

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE
NUMBER: M5-6SS-0130 -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 | :DIODE | JANTXV1N5552 |

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
 DIODE, GENERAL PURPOSE, 3 AMP, ISOLATION, OPEN - PMA 2/3 PASSIVE MECHANISM
 GROUP 1/2, SYSTEM A/B HOOKS CONTROL

REFERENCE DESIGNATORS: 36V73A7A3ABCR1
 36V73A7A3ABCR2
 36V73A7A3ABCR7
 36V73A7A3A8CR8
 36V73A7A3A9CR1
 36V73A7A3A9CR2
 36V73A7A3A9CR7
 36V73A7A3A9CR8

QUANTITY OF LIKE ITEMS: 8
 (EIGHT)

FUNCTION:
 PROVIDES ISOLATION BETWEEN THE PMA 2/3 PASSIVE MECHANISM GROUP 1, SYSTEM
 A AND B HOOKS POSITION INDICATION CIRCUIT AND BETWEEN THE GROUP 2, SYSTEM
 A AND B HOOKS POSITION INDICATION CIRCUIT. PROVIDES A CURRENT PATH TO
 EVENT INDICATOR.

REFERENCE DOCUMENTS: 1) V570-953103, 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-0130-02

REVISION#: 0 02/27/98

SUBSYSTEM NAME: ISS DOCKING SYSTEM

LRU: PANEL A6A3

ITEM NAME: DIODE

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:
SHORT (END TO END)

MISSION PHASE: OO ON-ORBIT

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

CAUSE:

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

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 DIODE IS CONTAINED WITHIN A STANDBY SYSTEM.

C)

METHOD OF FAULT DETECTION:

NONE

CORRECTING ACTION: MANUAL

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CORRECTING ACTION DESCRIPTION:

CREW WILL OPEN ASSOCIATED CIRCUIT BREAKER TO DE-ENERGIZE FAILED ON INHIBIT CIRCUIT.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF ISOLATION BETWEEN OPEN/CLOSE INHIBIT CIRCUITS.

(B) INTERFACING SUBSYSTEM(S):

LOSS OF ISOLATION BETWEEN OPEN/CLOSE INHIBIT CIRCUITS.

(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 FIVE FAILURES:

- 1) DIODE FAILS SHORT (END TO END) FOR "OPEN" INDICATION.
- 2) ONE OR MORE HOOKS IN THE ACTIVE MECHANISM FAIL TO CLOSE COMPLETELY.
- 3) "OPEN" POSITION LIMIT SWITCH FOR THE REDUNDANT MOTOR OF THE SAME HOOKS GROUP FAIL CLOSED. PROVIDES INHIBITS TO BOTH MOTORS OF THE SAME HOOKS GROUP.
- 4) CIRCUIT BREAKER OF AFFECTED LIMIT SWITCH FAILS CLOSED RESULTING IN LOSS OF ABILITY TO REMOVE INHIBIT TO BOTH "OPEN" HOOKS MOTOR OF SAME HOOKS GROUP. LOSS OF PMA 2/3 UNDOCKING CAPABILITY.
- 5) ONE ODS PASSIVE HOOK PYRO FAILS TO FIRE. LOSS OF 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 FIFTH 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 (SIXTH FAILURE), POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF ALL UNDOCKING CAPABILITY.

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- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: MINUTES

TIME FROM FAILURE OCCURRENCE TO DETECTION: SECONDS

TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: MINUTES

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

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
AFTER LOSS OF NOMINAL UNDOCKING CAPABILITY WITH THE PMA 2/3 HOOK MOTORS,
THE CREW CAN INITIATE ODS PASSIVE HOOK PYROS FOR UNDOCKING.

HAZARD REPORT NUMBER(S): ORBI 401

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

- APPROVALS -

SS&PAE
DESIGN ENGINEERING

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

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