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PRINT DATE: 08/07/90

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 05-6ED-2026-X

1398

SUBSYSTEM NAME: EPD&C - ET UMBILICAL DOORS

REVISION : 2 08/06/90

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
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-2026-03

1380

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

REVISION# 2 08/06/90 R

CRITICALITY OF THIS
FAILURE MODE:IR2

■ FAILURE MODE:
FAILS OPEN, SHORTS-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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NUMBER: 05-6ED-2025-03

- 1406
- (D) CREW, VEHICLE, AND ELEMENT(S):
FIRST FAILURE - NO EFFECT
 - (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 CENTERLINE LATCH
IS NOT RELEASED RESULTING IN INABILITY TO CLOSE AND/OR LATCH EXTERNAL
TANK DOORS PRIOR TO 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 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:

CREW WILL INITIATE DOOR CLOSURE WITH THE GPC SOFTWARE THROUGH A KEYBOARD
ITEM ENTRY.

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NUMBER: 05-6ED-2026-03

- APPROVALS -

RELIABILITY ENGINEERING:	T. AI	:	<u>TA Nelson</u> 9-28-90
DESIGN ENGINEERING	: J. KRAGER	:	<u>J. Krager</u>
QUALITY ENGINEERING	: W. R. HIGGINS	:	<u>WR Higgins</u> 8-21-90
NASA RELIABILITY	:	:	<u>DR Johnson</u> 10-24-90
NASA SUBSYSTEM MANAGER	:	:	<u>L. M. Bales</u> 10/25/90
NASA EPD&C RELIABILITY	:	:	<u>L. M. Bales</u> 10-24-90
NASA QUALITY ASSURANCE	:	:	<u>RD Darr</u> 9/28/90
NASA EPD&C SUBSYS MGR	:	:	<u>T. Higgins</u> FMEA 8/25/90