

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE**  
**NUMBER:M5-6SS-0906A -X**

**SUBSYSTEM NAME:** ISS DOCKING SYSTEM

**REVISION:** 0      04/19/00

**PART DATA**

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	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	:TEMPERATURE SENSOR ROSEMOUNT	ME449-0160-0005 146ET

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
TEMPERATURE SENSOR, 0 -- 160 DEG F -- OXYGEN SUPPLY LINE IN HEATER ZONE 2.

**REFERENCE DESIGNATORS:** 40V64MT46

**QUANTITY OF LIKE ITEMS:** 1  
ONE

**FUNCTION:**  
MONITOR TEMPERATURE OF OXYGEN SUPPLY LINE.

**REFERENCE DOCUMENTS:** VS70-640109  
VS70-960099 SHEET 32.2

**FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE**

**NUMBER: M5-6SS-0906A-01**

**REVISION#: 0 04/19/00**

**SUBSYSTEM NAME: ISS DOCKING SYSTEM**

**LRU: N/A**

**ITEM NAME: TEMPERATURE SENSOR**

**CRITICALITY OF THIS**

**FAILURE MODE: 1R3**

**FAILURE MODE:**

LOSS OF OUTPUT, ERRONEOUS OUTPUT

**MISSION PHASE: OO ON-ORBIT**

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

**CAUSE:**

PIECE PART STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY, THERMAL STRESS.

**CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO**

<b>REDUNDANCY SCREEN</b>	A) PASS
	B) PASS
	C) PASS

**PASS/FAIL RATIONALE:**

A)

B)

C)

**MASTER MEAS. LIST NUMBERS: V64T0186A**

**CORRECTING ACTION:**

**CORRECTING ACTION DESCRIPTION:**

CREW CAN ROTATE THE VEHICLE CARGO BAY TO FACE THE EARTH WHERE THE RADIATION TEMPERATURE IS KNOWN AT APPROXIMATELY +30 DEG F EXCEPT DURING DOCKING TO SPACE STATION. AT THIS TEMPERATURE, OXYGEN LINE TEMPERATURE WILL BE WITHIN THE ACCEPTABLE LIMIT.

**REMARKS/RECOMMENDATIONS:**

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**- FAILURE EFFECTS -**

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**(A) SUBSYSTEM:**

LOSS OF TEMPERATURE READING OF OXYGEN SUPPLY LINE.

**(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) LOSS OF OUTPUT/ERRONEOUS OUTPUT OF TEMPERATURE SENSOR – LOSS OF CAPABILITY TO MONITOR THE ACTUAL TEMPERATURE OF THE OXYGEN LINE WITH THIS SENSOR. NO EFFECT, THE TEMPERATURE SENSORS ON THE EXTERNAL AIR LOCK SUPPLY WATER LINE IN ZONE 1 AND ZONE 2 (MSID V64T0181A & V64T0184A) WILL BE USED FOR ESTIMATION OF THE OXYGEN LINE TEMPERATURE.
- 2) LOSS OF OUTPUT/ERRONEOUS OUTPUT OF THE FIRST TEMPERATURE SENSOR ON THE EXTERNAL AIR LOCK SUPPLY WATER LINE. LOSS OF ABILITY TO ESTIMATE THE OXYGEN LINE TEMPERATURE.
- 3) LOSS OF OUTPUT/ERRONEOUS OUTPUT OF THE SECOND TEMPERATURE SENSOR ON THE EXTERNAL AIR LOCK SUPPLY WATER LINE. LOSS OF ABILITY TO ESTIMATE THE OXYGEN LINE TEMPERATURE.
- 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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**- TIME FRAME -**

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**TIME FROM FAILURE TO CRITICAL EFFECT: HOURS**

**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:**

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FDA LIMITS FOR THE OXYGEN SUPPLY LINE WOULD BE 24 DEG F. FOR LOWER LIMIT AND 86 DEG. F FOR UPPER LIMIT. THESE LIMITS PROTECT THE EMU FROM SEEING 90 DEG. F AND 20 DEG. F OXYGEN. IN ADDITION THEY PROVIDE ONE ORBIT'S WORTH (90 MINUTES APPROXIMATE) OF MARGIN BEFORE ACTION MUST BE TAKEN. CORRECTIVE ACTION WOULD INCLUDE CHANGING ATTITUDE, AND/OR PURGING OXYGEN LINE.

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**- APPROVALS -**

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DESIGN ENGINEER

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