

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE**  
**NUMBER:M5-6SS-0901 -X**

**SUBSYSTEM NAME: ISS DOCKING SYSTEM**

**REVISION: 0 02/27/98**

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**PART DATA**

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	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	THERMOSTAT (TEMP CONTROL)	ME380-0017-0015

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
 THERMOSTAT, TEMPERATURE CONTROL (50 - 70 DEG. F) - EXTERNAL AIRLOCK WATER  
 LINE HEATERS (ZONES 1 AND 2)

**REFERENCE DESIGNATORS:** 40V64TS7  
 40V64TS8  
 40V64TS9  
 40V64TS10  
 40V64TS11  
 40V64TS12

**QUANTITY OF LIKE ITEMS: 6**  
 (SIX)

**FUNCTION:**  
 WHEN TEMPERATURE DROPS BELOW A LOWER LIMIT, THERMOSTAT ELECTRICALLY  
 CONNECTS HEATER CIRCUITS. WHEN TEMPERATURE RISES ABOVE AN UPPER LIMIT,  
 THERMOSTAT DISCONNECTS HEATER CIRCUIT.

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

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**LRU: N/A**

**CRITICALITY OF THIS**

**ITEM NAME: THERMOSTAT (TEMPERATURE CONTROL)**

**FAILURE MODE: 1R3**

**FAILURE MODE:**

**FAIL OPEN, FAIL TO CLOSE (POWER DISCONNECTED FROM HEATERS)**

**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 ENERGIZE THE AFFECTED HEATER STRING**

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**(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) FIRST TEMPERATURE CONTROLLING THERMOSTAT FAILS OPEN - NO EFFECT. SECOND ENERGIZED HEATER CIRCUIT PROVIDES REQUIRED HEAT.
- 2) SECOND TEMPERATURE CONTROLLING THERMOSTAT 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 TEMPERATURE CONTROLLING THERMOSTAT 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 SUBLIMATORS 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.

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**- TIME FRAME -**

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**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: 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 TEMPERATURE CONTROLLING THERMOSTAT FAILS OPEN WILL ALERT CREW TO  
SWITCH TO THIRD HEATER STRING.**

**HAZARD REPORT NUMBER(S): NONE**

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

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**- APPROVALS -**

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SS&PAE  
DESIGN ENGINEER

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