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PRINT DATE: 4/8/96

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE  
 NUMBER: 05-5-B24-1 -X

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)

REVISION: 9

04/08/96

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 PART DATA
 

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PART NAME	PART NUMBER
VENDOR NAME	VENDOR NUMBER
LRU : TOGGLE SWITCH, CRT SEL	ME452-0102-7201

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## EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

REFERENCE DESIGNATORS: 35V73A2A2S7  
 LEFT CRT SEL  
 35V73A2A2S8  
 RIGHT CRT SEL

QUANTITY OF LIKE ITEMS: 2  
 TWO

## FUNCTION:

"LEFT CRT SEL" SWITCH, S7, PROVIDES MEANS FOR SWITCHING THE LEFT KEYBOARD FROM THE LEFT CRT TO THE CENTER CRT OR VICE VERSA. THE "RIGHT CRT SEL" SWITCH, S8, PROVIDES MEANS FOR SWITCHING THE RIGHT KEYBOARD FROM THE RIGHT CRT TO THE CENTER CRT OR VICE VERSA.

FAILURE MODES EFFECTS ANALYSIS FMEA - CIL FAILURE MODE

NUMBER: 05-5-B24-1- D2

REVISION#: 9 04/05/96

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)

LRU: SWITCH, TOGGLE

CRITICALITY OF THIS  
FAILURE MODE: 1/1

ITEM NAME: TOGGLE SWITCH, CRT SEL

FAILURE MODE:

FAILS CLOSED, PREMATURE CLOSURE, CONTACT TO CONTACT SHORT, SHORTS TO CASE (GROUND)

MISSION PHASE:	PL	PRE-LAUNCH
	LO	LIFT-OFF
	OO	ON-ORBIT
	DO	DE-ORBIT
	LS	LANDING/SAFING

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

CAUSE:

CONTAMINATION, MECHANICAL SHOCK, VIBRATION, PROCESSING ANOMALY, PIECE PART STRUCTURAL FAILURE

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:

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IF EITHER S7 OR S8 FAILED WITH A SHORT TO CASE (GROUND) OR A CONTACT-TO-CONTACT SHORT, IT WOULD ALLOW TWO DEU'S (DEU'S 1 & 3, OR 2 & 3 RESPECTIVELY) TO ACCEPT/PROCESS THE SAME KEYSTROKES, RESULTING IN KEYBOARD COMMANDS POSSIBLY BEING PROCESSED BY UNINTENDED GPC SPEC FUNCTIONS.

**(B) INTERFACING SUBSYSTEM(S):**

DUAL GPC PROCESSING OF THE SAME KEYSTROKE INPUTS CAN RESULT IN UNINTENDED COMMANDS BEING SENT TO INTERFACING SUBSYSTEMS POSSIBLY CAUSING UNEXPECTED MANEUVERS AND LOSS OF CREW/VEHICLE.

**(C) MISSION:**

POTENTIAL LOSS OF CREW/VEHICLE.

**(D) CREW, VEHICLE, AND ELEMENT(S):**

POTENTIAL LOSS OF CREW VEHICLE.

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

CRITICALITY 1/1 BECAUSE OF THE FOLLOWING REASON:

BOTH THE CENTER AND EITHER THE LEFT OR RIGHT DEU'S WILL ACCEPT A KEYBOARD ENTRY AND COMMUNICATE THE ENTRY TO THE GPCS CONTROLLING THE DEUS. ENTRIES TO AN UNINTENDED ACTIVE GPC SPEC COULD BE ACCEPTED BY THE CONTROLLING GPC AS VALID DATA. IF SPECIFIC ITEM ENTRIES WERE EXECUTED INADVERTENTLY, AT THE PROPER TIME, AND WHERE APPLICABLE IN THE RIGHT ORDER AND WITH SUFFICIENT MAGNITUDE/PRECISION, IT COULD POSSIBLY RESULT IN THE LOSS OF CREW OR VEHICLE. THE FOLLOWING ARE EXAMPLES OF ONE AND TWO ITEM ENTRIES RESPECTIVELY WHICH REPRESENT POSSIBLE SCENARIOS.

**EXAMPLE (1)**

THE UNIVERSAL POINTING DISPLAY/SPEC (MODE DISPLAY FOR GNC MM201) CONTAINS THREE SINGLE ITEM ENTRIES THAT CAN MANEUVER THE ORBITER. IF ANY OF THE THREE WERE EXECUTED UNINTENTIONALLY ON ORBIT, WITH DAP IN "AUTO", AN UNINTENDED MANEUVER COULD RESULT. IF THIS UNINTENDED MANEUVER OCCURRED DURING PROXIMITY OPERATIONS OR DURING EVA, THE CONTACT OF THE ORBITER WITH A PAYLOAD OR EVA MEMBER WOULD RESULT IN CATASTROPHIC DAMAGE TO THE PAYLOAD BAY DOOR AND/OR EVA MEMBER.

**EXAMPLE (2)**

THE OVERRIDE DISPLAY (SPEC 051) CONTAINS TWO DIRECTLY EXECUTABLE ITEM ENTRIES THAT, IF EXECUTED IN THE PROPER ORDER, WOULD INITIATE A TAL OR ATO ABORT (THE FIRST ENTRY SPECIFIES THE TYPE OF ABORT, THE SECOND ENTRY INITIATES THE ABORT). INITIATION OF A TAL ABORT TOO EARLY OR TOO LATE (OUTSIDE OF THE OPERATIONAL ENVELOPE) HAS THE POTENTIAL TO RESULT IN LOSS OF CREW/VEHICLE.

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-DISPOSITION RATIONALE-

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(A) DESIGN:

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

(B) TEST:

GROUND TURNAROUND TEST: ALL TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

(C) INSPECTION:

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

(D) FAILURE HISTORY:

CURRENT DATA ON TEST FAILURES, FLIGHT FAILURES, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN THE PRACA DATABASE

ALSO REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

(E) OPERATIONAL USE:

THERE ARE NO OPERATIONAL CONSTRAINTS OR SPECIAL CONFIGURATIONS POSSIBLE TO MINIMIZE THE EFFECTS OF THE FIRST FAILURE. TO PROTECT AGAINST THIS FAILURE, CREW TRAINING HAS INCORPORATED POLICY SPECIFYING CRT USE DURING ALL MISSION PHASES WHERE SPEC/OPS DISPLAYS ARE ON CRTS COMMON TO A SINGLE KEYPAD. THE PRACTICE CONVEYS THAT BOTH CRT SCRATCH PAD LINES WILL BE CHECKED TO ASSURE THAT DUPLICATE ENTRIES HAVE NOT OCCURRED BEFORE DEPRESSION OF THE TERMINATOR KEY (EXEC, PRO, ETC.). IN OTHER WORDS, THE CREW WILL MONITOR BOTH CRT SCRATCH PAD LINES WHEN ENTERING KEYSTROKES TO A FORWARD KEYBOARD THAT HAS BOTH ASSOCIATED DEUS TURNED "ON" AND ASSIGNED TO AN OPERATING GPC. CRT NO. 3 IS NOT NORMALLY POWERED ON-ORBIT AND DISPLAYS ON CRT NO.3 DURING NOMINAL ASCENT/ENTRY DO NOT HAVE POTENTIAL CRITICALITY 1 EFFECTS.

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- APPROVALS -

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EDITORIALLY APPROVED  
EDITORIALLY APPROVED  
TECHNICAL APPROVAL

: RI  
: JSC  
: VIA APPROVAL FORM

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*Sam Army 15-3-96*  
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