

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER: M5-6SS-0117 -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	JANTX1N1188R

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

DIODES, POWER, 35 AMP - PANEL LOGIC BUSES A, B, AND C CIRCUITS.

REFERENCE DESIGNATORS: 36V73A7A3CR1
 36V73A7A3CR2
 36V73A7A3CR3
 36V73A7A3CR4
 36V73A7A3CR5
 36V73A7A3CR6

QUANTITY OF LIKE ITEMS: 6
 SIX

FUNCTION:

THESE DIODES PROVIDE BACK SURGE PROTECTION AND DISTRIBUTION FOR THE MAIN A, MAIN B, AND MAIN C POWER BUSES FROM THE A6A3 PANEL 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-0117-01

REVISION#: 0 02/27/98

SUBSYSTEM NAME: ISS DOCKING SYSTEM
 LRU: PANEL A6A3
 ITEM NAME: DIODE

CRITICALITY OF THIS
 FAILURE MODE: 1R3

FAILURE MODE:
 OPEN, FAILS TO CONDUCT, SHORT TO STRUCTURE (GROUND)

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 1R1 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-0117-01**

CORRECTING ACTION DESCRIPTION:

DESIGN FAULT TOLERANCE: REDUNDANT APDS 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

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

FIRST FAILURE - NO EFFECT

(E) FUNCTIONAL CRITICALITY EFFECTS:

POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE FAILURES:

- 1) FIRST DIODE FAILS OPEN - NO EFFECT.
- 2) MPCA CONTACTOR OF SECOND REDUNDANT POWER CIRCUIT FAILS OPEN OR SHORTS TO GROUND - LOSS OF APDS 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.

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 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-0117-01

- 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 : T. K. KIMURA
DESIGN ENGINEERING : C. J. ARROYO

T. Kimura 4-18-98
C. J. Arroyo