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PRINT DATE: 08/07/90

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 05-6ED-2030-X

1419

SUBSYSTEM NAME: EPD&C - ET UMBILICAL DOORS

REVISION : 2 08/06/90

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	PANEL R2	VD70-730277
SRU :	SWITCH, TOGGLE	ME452-0102-7403

PART DATA

- EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
SWITCH, TOGGLE, HERMETICALLY SEALED, 4P3P - LEFT AND RIGHT ORBITER/
EXTERNAL TANK (ORB/ET) UMBILICAL DRIVE CLOSE LATCH
- REFERENCE DESIGNATORS: 32V73A2S50
: 32V73A2S52
- QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:

PROVIDES THE CREW WITH THE CAPABILITY TO REMOTELY OPERATE THE LEFT AND RIGHT ORB/ET UMBILICAL DOOR CLOSE LATCHES. SWITCH POSITIONS ARE "LATCH-OFF-RELEASE". FOLLOWING ET SEPARATION THE DOORS ARE CLOSED AND LATCHED FOR SAFE RE-ENTRY.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6ED-2030-03

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 I/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
- (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
LATCHED 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 RIGHT/LEFT ET DOOR CLOSE LATCH CONTROL BY:
VERIFYING INITIAL MCA STATUS, SENDING THE RELEASE/LATCH COMMAND BY
SWITCH CYCLE AS APPROPRIATE, VERIFYING SWITCH SCAN, AND MONITORING
THREE PHASE AC CURRENTS AND OPERATING TIME. TOTAL OPERATING TIMES ARE
6 SEC (MAX) FOR TWO MOTORS AND 12 SEC (MAX) FOR SINGLE MOTOR. TESTS ARE
PERFORMED INFLIGHT FOR DUAL MOTOR OPERATION, EVERY FLIGHT FOR SINGLE
MOTOR, AND LRU RETEST PER TABLE V56200.000.
- (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:
AFTER FIRST FAILURE, THE CREW WILL PERFORM DOOR LATCHING WITH THE GPC
SOFTWARE THROUGH A KEYBOARD ITEM ENTRY.

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- APPROVALS -

RELIABILITY ENGINEERING: T. AI
 DESIGN ENGINEERING : J. KRAGER
 QUALITY ENGINEERING : W. R. HIGGINS
 NASA RELIABILITY :
 NASA SUBSYSTEM MANAGER :
 NASA EPJ&C RELIABILITY :
 NASA QUALITY ASSURANCE :
 NASA EPJ&C SUBSYS MGR :

JA. M. Clayton 8-20-90
J. M. Anderson 8-14-90
W. R. Higgins 8-29-90
W. R. Higgins 10-25/90
R. M. Balgobin 10/25/90
J. M. Anderson 10-24-90
RD [unclear] 9/23/90
J. M. Anderson for E. M. [unclear] 12/5/90