FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER: M5-6MR-B011-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: 36V73A8A3SB4-B1
36V73A8A3SB4-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) VS70-963104. ODS INTEGRATED SCHEMATIC.

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PRINT DATE: 12/27/95

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: M5-6MR-8011-01

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 OPEN (MULTIPLE CONTACTS WITHIN ONE SWITCH)

MISSION PHASE:
OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 104 ATLANTIS

CAUSE:
A) PIECE PART FAILURE, B) CONTAMINATION, C) [illegible]RATION, 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:
NONE.

- FAILURE EFFECTS -

(A) SUBSYSTEM:
PARTIAL LOSS OF SWITCH CONTROL CAPABILITY FOR THE APDS "OPEN HOOKS" COMMAND.

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FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: M5-6MR-B011- 01

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT. LOSS OF COMMAND REDUNDANCY.

(C) MISSION:
NO EFFECT.

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

(E) FUNCTIONAL CRITICALITY EFFECTS:
POSSIBLE LOSS OF CREW OR VEHICLE AFTER SEVEN FAILURES. 1) ONE OF TWO "HOOKS OPEN" SWITCHES FAILS OPEN. NO EFFECT. DEGRADED COMMAND IMPLEMENTATION REDUNDANCY FOR MANUAL BACK-UP SEPARATION. 2) ASSOCIATED "HOOKS OPEN" SWITCH FAILS OPEN. LOSS OF MANUAL BACK-UP SEPARATION CAPABILITY. 3) ONE OF TWO ASSOCIATED "UNDOCKING" SWITCHES FAILS OPEN. DEGRADED NOMINAL SEPARATION COMMAND IMPLEMENTATION REDUNDANCY. 4) SECOND ASSOCIATED "UNDOCKING" SWITCH FAILS OPEN. LOSS OF NOMINAL SEPARATION CAPABILITY. 6) ONE PYROBOLT FAILS TO INITIATE. LOSS OF CAPABILITY TO IMPLEMENT PYROTECHNIC SEPARATION.

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

(F) RATIONALE FOR CRITICALITY CATEGORY DOWNGRADE:
NONE. CRITICALITY UNCHANGED. WORKAROUNDS ADD TO REDANDANCY.

5) FAILURE OF IFM TO DRIVE THE HOOK MOTORS - UNABLE TO DRIVE HOOKS OPEN.
7) FAILURE OF EVA TO REMOVE 96 BOLTS - LOSS OF ALL UNDOCKING CAPABILITY.

- 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 USE IFM OR PERFORM EVA.
HAZARDS REPORT NUMBER(S) : ORBI 401A
HAZARD DESCRIPTION:
INABILITY TO SEPARATE ORBITER AND MIR.

- APPROVALS -

PRODUCT ASSURANCE ENGR : M. NIKOLAYEVA

DESIGN ENGINEER : B. VAKULIN

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