

FAILURE MODES EFFECTS ANALYSIS (FMEA) — CRITICAL HARDWARE

NUMBER: 05-6AB-2134-X

SUBSYSTEM NAME: EPD&C - ACTUATOR, VENT DOORS

REVISION : 2 07/20/90

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	MID MCA-4	V070-764500
LRU :	MID MCA-1	V070-764520
LRU :	MID MCA-2	V070-764530
LRU :	MID MCA-3	V070-764550
LRU :	MID MCA-1	V070-764610
LRU :	MID MCA-2	V070-764620
LRU :	MID MCA-3	V070-764630
LRU :	MID MCA-4	V070-764640
SRU :	RELAY, HYBRID	MC455-0135-0001

PART DATA

- EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
RELAY, HYBRID, FOUR POLE, NON-LATCH, RIGHT AND LEFT PAYLOAD BAY VENT DOORS 6, "CLOSE/PURGE" CONTROL
- REFERENCE DESIGNATORS: 40V76A117K2
: 40V76A117K4
: 40V76A118K1
: 40V76A118K3
: 40V76A119K52
: 40V76A119K66
: 40V76A120KJ
: 40V76A120K15
- QUANTITY OF LIKE ITEMS: 8
EIGHT (FOUR PER SIDE)
- FUNCTION:
UPON RECEIVING A STIMULUS FROM ASSOCIATED HYBRID DRIVERS OR BY DIRECT

PAGE: 2

PRINT DATE: 07/23/90

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COMMAND FROM A FLIGHT MDM, CONTACT SETS OF TWO HYBRID RELAYS IN SERIES
CONNECT THREE PHASE AC VOLTAGE TO ACTUATOR MOTORS TO OPERATE THE LEFT
AND RIGHT AFT PAYLOAD BAY VENT DOORS 6 TO THE CLOSE OR PURGE POSITION.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-GAB-2134-03

SUBSYSTEM: EPD&C - ACTUATOR, VENT DOORS
LRU :MID MCA-4
ITEM NAME: RELAY, HYBRID
REVISION# 2 07/20/90 R
CRITICALITY OF THIS FAILURE MODE:1R3

■ 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) FAIL
■ C) PASS

PASS/FAIL RATIONALE:

■ A)

■ B)
FAILS SCREEN "B" BECAUSE HYBRID RELAY SHORTS CONTACT-TO-CONTACT IS NOT
READILY DETECTABLE.

■ 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:
 1. HYBRID RELAY SHORTS CONTACT TO CONTACT (EITHER PHASE "B" OR PHASE "C")
 2. SERIAL HYBRID RELAY SHORTS CONTACT-TO-CONTACT ON SIMILAR PHASE
 3. LOSS OF REDUNDANT MOTOR
 4. REDUNDANT DOOR FAILS CLOSED

AFTER THE SECOND FAILURE, PHASE-TO-PHASE SHORT WOULD OCCUR WHEN OPEN COMMAND IS PRESENT CAUSING AC CIRCUIT BREAKER TO TRIP WHICH RESULTS IN LOSS OF ABILITY TO OPEN VENT DOOR VIA ASSOCIATED MOTOR. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO PROVIDE SUFFICIENT VENTING IF BOTH VENT DOORS FAIL CLOSED RESULTING IN STRUCTURAL OVERLOAD DURING 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
NO OMRSD TEST AVAILABLE
- (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 SUPERVISOR : J. COURSEN
 NASA RELIABILITY :
 NASA SUBSYSTEM MANAGER :
 NASA SUBSYSTEM MANAGER :
 NASA EPD&C RELIABILITY :
 NASA QUALITY ASSURANCE :

: ~~T. AI~~ 7/21/90
 : ~~J. Krager~~ 7/21/90
 : ~~J. Courson~~ 8/24/90
 : ~~J. Courson~~ 9/6/90
 : ~~R. M. Holloman~~ 9/4/90
 : ~~J. P. Courson~~ 8/21/90
 : ~~J. Courson~~ 8/21/90
 : ~~R. M. Holloman~~ 8/24/90