

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE**  
**NUMBER: M5-6SS-0111 -X**

**SUBSYSTEM NAME: ISS DOCKING SYSTEM**

**REVISION: 0 02/27/98**

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**PART DATA**

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	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	:PANEL A6A3	V828-730150
SRU	:FUSE	MC454-0018-0300

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
**FUSE, PLUG-IN, 3 AMP - PFCU "FIRE" POWER CIRCUIT**

**REFERENCE DESIGNATORS:** 36V73A7A3F3  
 36V73A7A3F4  
 36V73A7A3F5  
 38V73A7A3F11

**QUANTITY OF LIKE ITEMS: 4**  
**FOUR**

**FUNCTION:**  
 PROVIDE OVERLOAD PROTECTION TO THE ORBITER CONTROL BUSES (CA1, AB2) OR ESSENTIAL BUSES (MN A - ESS3AB, MN B - ESS1BC) FROM THE PFCU "FIRE" POWER CIRCUIT.

**REFERENCE DOCUMENTS:** 1) VS70-953103, INTEGRATED SCHEMATIC - 53PA, PFCU POWER DISTRIBUTION CONTROL CIRCUIT

**FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE**

NUMBER: M5-6SS-0111-01

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SUBSYSTEM NAME: ISS DOCKING SYSTEM

LRU: PANEL A6A3

ITEM NAME: FUSE

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:

FAILS OPEN

MISSION PHASE: OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:	103	DISCOVERY
	104	ATLANTIS
	105	ENDEAVOUR

**CAUSE:**

A) STRUCTURAL FAILURE, B) CONTAMINATION, C) VIBRATION, D) MECHANICAL SHOCK, E) PROCESSING ANOMALY, F) THERMAL STRESS

CRITICALITY 1/1 DURING INTACT ABDRT 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)

PYROTECHNIC SEPARATION CLASSIFIED AS STANDBY REDUNDANCY

C)

CORRECTING ACTION: NONE

**CORRECTING ACTION DESCRIPTION:**

DESIGN FAULT TOLERANCE: REDUNDANT PYROTECHNIC SEPARATION CIRCUIT REMAINS OPERATIONAL.

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**- FAILURE EFFECTS -**

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**(A) SUBSYSTEM:**

LOSS OF REDUNDANCY TO PROVIDE CONTROL LOGIC POWER TO ENERGIZE PFCU BUS 1 (OR 2) THROUGH RPCS IN MPCA 1.

**(B) INTERFACING SUBSYSTEM(S):**

DEGRADED REDUNDANCY FOR PYROTECHNIC SEPARATION CAPABILITY. LOSS OF ONE OF TWO FIRE CURRENT PATHS TO THE SEPARATION PYROBOLTS.

**(C) MISSION:**

FIRST FAILURE - NO EFFECT

**(D) CREW, VEHICLE, AND ELEMENT(S):**

FIRST FAILURE - NO EFFECT

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

POSSIBLE LOSS OF CREW/VEHICLE AFTER FOUR FAILURES:

- 1) FUSE OPENS - DEGRADED REDUNDANCY FOR PYROTECHNIC SEPARATION.
- 2) ONE OF THE TWELVE HOOKS FAILS TO OPEN (REF. FMEA M8-ISS-BMD01-04). LOSS OF NOMINAL UNDOCKING CAPABILITY.
- 3) FUSE IN THE PARALLEL CIRCUIT FAILS OPEN.
- 4) SWITCH IN THE REDUNDANT CIRCUIT FAILS OPEN - LOSS OF PFCU "FIRE" CAPABILITY. LOSS OF NOMINAL AND PYROTECHNIC UNDOCKING CAPABILITY.

**DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)):**

**(F) RATIONALE FOR CRITICALITY DOWNGRADE:**

ALTHOUGH THE CRITICALITY REMAINS UNCHANGED AFTER WORKAROUNDS CONSIDERATION (ALLOWED PER CR S050107W), ADDITIONAL FAULT TOLERANCE IS PROVIDED TO THE SYSTEM.

AFTER THE FOURTH FAILURE, THE CREW WOULD PERFORM EVA TO REMOVE 96 BOLTS FROM THE DOCKING BASE TO CIRCUMVENT THE WORST CASE "DESIGN CRITICALITY" EFFECT. IF UNABLE TO PERFORM EVA (FIFTH FAILURE), POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF ALL UNDOCKING CAPABILITY.

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**- TIME FRAME -**

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**TIME FROM FAILURE TO CRITICAL EFFECT: DAYS**

**TIME FROM FAILURE OCCURRENCE TO DETECTION: MINUTES**

**TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: HOURS**

**IS TIME REQUIRED TO IMPLEMENT CORRECTING ACTION LESS THAN TIME TO EFFECT?  
YES**

**RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:  
DESIGN FAULT TOLERANCE: REDUNDANT PYROTECHNIC SEPARATION CIRCUIT REMAINS  
OPERATIONAL. AFTER THE THIRD FAILURE, THE CREW CAN PERFORM PYROTECHNIC  
SEPARATION TO UNDOCK.**

**HAZARD REPORT NUMBER(S): ORBI 401**

**HAZARD(S) DESCRIPTION:  
INABILITY TO SAFELY SEPARATE ORBITER FROM A MATED ELEMENT.**

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**- APPROVALS -**

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SS&PAE  
DESIGN ENGINEERING

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