FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 05-6ED-2129-X

SUBSYSTEM NAME: EPD&C - ET UMBILICAL DOORS
REVISION : 4 05/21/91

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	AFT MCA-1	V070-765410
LRU	:	AFT MCA-2	V070-765420
LRU	:	AFT MCA-3	V070-765430
LRU	:	AFT MCA-3	V070-765600
LRU	:	AFT MCA-2	V070-765620
LRU	:	AFT MCA-1	V070-765630
SRU	:	RELAY, HYBRID	MC455-0135-0001
SRU	:	RELAY, HYBRID	MC455-0135-0002

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
RELAY, HYBRID, 4 POLE, NON-LATCH, LEFT AND RIGHT DOOR DRIVE - CLOSE CIRCUITS

REFERENCE DESIGNATORS: 54V76A114K16
: 55V76A115K9
: 56V76A116K10
: 56V76A116K16

QUANTITY OF LIKE ITEMS: 4
FOUR

FUNCTION:
WHEN COMMANDED, THE HYBRID RELAY CONTACT SETS CONNECT 3-PHASE AC POWER TO MOTORS IN THE PROPER SEQUENCE TO CLOSE THE LEFT AND RIGHT ORBITER/ EXTERNAL TANK UMBILICAL DOORS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6ED-2129-02

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REVISION# 2 09/07/90 R

SUBSYSTEM: EPD&C - ET UMBILICAL DOORS
LRU :AFT MCA-1
ITEM NAME: RELAY, HYBRID

CRITICALITY OF THIS FAILURE MODE:1R2

■ FAILURE MODE:
FAILS CLOSED (DC CONTROL LOGIC CIRCUIT FAILS ON)

MISSION PHASE:
OO OE-ORBIT

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

■ CAUSE:
PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY, THERMAL STRESS

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:
AFTER SECOND FAILURE (INADVERTENT ARM RELAY CLOSURE), DOOR DRIVE WOULD FUNCTION AGAINST CENTERLINE LATCHES CAUSING DAMAGE TO LINK MECHANISM AND POSSIBLY RESULTING IN INABILITY TO CLOSE DOOR (DOOR LINKAGE MAY NOT WITHSTAND STALL TORQUE WITHIN 8 1/2 DEGREES FROM OPEN POSITION). POSSIBLE LOSS OF CREW/VEHICLE IF DOORS CANNOT BE CLOSED RESULTING IN STRUCTURAL DAMAGE DUE TO THERMAL EFFECTS DURING RE-ENTRY.

- DISPOSITION RATIONALE -

■ (A) DESIGN:
REFER TO APPENDIX C, ITEM NO. 1 - HYBRID RELAY

■ (B) TEST:
REFER TO APPENDIX C, ITEM NO. 1 - HYBRID RELAY

GROUND TURNAROUND TEST
VERIFY HYBRID RELAY FUNCTION THAT CONNECTS AC BUSES TO RIGHT/LEFT DOOR DRIVE MOTOR BY: VERIFYING INITIAL MCA STATUS, SENDING THE OPEN/CLOSE COMMAND BY SOFTWARE OR SWITCH CYCLE AS APPROPRIATE, VERIFYING SWITCH SCAN, AND MONITORING THREE PHASE AC CURRENTS 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 C, ITEM NO. 1 - HYBRID RELAY

(D) FAILURE HISTORY:
REFER TO APPENDIX C, ITEM NO. 1 - HYBRID RELAY

(E) OPERATIONAL USE:
NONE

PRINT DATE: 08/07/90

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- APPROVALS -

RELIABILITY ENGINEERING	T. AI	8-20-90
DESIGN ENGINEERING	J. KRAGER	7-16-90
QUALITY ENGINEERING	W. R. HIGGINS	7-25-90
NASA RELIABILITY		10/16/90
NASA SUBSYSTEM MANAGER		10/25/90
NASA EPD&C RELIABILITY		10-24-90
NASA QUALITY ASSURANCE		9/28/90
NASA EPD&C SUBSYS MGR		