FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER:M5-6SS-0602 -X

SUBSYSTEM NAME: ISS DOCKING SYSTEM

REVISION: 0 02/27/98

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:FPCA-1	VO70-7633X0
LRU	:FPCA-2	VO70-7633X0
SRU	:DIODE	JANTX1N1188R

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
DIODES, POWER, 35 AMP - EMU POWER SUPPLY/BATTERY CHARGER SOURCE BUS SELECT POWER CIRCUIT

REFERENCE DESIGNATORS:
81V76A25CR43
81V76A25CR44
81V76A25CR45
81V76A25CR46

QUANTITY OF LIKE ITEMS: 4
(FOUR)

FUNCTION:
THESE DIODES PROVIDE ISOLATION BETWEEN MAIN A AND MAIN B WHEN AN EXTRAVEHICULAR MOBILITY UNIT (EMU) POWER SUPPLY SOURCE IS SWITCHED, AND DISTRIBUTION ISOLATION FROM MAIN A OR MAIN B BUS TO THE EMU POWER SUPPLIES.

REFERENCE DOCUMENTS:
1) VS70-960099, SHT 60DF1 - SCHEMATIC DIAGRAM - AECS EXTRAVEHICULAR MOBILITY UNIT/ EXT AIRLOCK.

FAILURE MODES EFFECTS ANALYSIS FMEA – NON-CIL FAILURE MODE
NUMBER: M5-6SS-0602-02

REVISION#: 0 02/27/98

SUBSYSTEM NAME: ISS DOCKING SYSTEM
LRU: FPCA-1 OR FPCA-2
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)
N/A - AT LEAST TWO REMAINING PATHS AFTER THE FIRST FAILURE ARE READILY DETECTABLE IN FLIGHT.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
DEGRADATION OF BUS ISOLATION. DIODES PROVIDE ISOLATION BETWEEN MAIN A AND MAIN B. ONE (OR FOUR) OPEN DIODE WILL NOT AFFECT OPERATION.

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
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(B) INTERFACING SUBSYSTEM(S):
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 SHORTS (END TO END) - LOSS OF ISOLATION OF EMU POWER SUPPLY AND BATTERY CHARGER CIRCUITS TO ONE EMU.
2) SAME DIODE SHORTS TO STRUCTURE (GROUND) - LOSS OF EMU POWER SUPPLY AND BATTERY CHARGER CAPABILITIES TO ONE EMU.
3) SWITCH OF SECOND EMU POWER SUPPLY AND BATTERY CHARGER FAILS OPEN - LOSS OF POWER TO ALL EMU'S. WORST CASE IF FAILURE OCCURS FOLLOWING AN INITIAL EVA WHERE SUBSEQUENT EVA MUST BE PERFORMED USING ONE EMU WITH THE SPARE BATTERY PACK.
4) LOSS OF THE SPARE BATTERY PACK FOR BOTH EMU'S - LOSS OF BOTH EMU'S WOULD PRECLUDE SUBSEQUENT EVA CAPABILITIES.
5) A FAILURE NECESSITATING AN EVA TO PREVENT A POTENTIAL CATASTROPHIC SITUATION - INABILITY TO PERFORM A CONTINGENCY EVA TO CORRECT A CRIT 1 CONDITION COULD RESULT IN LOSS OF CREW/VEHICLE.

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 (FAILURE NECESSITATING AN EVA TO PREVENT A POTENTIAL CATASTROPHIC SITUATION) - INABILITY TO PERFORM CONTINGENCY EVA (SIXTH FAILURE) TO CORRECT A CRIT 1 CONDITION COULD RESULT IN LOSS OF CREW AND VEHICLE.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: HOURS

TIME FROM FAILURE OCCURRENCE TO DETECTION: N/A

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TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: N/A

IS TIME REQUIRED TO IMPLEMENT CORRECTING ACTION LESS THAN TIME TO EFFECT?
N/A

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
AFTER THE SECOND FAILURE, THE REDUNDANT EMU POWER SUPPLY AND BATTERY CHARGER BUS SELECT SWITCH CAN BE USED TO CONNECT TO THE OPERATIONAL CIRCUIT - ONE POWER SUPPLY AND BATTERY CHARGER SERVICE POINT REMAINS OPERATIONAL ON THE SERVICE CONNECTION UNIT. THE CREW CAN ALTERNATE THE EMU'S ON THE OPERATIONAL SERVICE POINT TO CHARGE THE BATTERIES.

HAZARD REPORT NUMBER(S): NONE

HAZARD(S) DESCRIPTION:
NONE

- APPROVALS -

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