

## FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: MO-AD1-R02-X

S050270  
ATTACHMENT  
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SUBSYSTEM NAME: REMOTELY OPERATED ELECTRICAL UMBILICAL

REVISION : 1 02/11/91

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
■ ASSEM :	MID MCA-1	V070-764610
■ SRU :	RELAY, HYBRID	MC455-0135-0001
■ SRU :	RELAY, HYBRID	MC455-0135-0002

## PART DATA

## ■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

■ REFERENCE DESIGNATORS: 40V76A117 - K41  
 : 40V76A117 - K53  
 : 40V76A119 - K44  
 : 40V76A119 - K46

■ QUANTITY OF LIKE ITEMS: 4

## ■ FUNCTION:

PROVIDES CONTROL OF AC POWER APPLICATION TO DRIVE MOTOR FOR THE HOOK LATCH/UNLATCH FUNCTION. K41 AND K53 FOR SYSTEM 1, K44 AND K46 FOR SYSTEM 2.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
NUMBER: MO-AD1-RD2-03

SUBSYSTEM: REMOTELY OPERATED ELECTRICAL UMBILICAL REVISION# 1 02/11/91 R

ITEM NAME: RELAY, HYBRID

CRITICALITY OF THIS  
FAILURE MODE:2R3

- FAILURE MODE:  
SHORTED. ANY SINGLE SET OF CONTACTS.

MISSION PHASE:  
00 ON-ORBIT

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

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

- CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

- REDUNDANCY SCREEN A) PASS  
B) FAIL  
C) PASS

PASS/FAIL RATIONALE:

- A)  
PRELAUNCH CHECKOUT.
- B)  
ONE PHASE WILL NOT CAUSE MOTOR TO DRIVE. CANNOT CONFIRM RELAY FAILURE.
- C)  
PHYSICAL AND ELECTRICAL ISOLATION OF REDUNDANT ELEMENTS.

- FAILURE EFFECTS -

- (A) SUBSYSTEM:  
ONE AC POWER PHASE WILL BE CONTINUOUSLY APPLIED TO THE ASSOCIATED HOOK LATCH DRIVE MOTOR WHENEVER THREE PHASE AC POWER IS PRESENT.

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- (B) INTERFACING SUBSYSTEM(S):  
THE DRIVE MOTOR COULD OVER HEAT AND FAIL. A FAILED MOTOR WOULD CAUSE SUBSEQUENT HOOK LATCH FUNCTIONS TO BE AT HALF SPEED. IF THE RELAY FOR MOTOR ROTATION IS ACTIVATED CIRCUIT BREAKER COULD TRIP.
- (C) MISSION:  
NO EFFECT. FIRST FAILURE.
- (D) CREW, VEHICLE, AND ELEMENT(S):  
FIRST FAILURE - NO EFFECT.
- (E) FUNCTIONAL CRITICALITY EFFECTS:  
LOSS OF REDUNDANT RELAY IN THIS MODE WILL FAIL BOTH (HOOK) LATCH ACTUATOR DRIVE MOTORS WHICH WOULD REQUIRE USE OF EVA MECHANICAL ACTUATION TO ACCOMPLISH LATCH FUNCTION.

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- DISPOSITION RATIONALE -  
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- (A) DESIGN:  
REFER TO APPENDIX C, ITEM 1.
- (B) TEST:  
REFER TO APPENDIX C, ITEM 1.  
  
OMRSD: GROUND TURNAROUND;  
FREQUENCY OF CHECKOUT IS MISSION DEPENDENT. 3-PHASE AC MOTOR CIRCUITS;  
VERIFY PROPER PHASE ROTATION AND MOTOR PHASE VOLTAGE
- (C) INSPECTION:  
REFER TO APPENDIX C, ITEM 1.
- (D) FAILURE HISTORY:  
REFER TO APPENDIX C, ITEM 1.
- (E) OPERATIONAL USE:  
NONE

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- APPROVALS -

RELIABILITY ENGINEERING:	M. P. RAGUSA	<i>MPR</i>	<i>M.P. Ragusa</i>
DESIGN SUPERVISOR	: G. M. ANDERSON		<i>G.M. Anderson 6/16/91</i>
QUALITY ENGINEERING	: M. F. Mergen	<i>M.F.M</i>	<i>M.F. Mergen 6/26/91</i>
NASA RELIABILITY	:		<i>S.S. Wilcox 6/21/91</i>
NASA SUBSYSTEM MANAGER	:		<i>M. Saleem Jundani 6/21/91</i>
NASA EPO&C RELIABILITY	:		<i>KD Ewert Glendon 6/12/91</i>
NASA QUALITY ASSURANCE	:		<i>J.K. Johnson for F. Morris</i>
NASA EPO&C SUBSYS MGR	:		