FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 05-6ED-2130-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-OPEN CIRCUITS

REFERENCE DESIGNATORS: 54V76A114K15
: 55V76A115K10
: 56V76A116K11
: 56V76A116K17

QUANTITY OF LIKE ITEMS: 4
FOUR

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

PRINT DATE: 05/22/91

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6ED-2130-03

REVISION# 4 05/21/91 R

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

CRITICALITY OF THIS FAILURE MODE:1R2

FAILURE MODE:
SHORTS CONTACT-TO-CONTACT (PHASE "B" OR PHASE "C")

MISSION PHASE:
DO DE-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 - INADVERTENTLY CONNECTS ONE AC PHASE TO ASSOCIATED MOTOR. WHEN THE DOOR CLOSE COMMAND IS GIVEN, A PHASE-TO-PHASE SHORT WOULD OCCUR CAUSING AC CIRCUIT BREAKER TO TRIP RESULTING IN LOSS OF AC POWER TO ALL DOOR AND LATCH FUNCTIONS OF ASSOCIATED MOTOR CONTROLLER ASSEMBLY.

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(B) INTERFACING SUBSYSTEM(S):
FIRST FAILURE - INABILITY TO USE ASSOCIATED MOTOR

(C) MISSION:
FIRST FAILURE - NO EFFECT

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

(E) FUNCTIONAL CRITICALITY EFFECTS:
POSSIBLE LOSS OF CREW/VEHICLE AFTER SECOND FAILURE (LOSS OF REDUNDANT MOTOR) DUE TO STRUCTURAL DAMAGE CAUSED BY THERMAL EFFECTS WHEN DOORS CANNOT BE CLOSED.

- 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 BY PERFORMING DOOR OPEN/CLOSE FUNCTIONAL: VERIFYING INITIAL MCA STATUS, SENDING THE OPEN/CLOSE COMMAND BY SOFTWARE OR 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 EVERY FLIGHT 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

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- APPROVALS -

RELIABILITY ENGINEERING	T. AI	
DESIGN ENGINEERING	T. POCKLINGTON	
QUALITY ENGINEERING	W. R. HIGGINS	
NASA RELIABILITY		
NASA SUBSYSTEM MANAGER		
~~NASA SUBSYSTEM MANAGER~~		
NASA EPD&C RELIABILITY		
NASA QUALITY ASSURANCE		
NASA EPD&C SUBSYS MGR		