FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER: M5-6MR-B014-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 "PYRO CIRCUIT PROTECTION ON" COMMAND

REFERENCE DESIGNATORS: 36V73A8A3SB5-B3
36V73A8A3SB5-B4

QUANTITY OF LIKE ITEMS: 2
(TWO)

FUNCTION:
PROVIDE THE "PYRO CIRCUIT PROTECTION ON" COMMAND STIMULI TO CLOSE THE APPROPRIATE CONTACTS IN THE PYROTECHNIC FIRE CONTROL UNIT (PFCU.)

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) VS70-953104. ODS INTEGRATED SCHEMATIC.
5) I7RC=10> 2601F_J "P. PYRO FIRING CONTROL UNIT ELECTRICAL

CO ORIGINAL

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: MS-6MR-B014- 02

REVISION# 0 OCT, 1995

SUBSYSTEM NAME: ORBITER DOCKING SYSTEM
LRU: MC621-0097-0009 **CRITICALITY OF THIS**
ITEM NAME: PUSH BUTTON SWITCH **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:
REMOVAL OF POWER TO ONE OF THE PYROTECHNIC BUSES REMOVES UNWANTED COMMAND TO THE PFCU.

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF SWITCH CONTROL CAPABILITY FOR THE APDS "PYRO CIRCUIT PROTECTION ON" CIRCUITS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: M5-6MR-8014-02

(B) INTERFACING SUBSYSTEM(S):
UNWANTED "PYRO CIRCUIT PROTECTION ON" COMMAND TO THE PFCU. NO EFFECT ON SYSTEM OPERATION. THIS COMMAND CAN BE OVERRIDDEN BY THE "PYRO CIRCUIT PROTECTION OFF" SWITCH WHEN PYROTECHNIC SEPARATION IS REQUIRED.

(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 SIX FAILURES. 1) ONE OF TWO ASSOCIATED "PYRO CIRCUIT PROTECTION ON" SWITCHES FAILS CLOSED. 2) ONE OF TWELVE HOOKS FAILS TO OPEN (REF. M8-1MR-BM001-04.) LOSS OF CAPABILITY TO IMPLEMENT NOMINAL SEPARATION. 3) SINGLE SWITCHING DEVICE WITHIN THE PFCU FAILS TO TRANSFER RESULTING IN LOSS OF "PYRO CIRCUIT PROTECTION ON" OVERRIDE REDUNDANCY. 4) ASSOCIATED SWITCHING DEVICE WITHIN THE PFCU FAILS TO TRANSFER RESULTING IN TEMPORARY INABILITY TO SEPARATE VEHICLES. CREW WOULD PERFORM A PYRO LOGIC BUS DROP TO RECOVER PYROTECHNIC SEPARATION CAPABILITY. 5) REMAINING ASSOCIATED "PYRO CIRCUIT PROTECTION ON" FAILS CLOSED. LOSS OF 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 REDANDANCY.

6) 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 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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