

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE
NUMBER: 05-6ED-2132-X**

SUBSYSTEM NAME: EPD&C - ET UMBILICAL DOORS

REVISION: 5 08/24/93

	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 ORBITER/ET DOOR CLOSE
LATCH - RELEASE CIRCUIT

REFERENCE DESIGNATORS: 54V76A114K19
54V76A114K20
55V76A115K11
55V76A115K12
55V76A115K58
55V76A115K56
56V76A116K14
56V76A116K15

QUANTITY OF LIKE ITEMS: 8
EIGHT

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

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL FAILURE MODE
NUMBER: 05-6ED-2132-04**

REVISION# 5 08/24/93 R

SUBSYSTEM NAME: EPD&C - ET UMBILICAL DOORS

LRU : AFT MCA-1

ITEM NAME: RELAY, HYBRID

CRITICALITY OF THIS
FAILURE MODE: 1R2

FAILURE MODE:
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, 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 - 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 MCA

(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

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(E) FUNCTIONAL CRITICALITY EFFECTS:

CASE I:

1R2, PPP, 2 SUCCESS PATHS. MISSION PHASE: DE-ORBIT

- 1) HYBRID RELAY SHORTS POLE-TO-POLE (SOURCE SIDE)
- 2) LOSS OF REDUNDANT MOTOR

PHASE-TO-PHASE SHORT WOULD OCCUR AFTER FIRST FAILURE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO STRUCTURAL DAMAGE CAUSED BY THERMAL EFFECTS IF DOOR CANNOT BE LATCHED FOR SAFE RE-ENTRY.

CASE II:

1R2, PPP, 2 SUCCESS PATHS. MISSION PHASE: DE-ORBIT

- 1) HYBRID RELAY SHORTS POLE-TO-POLE (MOTOR SIDE)
- 2) LOSS OF REDUNDANT MOTOR

WHEN LATCH COMMAND IS GIVEN, PHASE-TO-PHASE SHORT WOULD OCCUR CAUSING AC CIRCUIT BREAKER TO TRIP. POSSIBLE LOSS OF CREW/VEHICLE DUE TO STRUCTURAL DAMAGE CAUSED BY THERMAL EFFECTS IF DOOR CANNOT BE 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

VERIFYING HYBRID RELAY FUNCTION THAT CONNECTS AC BUSES TO RIGHT/LEFT CLOSE LATCH ACTUATOR DRIVE BY PERFORMING LATCH FUNCTION: VERIFYING INITIAL MCA STATUS, SENDING THE RELEASE/LATCH COMMAND BY SOFTWARE OR SWITCH CYCLE AS APPROPRIATE, MONITORING THREE PHASE AC CURRENTS AND OPERATING TIME. TOTAL OPERATING TIME WITH SINGLE MOTOR IS 12 SEC (MAX). 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 -

EDITORIALLY APPROVED
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TECHNICAL APPROVAL

: RI
: JSC
: VIA CR

[Handwritten signatures and dates]
: *[Signature]* 8/24/93
: *[Signature]* 8/24/93
: S502/OL