FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL HARDWARE
NUMBER: M5-6MR-B005-X

SUBSYSTEM NAME: ORBITER DOCKING SYSTEM

REVISION: 1   SEPT 1, 1995

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: ENERGIA POWER PANEL RSC-E	MC821-0087-0009 CJIXIO.468.312.001
SRU	: PUSH BUTTON SWITCH	PKZ-8 (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 "RING IN" COMMAND.

REFERENCE DESIGNATORS: 36V73A8A3SB1-B7
                           36V73A8A3SB1-B8

QUANTITY OF LIKE ITEMS: 2
(TWO)

FUNCTION:
PROVIDE THE "RING IN" COMMAND STIMULI TO CLOSE THE APPROPRIATE CONTACTS IN
THE DSCU TO ENABLE THE TRANSMITTAL OF THE "RING IN" COMMAND TO THE DMCU.
THE DMCU ENABLES POWER TO THE RING MOTORS (M4 AND M5) FOR RING EXTENSION
AND RETRACTION FUNCTIONS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL FAILURE MODE
NUMBER: M5-6MR-B005- 01

REVISION# 1   SEPT 1, 1995

SUBSYSTEM NAME: ORBITER DOCKING SYSTEM
LRU: MC621-0067-0009   CRITICALITY OF THIS
ITEM NAME: PUSH BUTTON SWITCH   FAILURE MODE: 2R3

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) FAILS
                               C) FAILS

PASS/FAIL RATIONALE:
A)

B)
FIRST SWITCH FAILURE IS MASKED BY THE ASSOCIATED SWITCH.
C)
REDUNDANT FUNCTIONS ROUTED THROUGH THE SAME CONNECTOR.

METHOD OF FAULT DETECTION:
NONE.

MASTER MEAS. LIST NUMBERS: NONE

RSC
Energia *Proprietary Data*

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL FAILURE MODE
NUMBER: M5-6MR-8005- 01

· FAILURE EFFECTS ·

(A) SUBSYSTEM:
PARTIAL LOSS OF SWITCH CONTROL CAPABILITY FOR THE APDS "RING-IN" COMMAND.

(B) INTERFACING SUBSYSTEM(S):
LOSS OF MANUAL COMMAND REDUNDANCY.

(C) MISSION:
FIRST SWITCH FAILURE - NO EFFECT.

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

(E) FUNCTIONAL CRITICALITY EFFECTS:
FIRST FAILURE (AUTOMATIC DOCKING SEQUENCE FAILS) - THE AUTOMATIC DOCKING
SEQUENCE IS THE PRIMARY MEANS TO RETRACT THE DOCKING RING. THE AUTOMATIC
SEQUENCE WOULD HAVE TO FAIL FIRST BEFORE THE MANUAL "RING IN" COMMAND IS
INITIATED.
SECOND FAILURE (ONE OF TWO ASSOCIATED SWITCHES FAILS) - DISABLES ONE OF
THREE PANEL COMMAND SIGNALS. NO EFFECT. DEGRADED MANUAL COMMAND -
REDUNDANCY.
THIRD FAILURE (SECOND ASSOCIATED SWITCH FAILS OPEN) - LOSS OF REMAINING TWO
PANEL COMMAND CHANNEL INPUTS TO THE DSCU. PARTIAL LOSS OF RING RETRACTION
CAPABILITY. LOSS OF CAPABILITY TO SUPPLY THE "RING IN" COMMAND TO THE DMCU.
LOSS OF ALL RING CONTROL RESULTING IN LOSS OF CAPABILITY TO PERFORM
DOCKING. LOSS OF MISSION OBJECTIVES WITH INABILITY TO PERFORM DOCKING.

DESIGN CRITICALITY (PRIOR TO OPERATIONAL DOWNGRADE, DESCRIBED IN F): 2R3

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

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL FAILURE MODE
NUMBER: MS-6MR-8006- 01

-DISPOSITION RATIONALE-

(A) DESIGN:
REFER TO APPENDIX C, ENERGIA HARDWARE.

(B) TEST:
REFER TO APPENDIX C, ENERGIA HARDWARE.

DOCKING RING EXTENSION AND RETRACTION CONTROL CIRCUIT OPERATION IS
VERIFIED DURING GROUND CHECKOUT. ANY TESTING IS ACCOMPLISHED IN
ACCORDANCE WITH OMRSD.

(C) INSPECTION:
REFER TO APPENDIX C, ENERGIA HARDWARE.

(D) FAILURE HISTORY:
REFER TO APPENDIX C, ENERGIA HARDWARE.

(E) OPERATIONAL USE:
AFTER THIRD FAILURE, CREW COULD PERFORM AN IN-FLIGHT MAINTENANCE TO DRIVE
THE RING MOTORS DIRECTLY FROM THE FEED-THROUGH CONNECTORS IN THE
EXTERNAL AIRLOCK, USING THE ORBITER BREAKOUT BOX. HOWEVER, WORST CASE,
CREW WOULD ABORT DOCKING SINCE THIS WORKAROUND REQUIRES A GREAT DEAL OF
TIME TO PERFORM.

- APPROVALS -

PRODUCT ASSURANCE ENGR   :   M. NIKOLAYEVA   :
DESIGN ENGINEER   :   B. VAKULIN   :
NASA SS/MA   :   :   4/21/95
NASA SUBSYSTEM MANAGER   :   :   4/22/95

NASA EPD&C SUBSYSTEM MANAGER :