

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 05-6EB-2005-X

SUBSYSTEM NAME: EPD&C - PAYLOAD BAY DOORS

REVISION : 2 05/16/90

	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-1	V070-764610
LRU :	MID MCA-2	V070-764620
LRU :	MID MCA-4	V070-764640
SRU :	RELAY, HYBRID	MC455-0135-0001
SRU :	RELAY, HYBRID	MC455-0135-0002

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
RELAY, HYBRID, PAYLOAD BAY DOOR DRIVE MOTOR CONTROL

REFERENCE DESIGNATORS: 40V76A117K42
: 40V76A117K54
: 40V76A118K10
: 40V76A118K12
: 40V76A120K10
: 40V76A120K22
: 40V76A120K31
: 40V76A120K43

QUANTITY OF LIKE ITEMS: 8
8, 2/PLBD DRIVE MOTOR

FUNCTION:
HYBRID RELAY WITH MANUAL "OPEN/CLOSE" STIMULI APPLIED AND WITHOUT INHIBITS, TWO RELAYS, ONE FOR OPEN AND THE OTHER FOR CLOSE, CONNECT 3 PHASE AC POWER TO PAYLOAD BAY DOORS DRIVE MOTORS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6EB-2005-01

SUBSYSTEM: EPD&C - PAYLOAD BAY DOORS
LRU :MID MCA-4
ITEM NAME: RELAY, HYBRID

REVISION# 2 05/16/90 R

CRITICALITY OF THIS
FAILURE MODE:IR2

- FAILURE MODE:
OPEN, FAILS TO CONDUCT, INADVERTENTLY OPENS, FAILS TO TRANSFER, SHORT TO
STRUCTURE (GROUND), SHORT POLE-TO-POLE

MISSION PHASE:

OO ON-ORBIT
DO DE-ORBIT

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

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

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REUNDANCY SCREEN A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:

A)
B)
C)

- FAILURE EFFECTS -

- (A) SUBSYSTEM:
FIRST FAILURE - INABILITY TO PROVIDE POWER TO ONE OF THE PLBD DRIVE
MOTOR
- (B) INTERFACING SYSTEM(S):
FIRST FAILURE - LOSS OF ONE PLBD DRIVE MOTOR

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- (C) MISSION:
FIRST FAILURE - NO EFFECT
- (D) CREW, VEHICLE, AND ELEMENT(S):
FIRST FAILURE - NO EFFECT
- (E) FUNCTIONAL CRITICALITY EFFECTS:
SECOND FAILURE (HYBRID RELAY IN ASSOCIATED REDUNDANT CIRCUIT FAILS TO TRANSFER) WILL CAUSE LOSS OF POWER PATHS TO BOTH PAYLOAD BAY DOOR DRIVE MOTORS. FAILURE TO CLOSE PAYLOAD BAY DOORS WILL RESULT IN UNSAFE CONFIGURATION FOR ENTRY (1R2). FAILURE TO OPEN PAYLOAD BAY DOORS WILL RESULT IN LOSS OF MISSION (2R3).

- 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 POWER PATHS TO PAYLOAD BAY DOOR MOTORS BY: REVERIFYING INITIAL MCA STATUS, SENDING THE OPEN/CLOSE COMMAND BY SOFTWARE OR SWITCH CYCLE AS APPROPRIATE, VERIFYING LIMIT-SWITCH OR TALKBACK STATUS WHERE AVAILABLE (E.G., READY-TO-LATCH DOOR INDICATIONS), AND MONITORING AC CURRENTS AND DOOR OPERATING TIMES. TESTS ARE PERFORMED INFLIGHT (GROUND CHECKOUT IF VALID FLIGHT DATA IS UNAVAILABLE) FOR DUAL MOTOR OPERATION, ALTERNATE FLOW FOR SINGLE MOTOR OPERATION (ODD FLOW: MOTOR 1 TO OPEN & MOTOR 2 TO CLOSE, AND VICE VERSA FOR EVEN FLOW), AND LRU RETEST PER TABLE V37200.000.
- (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 IS REQUIRED FOR THE FIRST FAILURE. EVA CAPABILITY EXISTS TO CLOSE PAYLOAD BAY DOORS AFTER MULTIPLE FAILURES.

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 - APPROVALS -

RELIABILITY ENGINEERING:	T. AI	:	<u>TA News Clon 6.22.90</u>
DESIGN ENGINEERING	: T. BANHIDY	:	<u>[Signature]</u>
QUALITY ENGINEERING	: W. R. HIGGINS	:	<u>[Signature]</u>
NASA RELIABILITY	:	:	<u>[Signature]</u>
NASA SUBSYSTEM MANAGER	:	:	<u>[Signature]</u>
NASA QUALITY ASSURANCE	:	:	<u>R. M. Balchman 8/23/90</u>
NASA EPD/C SUBSYS MGR	:	:	<u>[Signature]</u>
NASA EPDC Reliability	:	:	<u>[Signature] for S. Woodard 8/22/90</u>