

FAILURE MODES EFFECTS ANALYSIS (FMEA) — CRITICAL HARDWARE

NUMBER: 05-6ED-2028-X

SUBSYSTEM NAME: EPD&C - ET UMBILICAL DOORS

REVISION : 2 08/06/90

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	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	PANEL R2	V070-730277
SRU :	SWITCH, TOGGLE	ME452-0102-7203

PART DATA

- EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
SWITCH, TOGGLE, HERMETICALLY SEALED, 2P3P - LEFT AND RIGHT ORBITER
EXTERNAL TANK (ORB/ET) UMBILICAL DOOR DRIVE
- REFERENCE DESIGNATORS: 32V73A2S49
: 32V73A2S51

QUANTITY OF LIKE ITEMS: 2
TWO

FUNCTION:

PROVIDES THE CREW WITH THE CAPABILITY TO REMOTELY OPERATE THE LEFT AND RIGHT ORB/ET UMBILICAL DOORS. SWITCH POSITIONS ARE "OPEN", "OFF", AND "CLOSE". FOLLOWING ET SEPARATION, THE SWITCH IS OPERATED TO CLOSE THE DOOR. DOOR CLOSURE IS A PREREQUISITE TO SAFE RE-ENTRY.

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SUBSYSTEM: EPD&C - ET UMBILICAL DOORS
LRU :PANEL R2
ITEM NAME: SWITCH, TOGGLE

REVISION# 2 08/06/90 R

CRITICALITY OF THIS
FAILURE MODE:1R2

■ FAILURE MODE:
FAILS OPEN, SHORT-TO-CASE (GROUND)

MISSION PHASE:
DO DE-ORBIT

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

■ 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 - LOSS OF MANUAL MODE OPERATION

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

■ (C) MISSION:
FIRST FAILURE - NO EFFECT

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

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- (E) FUNCTIONAL CRITICALITY EFFECTS:
 POSSIBLE LOSS OF CREW/VEHICLE AFTER SECOND FAILURE (LOSS OF GPC MODE)
 DUE TO STRUCTURAL DAMAGE CAUSED BY THERMAL EFFECTS IF ET DOORS CANNOT
 BE CLOSED FOR SAFE RE-ENTRY.

 - DISPOSITION RATIONALE -

- (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 OPEN/CLOSE OF RIGHT/LEFT ET DOORS BY:
 VERIFYING INITIAL MCA STATUS, SENDING THE OPEN/CLOSE COMMAND BY SWITCH
 CYCLE AS APPROPRIATE, VERIFYING SWITCH SCAN, AND MONITORING THREE PHASE
 AC CURRENT AND OPERATING TIME. TOTAL OPERATING TIMES ARE 24 SEC (MAX)
 FOR TWO MOTORS AND 48 SEC (MAX) FOR SINGLE MOTOR. TESTS ARE PERFORMED
 INFLIGHT FOR DUAL MOTOR OPERATION, EVERY FLIGHT FOR SINGLE MOTOR, 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:

AFT: FIRST FAILURE, THE CREW WILL PERFORM THE DOOR CLOSURE AND
 SUBSEQUENT LATCHING WITH THE GPC SOFTWARE THROUGH A KEYBOARD ITEM
 ENTRY.

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- APPROVALS -

RELIABILITY ENGINEERING:	T. AI	:	TA Miller 8/20/90
DESIGN ENGINEERING	: J. KRAGER	:	J. Krager 8/10/90
QUALITY ENGINEERING	: W. R. HIGGINS	:	W. R. Higgins 8/29/90
NASA RELIABILITY	:	:	David Taylor 10/25/90
NASA SUBSYSTEM MANAGER	:	:	R. M. Ballman 10/25/90
NASA EPD&C RELIABILITY	:	:	David Carls 10/25/90
NASA QUALITY ASSURANCE	:	:	RO [unclear] 9/28/90
NASA EPD&C SUBSYS MGR	:	:	[unclear] 8/25/90