

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

NUMBER: M5-6MR-8011-X

SUBSYSTEM NAME: ORBITER DOCKING SYSTEM

REVISION: 0 OCT, 1995

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	ENERGIA POWER PANEL RSC-E	MC621-0087-0009 CKB>=468-312-001
SRU	PUSH BUTTON SWITCH	PKZ-4 (AGO.360.212.TU)

PART DATA**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**

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

REFERENCE DESIGNATORS: 38V73A8A3SB4-B1
38V73A8A3SB4-B2

QUANTITY OF LIKE ITEMS: 2
(TWO)

FUNCTION:

PROVIDE THE "OPEN HOOKS" COMMAND STIMULI TO CLOSE THE APPROPRIATE CONTACTS IN THE DSCU TO IMPLEMENT THE "OPEN HOOKS" FUNCTION. THE "OPEN 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 OPENING OF THE STRUCTURAL LATCHES (HOOKS 1 & 2) FOR SEPARATION FROM THE MIR STATION.

REFERENCE DOCUMENTS:

- 1) ECN 104-25012A. ODS ELECTRICAL CHANGE NOTICE.
- 2) CKB>=468312-001 _ J"P. SCHEMATIC DIAGRAM - ANDROGYNOUS PERIPHERAL DOCKING SYSTEM (APDS) CONTROL PANEL PU-APSS SCHEMATIC.
- 3) 33Y.5212.005."3. APDS CONTROL UNIT ELECTRICAL SCHEMATIC.
- 4) VS70-863104. ODS INTEGRATED SCHEMATIC.

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

NUMBER: M5-6MR-B011-02

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) N/A
	C) PASS

PASS/FAIL RATIONALE:

A)

B)

FUNCTIONAL CRITICALITY 1R (FOUR FAULT TOLERANT OR GREATER) WITH AT LEAST TWO REMAINING OPERATIONAL STATUS VERIFIED IN FLIGHT.

C)

METHOD OF FAULT DETECTION:

NONE.

MASTER MEAS. LIST NUMBERS: NONE

CORRECTING ACTION:

CREW CAN DISABLE ONE OF THE THREE APDS LOGIC BUSES TO PREVENT IMPLEMENTATION OF AN UNWANTED COMMAND.

- FAILURE EFFECTS -**(A) SUBSYSTEM:**

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

(B) INTERFACING SUBSYSTEM(S):

POTENTIAL UNWANTED "HOOKS OPEN" COMMAND TO THE DSCU.

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(C) MISSION:
NO EFFECT.

(D) CREW, VEHICLE, AND ELEMENT(S):
FIRST FAILURE - NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECTS:

CASE 1: (2R3 - PNP)

POSSIBLE LOSS OF MISSION AFTER THREE FAILURES. 1) ONE OF TWO ASSOCIATED SWITCHES FAILS CLOSED. ENABLES ONE OF TWO PANEL COMMAND SIGNALS. TEMPORARY "HOOKS OPEN" COMMAND TO THE DSCU. CREW WOULD PERFORM AN APDS LOGIC BUS DROP TO RECOVER DOCKING FUNCTIONS. 2) REMAINING ASSOCIATED SWITCH FAILS CLOSED. UNWANTED "HOOKS OPEN" COMMAND. 3) ONE OF TWO "APDS CIRC PROT OFF" FAILS CLOSED. POSSIBLE PREMATURE UNDOCKING IF FAILURE OCCURS PRIOR TO SYSTEMS POWER DOWN AND OPENING OF HATCHES.

CASE 2: (1R3 - PNP)

POSSIBLE LOSS OF CREW OR VEHICLE AFTER EIGHT FAILURES. 1) ONE OF TWO ASSOCIATED "HOOKS OPEN" SWITCHES FAILS CLOSED. 2) ONE OF TWO ASSOCIATED "POWER ON" SWITCHES FAILS CLOSED. 3) ONE OF TWO ASSOCIATED "APDS CIRC PROT OFF" SWITCHES FAILS CLOSED. 4, 5) TWO APDS POWER (A8A3) CIRCUIT BREAKERS FAIL CLOSED. 6, 7) TWO APDS CONTROL PANEL POWER (A8A3) CIRCUIT BREAKERS FAIL CLOSED. 8) ONE PSU MAIN POWER RPC FAILS ON RESULTING IN ALL HOOKS OPENING INADVERTENTLY. POSSIBLE LOSS OF HABITABLE ENVIRONMENT.

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

(F) RATIONALE FOR CRITICALITY CATEGORY DOWNGRADE:
N/A

- TIME FRAME -

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 DISABLE THE LOGIC BUSES

HAZARDS REPORT NUMBER(S): ORBI 511

HAZARD DESCRIPTION:

LOSS OF PRESSURE IN HABITABLE VOLUME.

- APPROVALS -

PRODUCT ASSURANCE ENGR
DESIGN ENGINEER

: M. NIKOLAYEVA
: B. VAKULIN

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