

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE
NUMBER:M5-6SS-0107 -X**

SUBSYSTEM NAME: ISS DOCKING SYSTEM

REVISION: 0 02/27/98

PART DATA

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

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

FUSE, PLUG-IN, 3 AMP - PSU POWER MAIN A AND PSU POWER MAIN B CONTROL

REFERENCE DESIGNATORS: 36V73A7A3F12 1
36V73A7A3F13

QUANTITY OF LIKE ITEMS: 2
TWO

FUNCTION:

PROVIDE OVERLOAD PROTECTION TO THE ORBITER MAIN B- ESS 1BC, AND THE MAIN C- ESS 2CA BUSES FROM THE RPCS ASSOCIATED WITH THE APDS PSU POWER ENABLE CIRCUITS.

REFERENCE DOCUMENTS: 1) VS70-953103, INTEGRATED SCHEMATIC - 53G, MAIN A/MAIN B SUPPLY BUS POWER DISTRIBUTION

FAILURE MODES EFFECTS ANALYSIS FMEA - NON-CIL FAILURE MODE

NUMBER: M5-6SS-0107-01

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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 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:

TELEMETRY CAN BE USED TO VERIFY POWER FOR THE PSU 20 AMP BUSES. INDICATION IS OBTAINED BY SECONDARY MEANS (I.E. LOSS OF ODS REDUNDANT HOOKS MOTORS).

MASTER MEAS. LIST NUMBERS:	V53X0777E
	V53X0778E

**FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
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V53X0779E
V53X0780E
V53X0786E
V53X0787E
V53X0788E
V53X0789E

CORRECTING ACTION: NONE

CORRECTING ACTION DESCRIPTION:

DESIGN FAULT TOLERANCE: REDUNDANT PSU POWER ENABLE CIRCUIT REMAINS OPERATIONAL.

REMARKS/RECOMMENDATIONS:

FAILURE OF THIS CIRCUIT AFFECTS THE PERFORMANCE OF THE ANDROGYNOUS PERIPHERAL DOCKING ASSEMBLY (APDA).

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF ONE OF TWO PSU POWER BUSES.

(B) INTERFACING SUBSYSTEM(S):

DEGRADED APDS PERFORMANCE. INCREASED ACTUATOR OPERATION TIME.

(C) MISSION:

NO EFFECT

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

FIRST FAILURE - NO EFFECT

(E) FUNCTIONAL CRITICALITY EFFECTS:

POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE FAILURES:

- 1) FUSE FAILS OPEN. LOSS OF ONE PSU POWER ENABLE CIRCUIT. DEGRADED UNDOCKING CAPABILITY. REDUNDANT PATHS REMAIN OPERATIONAL.
- 2) FUSE IN OTHER POWER LEG FAILS OPEN. LOSS OF REMAINING PSU POWER ENABLE CIRCUIT. LOSS OF NOMINAL UNDOCKING CAPABILITY.
- 3) ONE PYROBOLT FAILS TO INITIATE RESULTING IN LOSS OF CAPABILITY TO IMPLEMENT PYROTECHNIC SEPARATION. LOSS OF NOMINAL AND PYROTECHNIC SEPARATION CAPABILITY.

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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 SECOND FAILURE, THE CREW WOULD PERFORM IFM TO DRIVE THE HOOKS OPEN. IF UNABLE TO PERFORM THE IFM (THIRD FAILURE) THEN IMPLEMENT THE PYROTECHNIC SEPARATION. IF UNABLE TO PERFORM THE PYROTECHNIC SEPARATION (FOURTH FAILURE) THEN 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.

- TIME FRAME -

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:

AFTER FAILURE OF THE REDUNDANT PSU POWER ENABLE CIRCUIT, THE CREW CAN PERFORM IFM TO DRIVE THE HOOKS OPEN TO UNDOCK.

HAZARD REPORT NUMBER(S): ORBI 401

HAZARD(S) DESCRIPTION:

INABILITY TO SAFELY SEPARATE ORBITER FROM A MATED ELEMENT.

- APPROVALS -

SS&PAE : T. K. KIMURA
DESIGN ENGINEERING : C. J. ARROYO

J. Kimura 4-13-98
[Signature]