FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER:M5-6SS-0124 -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	: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:
36V73A7A3A8CR3
36V73A7A3A8CR9
36V73A7A3A9CR3
36V73A7A3A9CR9

QUANTITY OF LIKE ITEMS: 4
(FOUR)

FUNCTION:
PROVIDES A CURRENT PATH TO DE-ENERGIZE MOTOR WINDINGS WHEN MOTOR IS SWITCHED OFF. ISOLATES THE POSSIBLE RELAY CONTACT FAILURE WHICH MAY CAUSE LOSS OF MOTOR "OPEN" FUNCTION.

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-0124-02

REVISION#: 0 02/27/98

SUBSYSTEM NAME: ISS DOCKING SYSTEM
LRU: A6A3 PANEL
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)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF CIRCUIT ISOLATION FUNCTION OF DIODE.

(B) INTERFACING SUBSYSTEM(S):

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FIRST FAILURE - NO EFFECT

(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 SHORT END-TO-END - NO EFFECT.
2) ONE OR MORE HOOKS IN THE ACTIVE MECHANISM FAIL TO CLOSE COMPLETELY.
3) "OPEN" HYBRID RELAY FAILS CONTACT-TO-CONTACT SHORT (I.E. ASSOCIATED CONTACT REMAINS IN THE DE-ENERGIZE STATE) PROVIDING A DIRECT SHORT TO GROUND WHICH TRIP THE "OPEN" CIRCUIT BREAKER UPSTREAM. UNABLE TO OPERATE ONE PMA HOOK MOTOR IN THE "OPEN HOOKS" DIRECTION. REDUNDANT PMA HOOK MOTOR WILL OPEN AFFECTED GROUP OF HOOKS AT HALF THE SPEED AND TWICE THE NORMAL TIME.
4) LOSS REDUNDANT MOTOR. LOSS OF PMA UNDOCKING CAPABILITY.
5) 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 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.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: HOURS

TIME FROM FAILURE OCCURRENCE TO DETECTION: MINUTES

TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: MINUTES

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

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YES

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
DESIGN FAULT TOLERANCE: REDUNDANT PMA 2/3 HOOKS "OPEN" MOTOR CIRCUIT IS OPERATIONAL. 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 ORBITER FROM A MATED ELEMENT

- APPROVALS -

SS&PAE	: T. K. KIMURA	: T. Kimura 4-13-98
DESIGN ENGINEERING	: C. J. ARROYO	: