

**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	PART NUMBER
	VENDOR NAME	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

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NUMBER: M5-6SS-0900-02

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

**CRITICALITY OF THIS
 FAILURE MODE: 1R3**

FAILURE MODE:
FAILS CLOSED (FAILS TO OPEN MECHANICALLY)

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

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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V64S0161E
V64S0162E

CORRECTING ACTION: NONE

CORRECTING ACTION DESCRIPTION:

DESIGN FAULT TOLERANCE: CONTROL AND OVER TEMPERATURE THERMOSTATS WILL OPERATE TO KEEP WATER LINES WITHIN TEMPERATURE LIMITS.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF CAPABILITY TO ISOLATE HEATERS AND THERMOSTATS FROM THE MAIN BUS.

(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 FOUR FAILURES:

- 1) CIRCUIT BREAKER FAILS CLOSED (FAILS TO OPEN MECHANICALLY) - CANNOT REMOVE POWER FROM HEATER STRING.
- 2) TEMPERATURE CONTROL THERMOSTAT FAILS CLOSED - NO EFFECT. OVER TEMPERATURE THERMOSTAT (IN SERIES WITH TEMPERATURE CONTROL THERMOSTAT) WILL OPEN IF TEMPERATURE INCREASES TO APPROXIMATELY 15 DEGREES ABOVE CONTROLLING THERMOSTAT UPPER LIMIT.
- 3) OVER TEMPERATURE THERMOSTAT FAILS CLOSED - TEMPERATURE SENSORS INDICATE OVER TEMPERATURE CONDITION CAUSING FDA ALARM. FAILED ON HEATER MAY RESULT IN WATER LINES POSSIBLY OVERHEATING AND REACHING ITS BURST PRESSURE CAUSING THE 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.

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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 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: 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?
YES**

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:

DESIGN FAULT TOLERANCE: CONTROL AND OVER TEMPERATURE THERMOSTATS WILL OPERATE TO KEEP WATER LINES WITHIN TEMPERATURE LIMITS.

HAZARD REPORT NUMBER(S): NONE

**HAZARD(S) DESCRIPTION:
N/A**

- APPROVALS -

SS&PAE
DESIGN ENGINEERING

: T. K. KIMURA
: C. J. ARROYO

J. Kimura 4-13-98
CR