

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE
NUMBER:M5-6SS-0122 -X**

SUBSYSTEM NAME: ISS DOCKING SYSTEM

REVISION: 0

02/27/98

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	:PANEL 6GA3	V828-730150
SRU	:CIRCUIT BREAKER	MC454-0026-2030

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CIRCUIT BREAKER, 3 AMP - PMA 2/3 GROUP 1/2 SYSTEM A/B OPEN

REFERENCE DESIGNATORS: 36V73A7A3CB17
36V73A7A3CB19
36V73A7A3CB21
36V73A7A3CB23

QUANTITY OF LIKE ITEMS: 4
(FOUR)

FUNCTION:
PROVIDES POWER TO "OPEN" CONTROL CIRCUITS IN ORDER TO OPEN GROUP 1 OR GROUP 2 HOOKS ON THE INTERNATIONAL SPACE STATION PRESSURIZED MATING ADAPTER 2/3 (PMA 2/3). PROVIDES OVERLOAD PROTECTION TO THE ORBITER MAIN A(B) BUS.

REFERENCE DOCUMENTS: 1) VS70-953103, INTEGRATED SCHEMATIC - 53JA, 53JC, 53JE, 53JG; PMA 2/3 PASSIVE MECHANISM GROUP 1/2, SYS A/B HOOKS CONTROL

**FAILURE MODES EFFECTS ANALYSIS FMEA - NON-CIL FAILURE MODE
NUMBER: M5-6SS-0122-01**

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)
SCREEN B IS "N/A" BECAUSE THE CIRCUIT BREAKER IS CONTAINED WITHIN A STANDBY SYSTEM.

C)

METHOD OF FAULT DETECTION:

ONE GROUP OF HOOKS TAKES TWICE THE NORMAL TIME TO OPEN

MASTER MEAS. LIST NUMBERS: NONE

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: M5-6SS-0122-01**

CORRECTING ACTION: NONE

CORRECTING ACTION DESCRIPTION:

DESIGN FAULT TOLERANCE: REDUNDANT PMA HOOK MOTOR WILL OPEN AFFECTED GROUP OF HOOKS AT HALF THE SPEED AND TWICE THE NORMAL TIME.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF ABILITY TO PROVIDE POWER TO "OPEN" CONTROL CIRCUIT IN ORDER TO OPEN GROUP 1 OR GROUP 2 HOOKS ON PMA 2/3 PASSIVE MECHANISM.

(B) INTERFACING SUBSYSTEM(S):

UNABLE TO OPERATE ONE PMA HOOK MOTOR. REDUNDANT PMA HOOK MOTOR WILL OPEN AFFECTED GROUP OF HOOKS AT HALF THE SPEED AND TWICE THE NORMAL TIME.

(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) CIRCUIT BREAKER FAILS OPEN
- 2) ONE OR MORE HOOKS IN THE ACTIVE MECHANISM FAIL TO CLOSE COMPLETELY.
- 3) CIRCUIT BREAKER POWERING REDUNDANT MOTOR CIRCUIT FAILS OPEN - UNABLE TO OPEN ONE GROUP OF PMA HOOKS. LOSS OF PMA2/3 UNDOCKING CAPABILITY.
- 4) ONE ODS PASSIVE HOOK PYRO FAILS TO FIRE. LOSS OF ODS 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), THEY ARE PROVIDING ADDITIONAL FAULT TOLERANCE 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.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: M5-6SS-0122-01**

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: HOURS

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 PMA 2/3 HOOK MOTOR WILL OPEN THE
AFFECTED GROUP OF HOOKS AT HALF THE SPEED AND TWICE THE NORMAL TIME.
ALSO, THE ODS PASSIVE HOOK PYROS ARE AVAILABLE FOR PYROTECHNIC UNDOCKING.**

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
C. Arroyo