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PRINT DATE: 05/22/91

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 05-6ED-2027-X

SUBSYSTEM NAME: EPD&C - ET UMBILICAL DOORS

REVISION : 4 05/21/91

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	PANEL R2	V070-730277
SRU :	SWITCH, TOGGLE	ME452-0102-7401

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

SWITCH, TOGGLE, HERMETICALLY SEALED, 4P2P - LEFT AND RIGHT ORBITER
EXTERNAL TANK (ORB/ET) UMBILICAL DOOR CENTERLINE LATCHES

REFERENCE DESIGNATORS: 32V73A2548

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:

PROVIDES THE CREW WITH THE CAPABILITY TO REMOTELY STOW THE CENTERLINE
LATCHES OF THE LEFT AND RIGHT ORB/ET UMBILICAL DOORS. IN THE "GND"
POSITION, THE SWITCH HAS NO OUTPUT. THE LATCHES ROTATE AND STOW WITHIN
THE VEHICLE MOLD LINE WHEN THE SWITCH IS IN "STOW" POSITION.

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FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6ED-2027-02

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

REVISION# 4 05/21/91 R

CRITICALITY OF THIS
FAILURE MODE:R2

FAILURE MODE:
FAILS CLOSED (MULTIPLE CONTACT SETS)

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

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(C) MISSION:
FIRST FAILURE - NO EFFECT

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

(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.

- 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 THAT STOWS THE CENTERLINE LATCHES OF THE RIGHT/LEFT ET DOORS BY: VERIFYING INITIAL MCA STATUS, SENDING THE CENTERLINE LATCH/RELEASE COMMAND BY SOFTWARE OR SWITCH CYCLE AS APPROPRIATE, VERIFY 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 OPERATION, 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 -

RELIABILITY ENGINEERING:	T. AI	:	<i>TA McNamee</i>	<i>4/29/91</i>
DESIGN ENGINEERING	: T. POCKLINGTON	:	<i>A.M. DeBell</i>	<i>6/24/91</i>
QUALITY ENGINEERING	: W. R. HIGGINS	:	<i>W.R. Higgins</i>	<i>7/10/91</i>
NASA RELIABILITY	:	:	<i>W.R. Higgins</i>	<i>1/13/92</i>
NASA SUBSYSTEM MANAGER	:	:	<i>R. Howard</i>	<i>1/29/92</i>
NASA EPD&C RELIABILITY	:	:	<i>S.D. Cooper</i>	<i>10/2 S. Woodward 2-7-92</i>
NASA QUALITY ASSURANCE	:	:	<i>K.O. Bland</i>	<i>1/8/92</i>
NASA EPD&C SUBSYS MGR	:	:	<i>L. Woodward</i>	<i>for E. H. ... 7 Feb 92</i>