V54AN0.040 "STBD PRIMARY POWER DEADFACE VERIF"
- V54AN0.041 "PORT PRIMARY POWER DEADFACE VERIF"
- V54AN0.042 "PORT B/UP POWER DEADFACE VERIF"
- V54AN0.043 "STBD B/UP POWER DEADFACE VERIF"

PRIOR TO MECHANICAL ARM INSTALLATION,
- V54AT0.182 "RELEASE VERIF"
- V54AT0.184 "BACKUP RELEASE VERIF"
- V54AT0.350 "SINGLE/DD SWITCH VERIF"
- V54AT0.354 "BACKUP DRIVE SWITCH 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:
FAILURE WILL RESULT IN LOSS OF ABILITY TO POWER EITHER RMS IN PRIMARY

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6IA-2029-05

OR BACKUP MODES. AN IFM PIN KIT PATCH MAY BE INSTALLED TO REGAIN PRIME DC POWER TO EITHER RMS. INSTALLATION OF THE (IFM) PIN KIT WILL NOT RESTORE BACKUP MODE. THE FAILURE WILL NOT PREVENT STOW/DEPLOY OF MPM AND LATCH/RELEASE OR MRL. RMS MAY BE CRADLED VIA EVA OR JETTISONED IF REQUIRED TO ALLOW PAYLOAD BAY 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 THE ORBITER STRUCTURE.

- APPROVALS -

RELIABILITY ENGINEERING	T. AI	
DESIGN ENGINEERING	D. SOVEREIGN	
QUALITY SUPERVISOR	J. COURSEN	
NASA RELIABILITY	J. Grisham	9/25/90
NASA SUBSYSTEM MANAGER	G. Gean	10/10/90
NASA EPD&C RELIABILITY		M. Salem 9/26/90
NASA QUALITY ASSURANCE		K.O. Brent Bentsen 9/10/90
NASA EPD&C SUBSYS MGR	F. ALANIS	FA 10-16-90
NASA RMS operations	D. Pallesen	D Pallesen