

PAGE: 1

PRINT DATE: 04/09/91

S050270A
ATTACHMENT
PAGE 72 OF 140

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 05-61A-2026-X

SUBSYSTEM NAME: EPD&C - REMOTE MANIP. ARM

REVISION : 2 04/02/91

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
■ LRU :	PANEL A8A2	VOB2-730150
■ SRU :	SWITCH, TOGGLE	ME452-0102-7101

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

SWITCH, TOGGLE, SINGLE POLE, 2 POSITION, STARBOARD AND PORT RMS HEATER
A, B

REFERENCE DESIGNATORS: 36V73ABA2S7
: 36V73ABA2S8
: 36V73ABA2S9
: 36V73ABA2S10

QUANTITY OF LIKE ITEMS: 4
FOUR

FUNCTION:

PROVIDES THE "AUTO/OFF" MANUAL CAPABILITY TO REMOTELY CONTROL THE
HEATER BUSES MAIN A AND B INPUT POWER TO THE RELATED STARBOARD AND
PORT REMOTE MANIPULATOR ARM.

PAGE: 2

PRINT DATE: 07/23/90

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
 NUMBER: 05-61A-2026-01

REVISION# 2 07/23/90 R

SUBSYSTEM: EPD&C - REMOTE MANIP. ARM
 LRU :PANEL A8A2
 ITEM NAME: SWITCH, TOGGLE

CRITICALITY OF THIS
 FAILURE MODE:1R2

- FAILURE MODE:
 FAILS OPEN, PREMATURE OPEN, SHORT-TO-CASE (GROUND)

MISSION PHASE:
 00 ON-ORBIT

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

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

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REUNDANCY SCREEN A) PASS
 B) FAIL
 C) PASS

PASS/FAIL RATIONALE:

A)

- B)
 SWITCH FAILS SCREEN B DUE TO (1) UNAVAILABILITY OF TELEMETRY ON BOTH
 SYSTEMS (2) NON-REQUIREMENT FOR BOTH SYSTEMS DURING OPERATIONS EVEN
 THOUGH BOTH SYSTEMS ARE KEPT ON (ONE SYSTEM CAN FAIL AND NOT BE
 DETECTED).

C)

- FAILURE EFFECTS -

- (A) SUBSYSTEM:
 FAILURE WILL RESULT IN LOSS OF AFFECTED HEATER CIRCUIT ON AFFECTED RMS.

PAGE: 3

PRINT DATE: 07/23/90

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NUMBER: 05-6IA-2026-01

- (B) INTERFACING SUBSYSTEM(S):
FIRST FAILURE - NO EFFECT
- (C) MISSION:
FIRST FAILURE - NO EFFECT
- (D) CREW, VEHICLE, AND ELEMENT(S):
FIRST FAILURE - NO EFFECT
- (E) FUNCTIONAL CRITICALITY EFFECTS:
SUBSEQUENT FAILURE IN OPPOSITE HEATER CIRCUIT MAY ALLOW TEMPERATURES TO DECLINE SUFFICIENTLY TO PREVENT RMS JOINT MOVEMENTS. POSSIBLE LOSS OF MISSION (2R3) DUE TO INABILITY TO MANUEVER THE RMS. POSSIBLE LOSS OF CREW/VEHICLE (1R2) DUE TO UNCOMMANDED RMS OR PAYLOAD MOTION CAUSED BY FROZEN RMS JOINT(S).

- DISPOSITION RATIONALE -

- (A) DESIGN:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH
- (B) TEST:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

GROUND TURNAROUND TEST
CIRCUIT VERIFIED ON-LINE PER PARAGRAPHS:
- V54AN0.010 "HEATER BUS A VERIF"
- V54AN0.011 "HEATER BUS B VERIF"
- V54AN0.044 "STBD HEATER BUS A DEADFACE VERIF"
- V54AN0.045 "STBD HEATER BUS B DEADFACE VERIF"
PRIOR TO MECHANICAL INSTALLATION,
- V54AT0.168 "HEATER BUS A VERIF"
- V54AT0.170 "HEATER BUS B VERIF"
FOR EVERY RMS FLIGHT, AND LRJ RETEST PER TABLE V54Z00.000.
- (C) INSPECTION:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH ✓
- (D) FAILURE HISTORY:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH
- (E) OPERATIONAL USE:
BOTH HEATER SYSTEMS ARE ENABLED DURING RMS OPERATIONS. A FAILURE AT THIS POINT WOULD NOT BE DETECTABLE SINCE THE TEMPERATURES WOULD BE KEPT WITHIN LIMITS BY THE REMAINING SYSTEM. DURING OTHER (NON-RMS) ON-ORBIT

PAGE: 4

PRINT DATE: 07/23/90

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MISSION PHASES, THE SYSTEMS ARE CYCLED TO DETERMINE OPERATIONAL STATUS. A FAILURE AT THIS POINT WOULD ALLOW TEMPERATURES TO DECREASE SUFFICIENTLY TO SET OFF ONBOARD FAULT ANNUNCIATION. EVA OR JETTISON OF RMS IS AVAILABLE TO ALLOW PAYLOAD BAY DOOR CLOSURE FOR SAFE ENTRY.

- APPROVALS -

RELIABILITY ENGINEERING:	T. AI	:	<u>JA McLeod Ch Hon</u>
DESIGN ENGINEERING	: D. SOVEREIGN	:	<u>D.S. F. L. [unclear] 8/10</u>
QUALITY SUPERVISOR	: J. COURSEN	:	<u>UBF [unclear] 2-90-90</u>
NASA RELIABILITY	: J. GRIHAM	:	<u>[unclear] 9/28/90</u>
NASA SUBSYSTEM MANAGER	: G. GRIEM	:	<u>[unclear] 10/10/90</u>
NASA EPD&C RELIABILITY	:	:	<u>M. Saleem Dawson 4/24/90</u>
NASA QUALITY ASSURANCE	:	:	<u>KO [unclear] 9/10/90</u>
NASA EPD&C SUBSYS MGR	: F. ALANIS	:	<u>[unclear] 10-16-90</u>
NASA RMS Operations	: D. PALLISON	:	<u>D. Pallison</u>