FAILURE ...DES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER: M5-6MR-B012-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 LATCHES" COMMAND.

REFERENCE DESIGNATORS: 36V73A8A3SB4-B3
36V73A8A3SB4-B4

QUANTITY OF LIKE ITEMS: 2
(TWO)

FUNCTION:
PROVIDE THE "OPEN LATCHES" COMMAND STIMULI TO CLOSE THE APPROPRIATE CONTACTS IN THE DSCU TO IMPLEMENT THE "OPEN LATCHES" FUNCTION. THE "OPEN LATCHES" SIGNAL IS ROUTED BY THE DSCU TO THE LATCH ACTUATION CONTROL UNIT (LACU) WHICH IMPLEMENTS THE OPERATION OF THE THREE CAPTURE LATCHES (M1, M2, AND M3.)

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FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: M5-6MR-B012- 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) 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)

C)

METHOD OF FAULT DETECTION:
NONE.

MASTER MEAS. LIST NUMBERS: NONE

CORRECTING ACTION:
IF FAILURE OCCURS DURING THE LAST STAGES OF DOCKING OR BEFORE UNDOCKING, THE LATCHES CAN BE OPENED MANUALLY FROM WITHIN THE AIRLOCK'S PRESSURIZED ENVIRONMENT.

- FAILURE EFFECTS -

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

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FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: MS-6MR-6012- 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 SIX FAILURES. 1) ONE OF TWO ASSOCIATED SWITCHES FAILS. DISABLES ONE OF THREE PANEL COMMAND SIGNALS. DEGRADED MANUAL COMMAND REDUNDANCY. 2) THE SECOND ASSOCIATED SWITCH FAILS OPEN. LOSS OF PANEL CAPABILITY TO SUPPLY THE "OPEN LATCHES" COMMAND TO THE LACU. 3) AUTOMATIC DOCKING SEQUENCE FAILS RESULTING IN LOSS OF NOMINAL CAPABILITY TO OPEN LATCHES. 4) MANUAL UNBLOCKING DEVICE FAILS TO RELEASE (1 OF 3.). INABILITY TO USE MANUAL LATCH/UNBLOCKING DEVICE TO OPEN CAPTURE LATCHES.

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

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

FIFTH FAILURE (INABILITY TO PERFORM IFM TO DRIVE THE CAPTURE LATCH MOTORS) - THE CAPTURE LATCHES CANNOT BE OPENED.
SIXTH FAILURE (INABILITY TO PERFORM EVA TO REMOVE 96 BOLTS HOLDING DOCKING BASE TO EXTERNAL AIRLOCK) - INABILITY TO SEPARATE ORBITER AND MIR RESULTING IN LOSS OF CREW AND VEHICLE.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS
TIME FROM FAILURE OCCURRENCE TO DETECTION: MINUTES
TIME FROM DETECTION TO COMPLETED CORRECTIVE ACTION: HOURS
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 OPEN LATCHES.
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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