FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 05-6IA-2126-X

SUBSYSTEM NAME: EPD&C - REMOTE MANIP. ARM

REVISION : 2 07/23/90

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
■ LRU	:	MID PCA 1	V070-764400
■ SRU	:	CONTACTOR, GENERAL PURPOSE	MC455-0134-0002 ✓
■ SRU	:	CONTACTOR, GENERAL PURPOSE	MC455-0134-0004 ✓

PART DATA

■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CONTACTOR, GP 125 AMP STARBOARD AND PORT REMOTE MANIPULATOR ARM

REFERENCE DESIGNATORS: 40V76A25K2
: 40V76A25K1

QUANTITY OF LIKE ITEMS: 2
TWO

FUNCTION:
UPON CREW INITIATED SWITCH COMMAND, THE CONTACTS OF CONTACTOR CONNECT PRIMARY 28VDC MAIN BUS A TO THE SELECTED (PORT, STARBOARD) REMOTE MANIPULATOR ARM.

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SUBSYSTEM: EPD&C - REMOTE MANIP. ARM
LRU :MID PCA 1
ITEM NAME: CONTACTOR, GENERAL PURPOSE

CRITICALITY OF THIS FAILURE MODE:1/1

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

MISSION PHASE:
OO ON-ORBIT

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

F-5 Endeavour

■ CAUSE:
PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) N/A
B) N/A
C) N/A

PASS/FAIL RATIONALE:
A)

B)

C)

- FAILURE EFFECTS -

■ (A) SUBSYSTEM:
FAILURE WILL INTERRUPT POWER TO THE PRIMARY RMS CONTROL BUS.

(B) INTERFACING SUBSYSTEM(S):
FAILURE WILL PREVENT USE OF THE PRIMARY RMS CONTROL SYSTEM WHEN REQUIRED. FAILURE DURING PAYLOAD CAPTURE OR RELEASE MAY ALLOW CAPTURE BUT INCOMPLETE RIGIDIZATION OF PAYLOAD WITH RMS END EFFECTOR. THE

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BRAKES WILL COME ON AND SAFING WILL BE INDICATED. NO ARM RELATED DATA WILL BE DISPLAYED ON THE D&C PANEL EXCEPT TEMPERATURE DATA. END EFFFECTOR TALKBACKS WILL BE BARBER POLE. IF FAILURE OCCURS DURING OPERATION, ARM WILL STOP, ALL PRIME MODES WILL BE LOST, AND END EFFECTOR PRIME MODES WILL BE LOST. IF CAPTURING A PAYLOAD, INCOMPLETE RIGIDIZATION CAN OCCUR RESULTING IN UNEXPECTED MOTION.

■ (C) MISSION:
FAILURE WILL RESULT IN LOSS OF MISSION SINCE BASELINE MISSION CANNOT BE PERFORMED WITH THE BACKUP RMS CONTROL SYSTEM.

■ (D) CREW, VEHICLE, AND ELEMENT(S):
FAILURE COULD RESULT IN LOSS OF CREW OR VEHICLE DUE TO UNEXPECTED RMS OR PAYLOAD MOTION DUE TO INCOMPLETE RIGIDIZATION.

(E) FUNCTIONAL CRITICALITY EFFECTS:

- DISPOSITION RATIONALE -

■ (A) DESIGN:
REFER TO APPENDIX C, ITEM NO. 5 - GENERAL PURPOSE CONTACTOR

■ (B) TEST:
REFER TO APPENDIX C, ITEM NO. 5 - GENERAL PURPOSE CONTACTOR

GROUND TURNAROUND TEST
CIRCUITS VERIFIED ON-LINE PER PARAGRAPHS:
- V54AND.012 "PORT MN A (PRIMARY) POWER VERIF"
PRIOR TO MECHANICAL ARM INSTALLATION,
- V54ATO.001 "CONFIGURATION AND CHECKOUT"
- V54ATO.016 "PORT ARM POWER FLAG VERIF"
FOR EVERY RMS FLIGHT, AND LRU RETEST PER TABLE V54Z00.000.

■ (C) INSPECTION:
REFER TO APPENDIX C, ITEM NO. 5 - GENERAL PURPOSE CONTACTOR ✓

■ (D) FAILURE HISTORY:
REFER TO APPENDIX C, ITEM NO. 5 - GENERAL PURPOSE CONTACTOR

■ (E) OPERATIONAL USE: If possible
FAILURE ~~WILL~~ BE NOTED BY INABILITY TO SELECT AFFECTED RMS ON PRIME POWER. ✓ PAYLOADS SHOULD BE CAPTURED/RELEASED IN POSITIONS WHERE INCOMPLETE RIGIDIZATION OR RELEASE WILL NOT ALLOW THE PAYLOAD TO ROTATE INTO ORBITER STRUCTURE.

SUBSEQUENT FAILURE OF THE BACKUP RELEASE SYSTEM WILL REQUIRE IMMEDIATE

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JETTISON OF RMS TO PREVENT LOSS OF VEHICLE DUE TO UNCONTROLLABLE PAYLOAD MOTION. FOR UNLOADED RMS OPERATIONS, SUBSEQUENT LOSS OF BACKUP RMS DRIVE SYSTEM MAY REQUIRE EVA OR JETTISON OF RMS FOR SAFE ENTRY.

- APPROVALS -

RELIABILITY ENGINEERING	T. AI	
DESIGN ENGINEERING	D. SOVEREIGN	
QUALITY SUPERVISOR	J. COURSEN	
NASA RELIABILITY	J. Crisham	
NASA SUBSYSTEM MANAGER	G. Glenn	10/10/90
NASA EPD&C RELIABILITY		9/26/90
NASA QUALITY ASSURANCE		9/20/90
NASA EPD&C SUBSYS MGR	F. ALANIS	FA 10-16-90
NASA RMS operations	D. Pallesen	D. Pallesen