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PRINT DATE: 12/27/95

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE**

**NUMBER: M5-SMR-B007-X**

**SUBSYSTEM NAME: ORBITER DOCKING SYSTEM**

**REVISION: 0 OCT, 1995**

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	<b>PART NAME VENDOR NAME</b>	<b>PART NUMBER VENDOR NUMBER</b>
LRU	: ENERGIA POWER PANEL RSC-E	MC621-0087-0009 CKB>=468=312=001
SRU	: PUSH BUTTON SWITCH	PKZ-8 (AGO 360.212.TU)

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**PART DATA**

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**

PUSH-BUTTON SWITCHES (TWO DOUBLE POLE SWITCHES UNDER A SINGLE COVER CAP.) TWO POLE, MOMENTARY - APDS "CLOSE HOOKS" COMMAND.

**REFERENCE DESIGNATORS:** 36V73A8A3SB2-B3  
36V73A8A3SB2-B4

**QUANTITY OF LIKE ITEMS: 2**  
(TWO)

**FUNCTION:**

PROVIDE THE "CLOSE HOOKS" COMMAND STIMULI TO CLOSE THE APPROPRIATE CONTACTS IN THE DSCU TO IMPLEMENT THE "CLOSE HOOKS" FUNCTION. THE "CLOSE HOOKS" SIGNAL IS ROUTED BY THE DSCU TO THE PACU-1 AND PACU-2 TO ENABLE THE MOTORS (M6, M7, M8, AND M9) WHICH IMPLEMENT THE CLOSE HOOK FUNCTION.

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**ORIGINAL**

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE**

NUMBER: M5-6MR-8007-02

REVISION# 0 OCT, 1995

SUBSYSTEM NAME: ORBITER DOCKING SYSTEM

LRU: MC621-0087-0009

ITEM NAME: PUSH BUTTON SWITCH

CRITICALITY OF THIS

FAILURE MODE: 1R3

**FAILURE MODE:**

FAILS CLOSED (MULTIPLE CONTACTS WITHIN ONE SWITCH.) SHORTS TO GROUND

**MISSION PHASE:**

OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 104 ATLANTIS

**CAUSE:**

A) PIECE PART FAILURE, B) CONTAMINATION, C) VIBRATION, D) MECHANICAL SHOCK, E) PROCESSING ANOMALY, F) THERMAL STRESS

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

CRITICALITY 1R2 DURING INTACT ABORT ONLY (AVIONICS ONLY)? NO

**REDUNDANCY SCREEN**

A) PASS

B) PASS

C) PASS

**PASS/FAIL RATIONALE:**

A)

B)

C)

**METHOD OF FAULT DETECTION:**

"HOOKS OPEN," "HOOKS CLOSED," AND "INTERFACE SEALED" INDICATION IN THE D&amp;C PANEL.

**MASTER MEAS. LIST NUMBERS:**

V53X0768E

V53X0769E

V53H0706A

V53H0707A

**CORRECTING ACTION:**

THE CREW CAN DISABLE ONE OF THE THREE APDS LOGIC BUSES TO PREVENT IMPLEMENTATION OF AN UNWANTED COMMAND. ALSO, IN-FLIGHT MAINTENANCE PROCEDURES DEVELOPED TO DRIVE THE HOOK MOTORS DIRECTLY FROM THE FEED-THROUGH CONNECTORS IN THE EXTERNAL AIRLOCK, USING THE ORBITER BREAKOUT BOX.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE**  
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**- FAILURE EFFECTS -**

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**(A) SUBSYSTEM:**

LOSS OF SWITCH CONTROL CAPABILITY FOR THE APDS "CLOSE HOOKS" CIRCUITS.

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

NO EFFECT. UNWANTED "CLOSE HOOKS" COMMAND.

**(C) MISSION:**

FIRST FAILURE - NO EFFECT.

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

FIRST FAILURE - NO EFFECT.

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

POSSIBLE LOSS OF CREW OR VEHICLE AFTER FIVE FAILURES. 1) ONE OF TWO ASSOCIATED SWITCHES FAILS CLOSED. UNWANTED "CLOSE HOOKS" COMMAND TO THE DSCU. PARTIAL LOSS OF MANUAL HOOK CONTROL CAPABILITY. HOOKS CANNOT BE COMMANDED OPEN. LOSS OF NOMINAL UNDOCKING CAPABILITY. CREW WOULD PERFORM AN APDS LOGIC BUS DROP TO RECOVER DOCKING FUNCTIONS. 2) REMAINING ASSOCIATED SWITCH FAILS CLOSED. UNWANTED "CLOSE HOOKS" COMMAND TO THE DSCU. LOSS OF NOMINAL UNDOCKING CAPABILITY. 4) ONE PYROBOLT FAILS TO INITIATE. LOSS OF CAPABILITY TO IMPLEMENT PYROTECHNIC SEPARATION. LOSS OF NOMINAL AND PYROTECHNIC SEPARATION CAPABILITY.

**DESIGN CRITICALITY (PRIOR TO OPERATIONAL DOWNGRADE, DESCRIBED IN F): N/A**

**(F) RATIONALE FOR CRITICALITY CATEGORY DOWNGRADE:**

NONE. CRITICALITY UNCHANGED. WORKAROUNDS ADD TO REDUNDANCY.

3) INABILITY TO PERFORM IFM TO DRIVE THE HOOKS MOTORS - UNABLE TO DRIVE HOOKS OPEN.

5) FAILURE OF EVA TO REMOVE 96 BOLTS - LOSS OF ALL UNDOCKING CAPABILITY.

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**- TIME FRAME -**

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**TIME FROM FAILURE TO CRITICAL EFFECT: DAYS**

**TIME FROM FAILURE OCCURRENCE TO DETECTION: HOURS**

**TIME FROM DETECTION TO COMPLETED CORRECTIVE ACTION: MINUTES**

**TIME REQUIRED TO IMPLEMENT CORRECTIVE ACTION LESS THAN TIME TO EFFECT? YES**

**RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:**

CREW WOULD HAVE SUFFICIENT TIME TO USE IFM OR PERFORM EVA TO REMOVE 96 BOLTS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE  
NUMBER: M5-6MR-B007-02

HAZARDS REPORT NUMBER(S) : ORBI 401A

HAZARD DESCRIPTION:  
INABILITY TO SEPARATE ORBITER AND MIR.

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- APPROVALS -

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