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PRINT DATE: 06/17/97

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE

NUMBER: M5-6SS-8017-X

SUBSYSTEM NAME: E - DOCKING SYSTEM

REVISION: 0 DEC, 1996

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: ENERGIA POWER PANEL RSC-E	MCS21-0087-0009 SLYU 468312.001
SRU	: CIRCUIT BREAKER	Az2-3 (8>3.619.242. TU)

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

PNL ABA3, CIRCUIT BREAKER (5.1 AMP TRIPPING CURRENT) - APDS +A, +B, +C
CONTROL PANEL POWER.

REFERENCE DESIGNATORS: 36V73A8A3F3
36V73A8A3F7
36V73A8A3F11

QUANTITY OF LIKE ITEMS: 3
(THREE)

FUNCTION:

PROVIDE OVERLOAD PROTECTION, CONTROL AND DISTRIBUTION FOR THE CONTROL
PANEL POWER BUSES (+A, +B, +C)

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE
NUMBER: M5-6SS-B017-01

REVISION# 0 FEBDEC, 1997

SUBSYSTEM NAME: E - DOCKING SYSTEM

LRU: M0621-0087-0009

ITEM NAME: CIRCUIT BREAKER

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:

FAILS OPEN, FAILS TO CONDUCT, INADVERTENTLY OPENS, FAILS TO TRANSFER

MISSION PHASE:

OO ON-ORBIT

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

CAUSE:

A) PIECE PART FAILURE, B) CONTAMINATION, C) VIBRATION, D) MECHANICAL SHOCK, E) PROCESSING ANOMALY, F) THERMAL STRESS

CRITICALITY 1R1 DURING INTACT ABORT ONLY? NO

CRITICALITY 1R2 DURING INTACT ABORT ONLY (AVIONICS ONLY)? NO

REDUNDANCY SCREEN A) PASS
 B) PASS
 C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

METHOD OF FAULT DETECTION:

TELEMETRY.

MASTER MEAS. LIST NUMBERS: V53X0758E
 V53X0759E
 V53X0760E

CORRECTING ACTION:

WORKAROUNDS ARE AVAILABLE TO SEPARATE THE ORBITER FROM ISS:

1) IFM TO DRIVE HOOKS OPEN;

2) INITIATION OF PYROBOLT SEPARATION;

3) PERFORM EVA TO REMOVE 96 BOLTS FROM THE DOCKING BASE.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE
NUMBER: M5-6SS-B017- 01**

- FAILURE EFFECTS -

(A) SUBSYSTEM:

DEGRADATION FOR REDUNDANCY FOR PROVIDING POWER TO THE PANEL POWER CONTROL BUSES (+A, +B, +C)

(B) INTERFACING SUBSYSTEM(S):

PARTIAL LOSS OF STATUS LIGHT INDICATION DUE TO LOSS OF EITHER BUS +A OR +C.

(C) MISSION:

NO EFFECT.

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

FIRST FAILURE - NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECTS:

WORST CASE, SHUTTLE MECHANISM CONTROL: POSSIBLE LOSS OF CREW OR VEHICLE AFTER THREE FAILURES.

1) ONE OF THREE CIRCUIT BREAKERS FAILS OPEN. NO EFFECT. DEGRADED PANEL POWER BUS REDUNDANCY. 2) ONE OF TWO REMAINING ASSOCIATED CIRCUIT BREAKERS FAILS OPEN. LOSS OF TWO OF THREE PANEL POWER BUSES RESULTING IN LOSS OF NOMINAL ORBITER UNDOCKING CAPABILITY. 3) ONE PYROBOLT FAILS TO INITIATE. LOSS OF CAPABILITY TO IMPLEMENT PYROTECHNIC SEPARATION.

DESIGN CRITICALITY (PRIOR TO OPERATIONAL DOWNGRADE, DESCRIBED IN F):

(F) RATIONALE FOR CRITICALITY CATEGORY DOWNGRADE:

ALTHOUGH THE CRITICALITY REMAINS UNCHANGED AFTER WORKAROUNDS CONSIDERATION (ALLOWED PER CR S050107W), THEY ARE PROVIDING ADDITIONAL FAULT TOLERANCE TO THE SYSTEM.

AFTER THE SECOND FAILURE, THE CREW WOULD PERFORM IFM TO DRIVE THE HOOKS OPEN. IF UNABLE TO PERFORM THE IFM (THIRD FAILURE) THEN IMPLEMENT THE PYROTECHNIC SEPARATION. IF UNABLE TO PERFORM THE PYROTECHNIC SEPARATION (FOURTH FAILURE) THEN PERFORM EVA TO REMOVE 96 BOLTS 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

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: HOURS

TIME FROM DETECTION TO COMPLETED CORRECTIVE ACTION: HOURS

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TIME REQUIRED TO IMPLEMENT CORRECTIVE ACTION LESS THAN TIME TO EFFECT?
YES

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
CREW WOULD HAVE SUFFICIENT TIME TO PERFORM IFM OR EVA.

HAZARDS REPORT NUMBER(S) : ORBI 401A

HAZARD DESCRIPTION:
INABILITY TO SEPARATE ORBITER AND ISS.

- APPROVALS -

PRODUCT ASSURANCE ENGR : M. NIKOLAYEVA
DESIGN ENGINEER : B. VAKULIN

