

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER:M5-6SS-0113 -X

SUBSYSTEM NAME: ISS DOCKING SYSTEM

REVISION: 0 02/27/98

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	:MID PCA-1	VO70-764400
LRU	:MID PCA-2	VO70-764430
SRU	:REMOTE POWER CONTROLLER	MC450-0017-X200

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
 REMOTE POWER CONTROLLER, 20 AMP - PFCU "FIRE" POWER CIRCUIT

REFERENCE DESIGNATORS: 40V78A25RPC18
 40V78A25RPC31
 40V78A27RPC37
 40V78A27RPC38

QUANTITY OF LIKE ITEMS: 4
 FOUR

FUNCTION:
 THE REMOTE POWER CONTROLLERS PROVIDE POWER DISTRIBUTION AND CIRCUIT PROTECTION ACTIVATION OF THE PFCU "FIRE" (MN A, MN C) POWER CIRCUITS.

REFERENCE DOCUMENTS: 1) VS70-853103, INTEGRATED SCHEMATIC - 53PA, PFCU POWER DISTRIBUTION CONTROL CIRCUIT

FAILURE MODES EFFECTS ANALYSIS FMEA – NON-CIL FAILURE MODE

NUMBER: M5-6SS-0113-01

REVISION#: 0 02/27/98

SUBSYSTEM NAME: ISS DOCKING SYSTEM

LRU: MID PCA-1, 2

ITEM NAME: REMOTE POWER CONTROLLER

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:

LOSS OF OUTPUT, FAILS TO CONDUCT, FAILS TO TURN "ON"

MISSION PHASE: OO ON-ORBIT

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

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)

PYROTECHNIC SEPARATION CLASSIFIED AS STANDBY REDUNDANCY.

C)

CORRECTING ACTION: NONE**CORRECTING ACTION DESCRIPTION:**

DESIGN FAULT TOLERANCE: REDUNDANT PYROTECHNIC SEPARATION CIRCUIT REMAINS OPERATIONAL.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
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- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF CAPABILITY TO ACTIVATE ONE OF THE TWO PFCU FIRE CIRCUITS.

(B) INTERFACING SUBSYSTEM(S):

DEGRADED REDUNDANCY FOR PYROTECHNIC SEPARATION CAPABILITY. LOSS OF ONE OF TWO PYROTECHNIC SEPARATION "FIRE" CURRENT BUSES

(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) RPC FAILS - DEGRADED REDUNDANCY FOR PYROTECHNIC SEPARATION.
- 2) ONE OF THE TWELVE HOOKS FAILS TO OPEN (REF. FMEA M8-ISS-BM001-04).
LOSS OF NOMINAL UNDOCKING CAPABILITY.
- 3) REDUNDANT RPC FAILS TO CONDUCT - LOSS OF ONE OF TWO BUSES FOR PYRO
"FIRE" POWER.
- 4) PYRO POWER SWITCH IN REDUNDANT MAIN BUS POWER CIRCUIT FAILS OPEN - 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.

- TIME FRAME -

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE
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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 FOR
SAME PYRO BUS "FIRE" POWER 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.

- APPROVALS -

SS&PAE
DESIGN ENGINEERING

: T. K. KIMURA
: C. J. ARROYO

: J. Kimura 4-13-98
: [Signature]