

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE
NUMBER: M5-6SS-0903 -X**

SUBSYSTEM NAME: ISS DOCKING SYSTEM

REVISION: 0 02/27/98

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	:HEATER (ZONE 1)	MC363-0038-0101
LRU	:HEATER (ZONE 2)	MC363-0038-0102

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

HEATER, 3.25 WATT (ZONE 1), 6.5 WATT (ZONE 2) - EXTERNAL AIRLOCK WATER LINE HEATERS

REFERENCE DESIGNATORS: 40V64HR7
40V64HR8
40V64HR9
40V64HR10
40V64HR11
40V64HR12
40V64HR14
40V64HR15

QUANTITY OF LIKE ITEMS: 8
(SIX - 3.25 WATT, TWO - 6.5 WATT)

FUNCTION:

PROVIDE REQUIRED HEAT TO PREVENT WATER LINES FROM FREEZING.

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

FAILURE MODES EFFECTS ANALYSIS FMEA - NON-CIL FAILURE MODE

NUMBER: M5-6SS-0903-01

REVISION#: 0 02/27/98

SUBSYSTEM NAME: ISSA DOCKING SYSTEM

LRU: N/A

ITEM NAME: HEATER (ZONE 1)/HEATER (ZONE 2)

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

FAIL OPEN

MISSION PHASE: OO ON-ORBIT

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

CAUSE:

A) PIECE PART 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) N/A
	C) PASS

PASS/FAIL RATIONALE:

A)

B)

SCREEN "B" IS "N/A" BECAUSE AT LEAST TWO REMAINING PATHS ARE READILY DETECTABLE IN FLIGHT.

C)

- FAILURE EFFECTS -**(A) SUBSYSTEM:**

LOSS OF ABILITY TO PROVIDE HEAT FROM THE AFFECTED HEATER STRING

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(B) INTERFACING SUBSYSTEM(S):

FIRST FAILURE - NO EFFECT. THE SECOND ENERGIZED HEATER CIRCUIT PROVIDES REQUIRED HEAT.

(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) FIRST HEATER FAILS OPEN - NO EFFECT. SECOND ENERGIZED HEATER CIRCUIT PROVIDES REQUIRED HEAT.
- 2) A HEATER IN THE SECOND STRING 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) A HEATER IN THE THIRD STRING FAILS OPEN - LOSS OF CAPABILITY TO HEAT WATER LINES. WATER IN LINES MAY FREEZE RESULTING IN LOSS OF NOMINAL WATER SUPPLY TO EMU'S. WORST CASE IF FAILURE OCCURS FOLLOWING AN INITIAL EVA. THEN LOSS OF WATER SUPPLY TO REFILL THE EMU SUBLIMATOR 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)):

(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

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

HAZARD REPORT NUMBER(S): NONE

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

- APPROVALS -

SS&PAE
DESIGN ENGINEER

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

: J. Kimura 4-13-98
: [Signature]