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PRINT DATE: 08/24/93

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE
NUMBER: 06-6ED-2127-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, CENTERLINE LATCHES - STOW CIRCUITS

REFERENCE DESIGNATORS: 54V76A114K7
54V76A114K8
54V76A114K12
54V76A114K13
55V76A115K15
55V76A115K16
56V76A116K7
56V76A116K8

QUANTITY OF LIKE ITEMS: 8
EIGHT

FUNCTION:

TWO HYBRID RELAYS ARE USED IN SERIES TO CONNECT THREE-PHASE AC POWER TO EACH CENTERLINE LATCH ACTUATOR DRIVE FOR THE ROTATE AND STOW OPERATIONS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-6ED-2127-02

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:
CLOSED, PREMATURELY CLOSES

MISSION PHASE:
LO LIFT-OFF
OO OE-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 - ASSOCIATED RELAY INADVERTENTLY ENERGIZES

(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:

POSSIBLE LOSS OF CREW/VEHICLE AFTER SECOND FAILURE (REMAINING RELAY IN SERIES FAILS CLOSED) DUE TO PREMATURE STOWING ONE OF TWO CENTERLINE LATCHES DURING ASCENT PHASE PARTIALLY RELEASING AND SUBJECTING LESS RESTRAINED ET DOORS TO BOOST ENVIRONMENT. POSSIBLE DOOR DAMAGE OR LOSS COULD OCCUR DURING ASCENT PHASE WHEN THE DOORS ARE NOT SECURED BY BOTH CENTERLINE LATCHES. POSSIBLE LOSS OF CREW/VEHICLE DUE TO STRUCTURAL DAMAGE CAUSED BY THERMAL EFFECTS IF ET DOORS CANNOT BE CLOSED FOR SAFE 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 EACH CENTERLINE LATCH DRIVE MOTOR BY: VERIFYING INITIAL MCA STATUS, SENDING THE LATCH/RELEASE COMMAND BY SOFTWARE OR SWITCH CYCLE AS APPROPRIATE, VERIFY 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 INFLIGHT 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	:	TA <u>M. G. Clark</u> 7-9-91
DESIGN ENGINEERING	: T. POCKLINGTON	:	<u>B. Williams</u> - 6-28-91
QUALITY ENGINEERING	: W. R. HIGGINS	:	<u>W. R. Higgins</u> 7/1/91
NASA RELIABILITY	:	:	<u>W. R. Higgins</u> 1/15/92
NASA SUBSYSTEM MANAGER	:	:	<u>R. Davis</u> 1/28/92
NASA EPD&C RELIABILITY	:	:	<u>W. R. Higgins</u> for J. Woodard 2-7-92
NASA QUALITY ASSURANCE	:	:	<u>K. O. Brink</u> 1/18/92
NASA EPD&C SUBSYS MGR	:	:	<u>J. Woodard</u> for R. Davis 7 Feb 92