

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE
NUMBER:M5-6SS-0600 -X

SUBSYSTEM NAME: ISS DOCKING SYSTEM

REVISION: 0 02/27/98

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	:AW18H PANEL	VO75-730151
SRU	:TOGGLE SWITCH	MC452-0102-7103
SRU	:TOGGLE SWITCH	MC452-0102-7603

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

SWITCH, TOGGLE, 1 POLE 2 POSITION, MAINTAINED ON - EMU POWER
 SUPPLY/BATTERY CHARGER BUS SELECT CONTROL CIRCUIT

REFERENCE DESIGNATORS: 84V73A133S1
 84V73A133S2

QUANTITY OF LIKE ITEMS: 2
 (TWO)

FUNCTION:

SWITCH ALLOWS EITHER POWER FROM MAIN "A" (THROUGH FPCA-1), OR MAIN "B"
 (THROUGH FPCA-2) TO BE CONNECTED TO A SINGLE EXTRAVEHICULAR MOBILITY UNIT
 (EMU) POWER CONNECTOR.

REFERENCE DOCUMENTS: 1) VS70-96009, INTEGRATED SCHEMATIC - 60DF1, AECS
 EXTRAVEHICULAR MOBILITY UNIT/EXT AIRLOCK

FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE
NUMBER: M5-6SS-0600-02

REVISION#: 0 02/27/98

SUBSYSTEM NAME: ISS DOCKING SYSTEM
LRU: AW16H PANEL
ITEM NAME: TOGGLE SWITCH

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

FAILURE MODE:
FAILS CLOSED, CONTACT-TO-CONTACT SHORT

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) PASS
C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

METHOD OF FAULT DETECTION:

THE FAILURE DETECTED DURING SYSTEM POWER DOWN.

CORRECTING ACTION: NONE

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CORRECTING ACTION DESCRIPTION:

DESIGN FAULT TOLERANCE: SWITCH OF OTHER EMU POWER SUPPLY AND BATTERY CHARGER REMAINS OPERATIONAL FOR SWITCHING BETWEEN MAIN BUSES A AND B.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

INPUT POWER TO ONE EMU POWER SUPPLY CONTINUALLY ON. LOSS OF CAPABILITY TO SWITCH BETWEEN MAIN BUS "A" AND MAIN BUS "B."

(B) INTERFACING SUBSYSTEM(S):

UNABLE TO SWITCH OFF POWER TO AN EMU POWER SUPPLY.

(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 FIVE FAILURES:

- 1) SWITCH FAILS CLOSED ON MAIN A(B) - LOSS OF ABILITY TO SWITCH POWER WITH THE RPC TO MAIN B(A) FOR EMU POWER SUPPLY AND BATTERY CHARGER. NO EFFECT, REDUNDANT SWITCH CAN BE USED TO SWITCH TO MAIN B(A).
- 2) SECOND SWITCH FAILS CLOSED ON MAIN A(B) - LOSS OF ALL ABILITY TO SWITCH POWER TO MAIN B(A) WITH ASSOCIATED RPC FOR OTHER EMU POWER SUPPLY AND BATTERY CHARGER.
- 3) ASSOCIATED RESISTOR FAILS OPEN LOSING CONTROL POWER TO SWITCH RPC FROM MAIN A(B) TO MAIN B(A) BUS POWER SOURCE TO EMU POWER SUPPLIES AND BATTERY CHARGERS - LOSS OF ABILITY TO PROVIDE POWER TO EMU AND TO CHARGE BATTERIES. WORST CASE IF FAILURE OCCURS FOLLOWING AN INITIAL EVA WHERE SUBSEQUENT EVA MUST BE PERFORMED USING ONE EMU WITH THE SPARE BATTERY PACK.
- 4) LOSS OF THE SPARE BATTERY PACK FOR BOTH EMU'S - LOSS OF BOTH EMU'S WOULD PRECLUDE SUBSEQUENT EVA CAPABILITIES.
- 5) 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 LOSS OF CREW/VEHICLE.

DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)):

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(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 FIFTH FAILURE (FAILURE NECESSITATING AN EVA TO PREVENT A POTENTIAL CATASTROPHIC SITUATION) - INABILITY TO PERFORM CONTINGENCY EVA (SIXTH 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: DAYS

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 REDUNDANT EMU POWER SUPPLY AND BATTERY CHARGER BUS SELECT SWITCH CAN BE USED TO SWITCH TO THE OTHER BUS (MAIN BUS A OR B).

HAZARD REPORT NUMBER(S): NONE

**HAZARD(S) DESCRIPTION:
NONE**

- APPROVALS -

SS&PAE
DESIGN ENGINEERING

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

J. Kimura 4-13-98
C. J. Arroyo