

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE
NUMBER:M5-6SS-0116 -X**

SUBSYSTEM NAME: ISS DOCKING SYSTEM

REVISION: 0 02/27/98

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:PANEL A6A3	V828-730150
SRU	:CIRCUIT BREAKER	MC454-0026-2075

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CIRCUIT BREAKERS, 7.5 AMP - DOCKING SYSTEM POWER (MAIN A, MAIN B, MAIN C)**

REFERENCE DESIGNATORS: 36V73A7A3CB11
36V73A7A3CB12
36V73A7A3CB13
36V73A7A3CB14
36V73A7A3CB15
36V73A7A3CB16

**QUANTITY OF LIKE ITEMS: 6
SIX**

FUNCTION:
PROVIDE OVERLOAD PROTECTION TO THE ORBITER MAIN A (MPCA-1) MAIN B (MPCA-2,) AND MAIN C (MPCA-3) FROM THE PANEL LOGIC BUS A, B, AND C CIRCUITS.

REFERENCE DOCUMENTS: 1) VS70-953103, INTEGRATED SCHEMATIC - 53A, MAIN A/MAIN B SYSTEM POWER AND APDS LOGIC BUSES

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

NUMBER: M5-6SS-0116-01

REVISION#: 0 02/27/98

SUBSYSTEM NAME: ISS DOCKING SYSTEM

LRU: PANEL A6A3

ITEM NAME: CIRCUIT BREAKER

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:

FAILS OPEN, FAILS TO CONDUCT, FAILS TO CLOSE

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) N/A
	C) PASS

PASS/FAIL RATIONALE:

A)

B)

N/A - AT LEAST TWO REMAINING PATHS ARE DETECTABLE.

C)

METHOD OF FAULT DETECTION:FIRST FAILURE MASKED BY REDUNDANT POWER SOURCE. FAILURE WOULD BE
DETECTABLE AFTER FAILURE OF THE PARALLEL POWER SOURCE.

CORRECTING ACTION: NONE

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: M5-6SS-0116-01**

CORRECTING ACTION DESCRIPTION:

DESIGN FAULT TOLERANCE: REDUNDANT ISS DOCKING MECHANISM LOGIC POWER
CIRCUIT REMAINS OPERATIONAL.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF REDUNDANT POWER DISTRIBUTION

(B) INTERFACING SUBSYSTEM(S):

DEGRADED PANEL BUS REDUNDANCY

(C) MISSION:

FIRST FAILURE - NO EFFECT. DEGRADATION OF PANEL BUS REDUNDANCY. DEGRADED
DOCKING LIGHTS REDUNDANCY.

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

FIRST FAILURE - NO EFFECT. DEGRADATION OF ISS DOCKING MECHANISM LOGIC BUS
REDUNDANCY.

(E) FUNCTIONAL CRITICALITY EFFECTS:

POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE FAILURES:

- 1) FIRST CIRCUIT BREAKER FAILS OPEN - NO EFFECT.
- 2) MPCA CONTACTOR OF SECOND REDUNDANT POWER CIRCUIT FAILS OPEN OR
SHORTS TO GROUND - LOSS OF ISS DOCKING MECHANISM LOGIC REDUNDANCY.
- 3) ONE OF TWO MAIN LOGIC CIRCUIT BREAKERS OR DIODES OF THIRD REDUNDANT
POWER CIRCUIT IN PANEL A6A3 FAILS OPEN - LOSS OF ALL UNDOCKING CAPABILITY.
FAILURE OF TWO OF THREE APDS LOGIC BUSES DISABLES NOMINAL AND
PYROTECHNIC SEPARATION SYSTEMS CONTROL. LOSS OF ISS DOCKING
MECHANISM PANEL CONTROL.

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 THIRD FAILURE, THE CREW WOULD PERFORM IFM TO COMPLETE ALL
REQUIRED APDS MOTOR DRIVE FUNCTION. IF UNABLE TO PERFORM THE IFM (FOURTH
FAILURE) THEN PERFORM EVA TO REMOVE 96 BOLTS FROM THE DOCKING BASE TO
CIRCUMVENT THE WORST CASE "DESIGN CRITICALITY" EFFECT. IF UNABLE TO

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: M5-SSS-0116-01**

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:
DESIGN FAULT TOLERANCE: REDUNDANT LOGIC POWER CIRCUIT REMAINS OPERATIONAL. AFTER THE THIRD FAILURE, THE CREW CAN PERFORM IFM TO COMPLETE ALL REQUIRED APDS MOTOR DRIVE FUNCTIONS 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]*