

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE  
 NUMBER:05-2B-22103M -X

SUBSYSTEM NAME: COMM & TRACK: UHF SPACE COMMUNICATION  
 REVISION: 0 10/03/96

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PART DATA

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	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: PANEL 06	VO70-730389
SRU	: SWITCH, TOGGLE	ME452-0102-8301

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EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
 TOGGLE SWITCH, UHF TRANSMIT FREQUENCY, 3P2P

REFERENCE DESIGNATORS: 33V73A6S7

QUANTITY OF LIKE ITEMS: 1  
 ONE POLE FOR ATC, ONE POLE FOR EVA, ONE POLE SW SCAN

FUNCTION:  
 SELECTS 259.7 MHZ OR 295.8 MHZ TRANSMIT FREQUENCY ON THE UHF - ATC  
 TRANCEIVER FOR AIR-TO-GROUND OR AIR-TO-AIR COMMUNICATION. SELECTS  
 FREQUENCY (414.2 MHZ OR 417.1 MHZ) ON THE SPACE-TO-SPACE ORBITER RADIO  
 (SSOR) FOR EVA OR STATION RENDEZVOUS COMMUNICATIONS.

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

**NUMBER: 05-2B-22103M-02**

**REVISION#: 0 10/03/96**

**SUBSYSTEM NAME: COMM & TRACK: UHF SPACE COMMUNICATION**

**LRU: PANEL 06**

**CRITICALITY OF THIS**

**ITEM NAME: SWITCH, TOGGLE**

**FAILURE MODE: 1R3**

**FUNCTIONAL CRITICALITY/**

**REQUIRED FAULT TOLERANCE/ACHIEVED FAULT TOLERANCE:1R/2/3**

**FAILURE MODE:**

**FAILS OPEN**

**MISSION PHASE:**

- PL PRE-LAUNCH
- LO LIFT-OFF
- OD ON-ORBIT
- LS LANDING/SAFING

**VEHICLE/PAYLOAD/KIT EFFECTIVITY:**

- 102 COLUMBIA
- 103 DISCOVERY
- 104 ATLANTIS
- 105 ENDEAVOUR
- AFTER SPACE COMM MODIFICATION

**CAUSE:**

PIECE PART STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY, 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)

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**CORRECTING ACTION:** MANUAL

**CORRECTING ACTION DESCRIPTION:**

FOR SSOR - HAVE ALL USERS CONFIGURE FOR THE FUNCTIONAL FREQUENCY.

FOR ATC - CREW MUST MANUALLY SELECT GUARD T/R. ASCENT POCKET CHECKLIST AND ENTRY POCKET CHECKLIST DIRECT CREW TO SELECT GUARD T/R IF OTHER COMM IS LOST.

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- FAILURE EFFECTS -

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**(A) SUBSYSTEM:**

NO EFFECT ON DOWNLINK, BOTH GROUND RECEIVERS ACTIVE SIMULTANEOUSLY. LOSS OF UPLINK ON 296.8 OR 259.7 MHZ. GUARD T/R MODE NOT AFFECTED.

(REFER TO "ADDITIONAL DATA" FOR LESS CRITICAL EFFECTS SCENARIOS).

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

NO EFFECT ON DOWNLINK, BOTH GROUND RECEIVERS ACTIVE SIMULTANEOUSLY. LOSS OF UPLINK ON 296.8 OR 259.7 MHZ. GUARD T/R MODE NOT AFFECTED.

(REFER TO "ADDITIONAL DATA" FOR LESS CRITICAL EFFECTS SCENARIOS).

**(C) MISSION:**

NO EFFECT - FIRST FAILURE

LOSS OF MISSION IF STATION RENDEZVOUS IS REQUIRED. LOSS OF MISSION DUE TO LOSS OF RF COMMAND AND/OR VOICE COMMUNICATION TO SPACE STATION. WORST CASE - STATION RENDEZVOUS MUST BE TERMINATED.

(REFER TO "ADDITIONAL DATA" FOR LESS CRITICAL EFFECTS SCENARIOS).

**(D) CREW, VEHICLE, AND ELEMENT(S):**

NO EFFECT - FIRST FAILURE

(REFER TO "ADDITIONAL DATA" FOR LESS CRITICAL EFFECTS SCENARIOS).

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

POSSIBLE LOSS OF CREW/VEHICLE AFTER 4 FAILURES (THIS SWITCH FAILS, LOSS OF GUARD FREQUENCY, AND LOSS OF 2 S-BAND) DUE TO LOSS OF STATE VECTOR UPDATE.

(REFER TO "ADDITIONAL DATA" FOR LESS CRITICAL EFFECTS SCENARIOS).

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-ADDITIONAL DATA-

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FOR OTHER MISSION PHASES: 2R3, PPP

**(A) SUBSYSTEM:**

IF THE XMIT FREQ HI AND THE XMIT FREQ LO LINES ARE BOTH OPEN, THE SSOR WILL  
DEFAULT TO TRANSMIT/RECEIVE ON 417.1 MHZ.

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

NO EFFECT - FIRST FAILURE

**(C) MISSION:**

NO EFFECT - FIRST FAILURE

**(D) CREW, VEHICLE, AND ELEMENT(S):**

NO EFFECT

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

POSSIBLE LOSS OF MISSION AFTER TWO FAILURES (THIS SWITCH FAILS AND LOSS OF  
THE DEFAULT FREQUENCY) DUE TO LOSS OF SPACE-TO-SPACE COMMUNICATIONS.

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- TIME FRAME -

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TIME FROM FAILURE TO CRITICAL EFFECT: MINUTES

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- APPROVALS -

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PRODUCT ASSURANCE ENGR : VAN D. NGUYEN  
DESIGN ENGINEERING : G. J. SCHWARTZ

*Van Nguyen 8-20-98*  
*G. J. Schwartz 8-21-98*