FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL HARDWARE
NUMBER: M5-6MR-B025-X

SUBSYSTEM NAME: ORBITER DOCKING SYSTEM
REVISION: 1 **OCT, 1995**

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	POWER SWITCHING UNIT (PSU) RSC-E	MC621-0087-1003 33Y.5114.007

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
LINE REPLACEABLE UNIT (LRU) PSU - APDS LOGIC AND POWER CONTROL, DISTRIBUTION, AND PROTECTION.

REFERENCE DESIGNATORS: 40V53A1A1

QUANTITY OF LIKE ITEMS: 1
(ONE)

FUNCTION:
THE PSU CONTROLS AND DISTRIBUTES THE APDS LOGIC BUSES. IT PROTECTS AND DISTRIBUTES THE APDS POWER BUSES. LOGIC AND MAIN POWER IS RECEIVED FROM THE ORBITER THROUGH CONNECTOR X3 AND RETURNED THROUGH CONNECTOR X4. THE LOGIC POWER BUSES ARE +IIIA, +IIIB, +IIIC AND THE POWER BUSES ARE +CIII1 AND CIII2. THE PSU PROVIDES THE FOLLOWING OUTPUTS:

OUTPUT FUNCTIONS:
1) POWER BUS +CIII1: RING MOTOR M4, PACU MOTORS M6 & M8, FIXERS 1 & 2, AND HI-ENERGY DAMPERS 1 & 2.
2) POWER BUS +CIII2: RING MOTOR M5, PACU MOTORS M7 & M9, FIXERS 3, 4, & 5, AND HI-ENERGY DAMPER 3.
3) LOGIC POWER BUSES +IIIA, +IIIB, +IIIC ARE PROVIDED UNFUSED TO THE LACU, PACU-1, PACU-2, DSCU, AND THE DMCU.

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FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: M5-6MR-B025- 01

REVISION# 0 OCT. 1995

SUBSYSTEM NAME: ORBITER DOCKING SYSTEM
LRU: MC621-0087-1003
ITEM NAME: POWER SWITCHING UNIT

CRITICALITY OF THIS FAILURE MODE: 1R3

FAILURE MODE:
LOSS OF ONE OF TWO POWER BUSES (-C11 OR -C12) TO SINGLE AVIONICS LRU.

MISSION PHASE:
OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 104 ATLANTIS

CAUSE:
INTERNAL FUSES FAIL OPEN.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

CRITICALITY 1R2 DURING INTACT ABORT ONLY (AVIONICS ONLY)? NO

REDUNDANCY SCREEN
A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:
A)

B)

C)

METHOD OF FAULT DETECTION:
LOSS OF TELEMETRY INDICATION.

MASTER MEAS. LIST NUMBERS: V53X0779E
V53X0780E

CORRECTING ACTION:
IN-FLIGHT MAINTENANCE PROCEDURES DEVELOPED TO DRIVE THE HOOKS MOTORS DIRECTLY FROM THE FEED-THROUGH CONNECTORS IN THE EXTERNAL AIRLOCK USING THE ORBITER BREAKOUT BOX. 96 BOLT EVA OPTION MAY BE AVAILABLE.

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FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: M5-6MR-6025- 01

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF ONE OF TWO POWER FEEDS TO PACU.

(B) INTERFACING SUBSYSTEM(S):
LOSS OF ONE OF TWO REDUNDANT HOOKS MOTORS RESULTING IN INCREASED MOTOR RUN TIME.

(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 FIVE FAILURES. 1) LOSS OF ONE OF TWO POWER BUSES RESULTING IN LOSS OF ONE HOOK MOTOR. 2) LOSS OF ASSOCIATED POWER BUS RESULTING IN LOSS OF ASSOCIATED HOOK MOTOR. LOSS OF NOMINAL VEHICLE SEPARATION CAPABILITY. 4) 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.

3) INABILITY TO PERFORM IFM TO DRIVE THE HOOK MOTORS - UNABLE TO OPEN HOOKS.
5) FAILURE OF EVA TO REMOVE 96 BOLTS - COMPLETE 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: 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 PERFORM IFM OR EVA TO REMOVE 96 BOLTS.
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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