FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER:M5-6SS-0900 -X

SUBSYSTEM NAME: ISS DOCKING SYSTEM

REVISION: 0 02/27/98

PART DATA

	PART NAME / **VENDOR NAME**	**PART NUMBER** / **VENDOR NUMBER**
LRU	:ML86B PANEL	VO70-730382
SRU	:CIRCUIT BREAKER	MC454-0026-2050

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CIRCUIT BREAKER, 5 AMP - EXTERNAL AIRLOCK WATER LINE HEATER CIRCUITS

REFERENCE DESIGNATORS:
80V73A130CB102
80V73A130CB103
80V73A130CB104
80V73A130CB105
80V73A130CB107
80V73A130CB108

QUANTITY OF LIKE ITEMS: 6
(SIX)

FUNCTION:
PROVIDE OVERLOAD PROTECTION AND ISOLATION FROM THE MAIN A, MAIN B, MAIN C BUS FOR THE ZONE 1 OR ZONE 2 HEATER CIRCUITS.

REFERENCE DOCUMENTS:
1) VS70-640109, SCHEMATIC DIAGRAM - AIRLOCK ENVIRONMENTAL CONTROL SUBSYSTEM

FAILURE MODES EFFECTS ANALYSIS FMEA – NON-CIL FAILURE MODE
NUMBER: M5-6SS-0900-01

REVISION#: 0 02/27/98

SUBSYSTEM NAME: ISS DOCKING SYSTEM
LRU: ML86B PANEL
ITEM NAME: CIRCUIT BREAKER

CRITICALITY OF THIS FAILURE MODE: 1R3

FAILURE MODE:
FAILS OPEN, FAILS TO CONDUCT, FAILS TO CLOSE

MISSION PHASE: OO ON-ORBIT

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

CAUSE:
A) STRUCTURAL FAILURE, B) CONTAMINATION, C) VIBRATION, D) MECHANICAL SHOCK, E) PROCESSING ANOMALY, F) THERMAL STRESS

CRITICALITY 1/1 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:
REVIEW HEATER CIRCUIT TELEMETRY DATA

MASTER MEAS. LIST NUMBERS:
V64S0157E
V64S0158E
V64S0159E
V64S0160E

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V54S0161E
V54S0162E

CORRECTING ACTION: NONE

CORRECTING ACTION DESCRIPTION:
DESIGN FAULT TOLERANCE: REDUNDANT WATER LINE HEATER WILL CONTROL TEMPERATURE.

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF ABILITY TO ENERGIZE ONE HEATER STRING

(B) INTERFACING SUBSYSTEM(S):
FIRST FAILURE - NO EFFECT. THE SECOND ENERGIZED HEATER CIRCUIT WILL CONTROL TEMPERATURE.

(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 FOUR FAILURES:

1) CIRCUIT BREAKER FAILS OPEN - NO EFFECT. SECOND ENERGIZED HEATER CIRCUIT PROVIDES REQUIRED HEAT.
2) SECOND CIRCUIT BREAKER FAILS OPEN - TEMPERATURE OF WATER LINES DECREASES BELOW LOWER TEMPERATURE LIMIT. CREW ALERTED BY FDA ALARM. CREW MEMBER MUST SWITCH IN THIRD HEATER STRING.
3) THIRD CIRCUIT BREAKER FAILS OPEN - LOSS OF CAPABILITY TO HEAT WATER LINES. WATER IN LINES MAY FREEZE RESULTING IN LOSS OF NOMINAL WATER SUPPLY TO THE EMU'S. WORST CASE IF FAILURE OCCURS FOLLOWING AN INITIAL EVA. THEN LOSS OF WATER SUPPLY TO REFILL THE EMU SUBLIMATOR TO OPERATE AND PROVIDE COOLING FOR BOTH EMU'S WOULD PRECLUDE SUBSEQUENT EVA CAPABILITIES.
4) 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 A LOSS OF CREW/VEHICLE.

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

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
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(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 FOURTH FAILURE (FAILURE NECESSITATING AN EVA TO PREVENT A POTENTIAL CATASTROPHIC SITUATION) - INABILITY TO PERFORM CONTINGENCY EVA (FIFTH FAILURE) TO CORRECT A CRIT 1 CONDITION COULD RESULT IN LOSS OF CREW AND VEHICLE.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: HOURS

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:
FDA ALARM INDICATING WATER LINE TEMPERATURE BELOW LOWER LIMIT AFTER SECOND CIRCUIT BREAKER FAILS OPEN WILL ALERT CREW TO SWITCH TO THIRD HEATER STRING.

HAZARD REPORT NUMBER(S): NONE

HAZARD(S) DESCRIPTION:
NONE

- APPROVALS -

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