

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
 NUMBER: 05-6ED-2131-X

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SUBSYSTEM NAME: EPD&C - ET UMBILICAL DOORS

REVISION : 2 08/06/90

	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 ANDS RIGHT ORBITER/EXTERNAL
 (ORB/ET) TANK DOOR CLOSE LATCH - LATCH CIRCUIT

REFERENCE DESIGNATORS: 54V76A114K17
 : 54V76A114K18
 : 55V76A115K13
 : 55V76A115K14
 : 55V76A115K57
 : 56V76A115K59
 : 56V76A116K12
 : 56V76A116K13

QUANTITY OF LIKE ITEMS: 8
 EIGHT

FUNCTION:
 THE HYBRID RELAYS ARE USED IN SERIES TO CONNECT 3-PHASE AC POWER TO EACH
 ET/ORB LEFT AND RIGHT DOOR CLOSE LATCH ACTUATOR DRIVE.

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

CRITICALITY OF THIS
FAILURE MODE:1R2

- FAILURE MODE:
OPEN, FAILS TO CONDUCT, FAILS TO TRANSFER, SHORT TO STRUCTURE (CASE),
SHORT POLE-TO-POLE

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 - UNABLE TO PROVIDE POWER TO ASSOCIATED MOTOR
- (B) INTERFACING SUBSYSTEM(S):
FIRST FAILURE - LOSS OF ASSOCIATED MOTOR

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■ (C) MISSION:
FIRST FAILURE - NO EFFECT

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

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■ (E) FUNCTIONAL CRITICALITY EFFECTS:
POSSIBLE LOSS OF CREW/VEHICLE AFTER SECOND FAILURE (LOSS OF REDUNDANT MOTOR) DUE TO STRUCTURAL DAMAGE CAUSED BY THERMAL EFFECTS IF DOOR CANNOT BE SECURELY CLOSED (LATCHED) FOR SAFE 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 CLOSE LATCH ACTUATOR DRIVE BY PERFORMING UNLOCK LATCH FUNCTIONAL : VERIFYING INITIAL MCA STATUS, SENDING THE RELEASE/LATCH COMMAND BY SOFTWARE OR 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 INFIGHT FOR DUAL MOTOR OPERATION, EVERY FLIGHT FOR SINGLE MOTOR, AND LRU RETEST PER TABLE V56200.000.

■ (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 : J. KRAGER
 QUALITY ENGINEERING : W. R. HIGGINS
 NASA RELIABILITY :
 NASA SUBSYSTEM MANAGER :
 NASA EPD&C RELIABILITY :
 NASA QUALITY ASSURANCE :
 NASA EPD&C SUBSYS MGR :

: ~~JA [Signature]~~ 8-24-90
 : ~~J. M. [Signature]~~ 9-11-90
 : ~~[Signature]~~ 8-29-90
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