

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE  
NUMBER:M5-6SS-0607B -X**

**SUBSYSTEM NAME: ISS DOCKING SYSTEM**

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

**PART DATA**

	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	:ML86B PANEL	VO70-730382
SRU	:CIRCUIT BREAKER	MC454-0026-2030

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**

CIRCUIT BREAKER (3 AMP) - EMU 1 AND 2 WASTE WATER VALVE POWER

**REFERENCE DESIGNATORS:** 80V73A130CB60  
80V73A130CB61

**QUANTITY OF LIKE ITEMS:** 2  
(TWO)

**FUNCTION:**

PROVIDES OVERLOAD PROTECTION FOR THE ORBITER MAIN "A" AND MAIN "C" BUS AND PROVIDES POWER ISOLATION FOR THE EMU 1 AND 2 WASTE WATER VALVE CONTROL CIRCUITS.

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

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

NUMBER: M5-6SS-0607B-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 ANOMALLY, F) THERMAL STRESS.

CRITICALITY 1R1 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)

CORRECTING ACTION: NONE

**CORRECTING ACTION DESCRIPTION:**

DESIGN FAULT TOLERANCE: THE WASTE WATER VALVE CIRCUIT FOR THE SECOND EMU SERVICE POINT REMAINS OPERATIONAL - BOTH EMU'S CAN STILL BE SERVICED.

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**- FAILURE EFFECTS -**

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**(A) SUBSYSTEM:**

LOSS OF CAPABILITY TO OPEN OR CLOSE THE AFFECTED EMU WASTE WATER VALVE.

**(B) INTERFACING SUBSYSTEM(S):**

CANNOT SIMULTANEOUSLY CONNECT AND SERVICE TWO EMU'S TO WASTE WATER LINES. TIME MAY BE INCREASED TO COMPLETE EVA SINCE ALL EMU'S WILL BE SERVICED FROM ONLY ONE WASTE WATER RETURN PATH.

**(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 THREE FAILURES:

- 1) EMU 1 CIRCUIT BREAKER FAILS OPEN WHEN THE WASTE WATER VALVE IS IN THE CLOSED POSITION. LOSS OF CAPABILITY TO SERVICE TWO EMU'S SIMULTANEOUSLY.
- 2) EMU 2 CIRCUIT BREAKER FAILS OPEN WHEN THE WASTE WATER VALVE IS IN THE CLOSED POSITION. LOSS OF ABILITY TO REMOVE WASTE WATER FROM THE EMU'S WOULD PRECLUDE SUBSEQUENT EVA CAPABILITIES. POTENTIAL LOSS OF CONTINGENCY EVA OPERATION.
- 3) A FAILURE REQUIRING 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 THIRD FAILURE (FAILURE NECESSITATING AN EVA TO PREVENT A POTENTIAL CATASTROPHIC SITUATION) - INABILITY TO PERFORM CONTINGENCY EVA (FOURTH 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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FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE  
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TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

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:  
THE WASTE WATER VALVE CIRCUIT FOR THE SECOND EMU SERVICE POINT REMAINS  
OPERATIONAL - BOTH EMU'S CAN STILL BE SERVICED.

HAZARD REPORT NUMBER(S): NONE

HAZARD(S) DESCRIPTION:  
NONE

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- APPROVALS -

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SS&PAE  
DESIGN ENGINEER

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

: J. Kimura 4-13-98  
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