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PRINT DATE: 08/24/93

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE  
NUMBER: 05-6ED-2028-X**

**SUBSYSTEM NAME: EPD&C - ET UMBILICAL DOORS**

**REVISION: 5 08/24/93**

	<b>PART NAME VENDOR NAME</b>	<b>PART NUMBER VENDOR NUMBER</b>
LRU	: PANEL R2	V070-730277
SRU	: SWITCH, TOGGLE	ME452-0102-7451

**PART DATA**

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
SWITCH, TOGGLE, HERMETICALLY SEALED, 4P2P - ORBITER/EXTERNAL TANK (ORB/ET)  
UMBILICAL DOOR MODE SWITCH**

**REFERENCE DESIGNATORS: 32V73A2S47**

**QUANTITY OF LIKE ITEMS: 1  
ONE**

**FUNCTION:**

SELECTS GPC OR MANUAL MODE FOR ET DOOR OPERATION. GPC MODE ALLOWS AUTOMATIC ET DOOR CLOSING CONTROL BY THE GPC DURING RTLS OR AS AN ALTERNATE TO THE MANUAL MODE (PRIME) FOLLOWING A NORMAL BOOST PHASE. CONTROLS POWER TO HYBRID RELAYS TO STOW CENTERLINE LATCHES AND TO CLOSE AND LATCH ET UMBILICAL DOORS. MANUAL MODE PROVIDES CONTROL POWER TO PERMIT OPERATION OF CENTERLINE LATCHES AND ET UMBILICAL DOORS AND LATCHES USING MANUAL SWITCHES ON NORMAL ASCENT.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL FAILURE MODE  
NUMBER: 05-6ED-2028-04**

SUBSYSTEM NAME: EPD&C - ET UMBILICAL DOORS  
LRU : PANEL R2  
ITEM NAME: SWITCH, TOGGLE  
REVISION# 5 08/24/93 R  
CRITICALITY OF THIS FAILURE MODE: 1R2

**FAILURE MODE:**  
FAILS CLOSED (MULTIPLE CONTACT SET)

**MISSION PHASE:**  
LO LIFT-OFF  
DO DE-ORBIT

**VEHICLE/PAYLOAD/KIT EFFECTIVITY:** 102 COLUMBIA  
103 DISCOVERY  
104 ATLANTIS  
105 ENDEAVOUR

**CAUSE:**  
PIECE PART STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY

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

**REDUNDANCY SCREEN** A) PASS  
B) PASS  
C) PASS

**PASS/FAIL RATIONALE:**  
A)  
B)  
C)

**- FAILURE EFFECTS -**

**(A) SUBSYSTEM:**  
FIRST FAILURE - NO EFFECT

**(B) INTERFACING SUBSYSTEM(S):**  
FIRST FAILURE - NO EFFECT

**(C) MISSION:**  
FIRST FAILURE - NO EFFECT

**(D) CREW, VEHICLE, AND ELEMENT(S):**  
FIRST FAILURE - NO EFFECT

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL FAILURE MODE  
NUMBER: 05-6ED-2026-04

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

BOTH (S47 & S48) FAIL CLOSED MAY RESULT IN INADVERTENT STOWAGE OF CENTERLINE LATCHES PRIOR TO EXTERNAL TANK SEPARATION. POSSIBLE LOSS OF CREW/VEHICLE DUE TO PREMATURE STOWING ONE OF TWO CENTERLINE LATCHES DURING ASCENT PARTIALLY RELEASING AND SUBJECTING THE LESS RESTRAINED ET DOORS TO THE BOOST ENVIRONMENT. POSSIBLE DOOR DAMAGE/LOSS COULD OCCUR DURING THE ASCENT PHASE WHEN DOORS ARE NOT SECURED BY BOTH CENTERLINE LATCHES. POSSIBLE LOSS OF CREW/VEHICLE DUE TO STRUCTURAL DAMAGE CAUSED BY THERMAL EFFECTS IF ET DOORS CANNOT BE CLOSED FOR SAFE ENTRY.

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-DISPOSITION RATIONALE-

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**(A) DESIGN:**

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

**(B) TEST:**

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

**GROUND TURNAROUND TEST**

VERIFY SWITCH FUNCTION FOR MANUAL/GPC SELECT CAPABILITY ON RIGHT/LEFT ET DOORS AT MANUAL OPERATION MODE BY: VERIFYING INITIAL MCA STATUS, SENDING THE CENTERLINE LATCH/RELEASE COMMAND BY SWITCH CYCLE AS APPROPRIATE, VERIFYING SWITCH SCAN, AND MONITORING THREE PHASE AC CURRENTS AND OPERATING TIME. TESTS ARE PERFORMED EVERY FLIGHT AND LRU RETEST PER TABLE V56Z00.000.

**(C) INSPECTION:**

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

**(D) FAILURE HISTORY:**

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

**(E) OPERATIONAL USE:**

NONE

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- APPROVALS -

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EDITORIALLY APPROVED  
EDITORIALLY APPROVED  
TECHNICAL APPROVAL

: RI  
: JSC  
: VIA CR

: *[Signature]* 8/24/93  
: *[Signature]* 8/26/93  
: SS0270L