

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE

NUMBER: 05-6N-2066-IM -X

SUBSYSTEM NAME: EPD&C - AUXILIARY PWR

REVISION: 0

02/18/92

PART DATA

PART NAME	PART NUMBER
VENDOR NAME	VENDOR NUMBER
LRU : AFT LCA 1	MC450-0057-0001
LRU : AFT LCA 2	MC450-0058-0001
LRU : AFT LCA 3	MC450-0059-0001
SRU : DIODE	JANTXV1N5551

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

DIODE, ISOLATION (3 AMP) - IMPROVED AUXILIARY POWER UNIT (IAPU) HEATERS, GAS GENERATOR/FUEL PUMP 1, 2, AND 3 POWER CIRCUIT

REFERENCE DESIGNATORS:

- 54V76A121(J3-2)
- 54V76A121(J3-3)
- 54V76A121(J3-17)
- 54V76A121(J3-18)
- 54V76A121(J3-35)
- 54V76A121(J3-37)
- 55V76A122(J3-2)
- 55V76A122(J3-3)
- 55V76A122(J3-17)
- 55V76A122(J3-18)
- 55V76A122(J3-35)
- 55V76A122(J3-37)
- 56V76A123(J3-2)
- 56V76A123(J3-3)
- 56V76A123(J3-17)
- 56V76A123(J3-18)
- 56V76A123(J3-35)
- 56V76A123(J3-37)

QUANTITY OF LIKE ITEMS: 18
EIGHTEEN

FAILURE MODES EFFECTS ANALYSIS (FMEA) --CIL HARDWARE

NUMBER: 05-6N-2066-IM-X

FUNCTION:

**PROVIDES ISOLATION FOR THE GROUND TYPE I HDC CIRCUIT AND PREVENTS SWITCH
COMMANDS FROM BEING TIED TOGETHER.**

FAILURE MODES EFFECTS ANALYSIS FMEA - NON-CIL FAILURE MODE

NUMBER: 05-6N-2066-IM- 02

REVISION#: 01 08/01/96

SUBSYSTEM NAME: EPD&C - AUXILIARY PWR

LRU: AFT LCA 1, 2, 3

ITEM NAME: DIODE

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:

SHORT (END TO END)

MISSION PHASE:

PL PRE-LAUNCH
 LO LIFT-OFF
 OO ON-ORBIT
 DO DE-ORBIT
 LS LANDING/SAFING

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

CAUSE:

STRUCTURAL FAILURE (MECHANICAL STRESS, VIBRATION), CONTAMINATION,
 ELECTRICAL STRESS, THERMAL STRESS, PROCESSING ANOMALY

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

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

PASS/FAIL RATIONALE:

A)

B)

FIRST FAILURE NOT DETECTABLE IN FLIGHT SINCE THE SHORT FAILURE MODE OF THIS DIODE DOES NOT AFFECT THE FUNCTIONAL OPERATION OF THE SYSTEM UNLESS THERE ARE ADDITIONAL ASSOCIATED FAILURES. DIODE IS 3-FAULT TOLERANT WITH 2 LEGS VERIFIABLE IN FLIGHT. CONTROL THERMOSTAT OPERATION IS VERIFIABLE IN FLIGHT. SHORTED SWITCH CONTACTS ARE VERIFIABLE IN FLIGHT.

C)

- FAILURE EFFECTS -

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: 05-6N-2066-IM- 02**

(A) SUBSYSTEM:
DEGRADATION OF REDUNDANCY AGAINST INADVERTENT ENERGIZING OF HEATERS.

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT - FIRST FAILURE

(C) MISSION:
NO EFFECT - FIRST FAILURE

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT - FIRST FAILURE

(E) FUNCTIONAL CRITICALITY EFFECTS:
POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE OTHER FAILURES (ONE SWITCH CONTACT SET FAILED CLOSED, THERMOSTAT CONTACTS FAIL CLOSED, AND OVERTEMPERATURE THERMOSTAT CONTACTS FAIL CLOSED) ENERGIZING HEATERS CONTINUOUSLY RESULTING IN FUEL DECOMPOSITION AND LINE RUPTURE.

-DISPOSITION RATIONALE-

(A) DESIGN:
REFER TO APPENDIX F, ITEM NO. 4 - DIODE

(B) TEST:
REFER TO APPENDIX F, ITEM NO. 4 - DIODE

GROUND TURNAROUND TEST - APU 1/2/3 FUEL PUMP AND GAS GENERATOR HEATER CIRCUIT TESTS PERFORMED DURING ORBITER MAINTENANCE DOWN PERIOD (OMDP).

(C) INSPECTION:
REFER TO APPENDIX F, ITEM NO. 4 - DIODE

| FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE

NUMBER: 05-6N-2066-IM- 02

(D) FAILURE HISTORY:
REFER TO APPENDIX F, ITEM NO. 4 - DIODE

(E) OPERATIONAL USE:
NONE

- APPROVALS -

EDITORIALLY APPROVED : RI
EDITORIALLY APPROVED : JSC
TECHNICAL APPROVAL : VIA JSC

: *Diana S. Thomas 8/22/96*
: *Sam Lacey 8-22-96*
: 95-CIL-010

SHUTTLE CRITICAL ITEMS LIST - ORBITER

ATTACHMENT
PAGE 7 OF 1

SUBSYSTEM : EPD&C - AUXILIARY PWR FMEA NO 05-6N-2066-IM-2 REV: 02/

ASSEMBLY : AFT LCA 1,2,3
P/N RI : JANTXVIN5551
P/N VENDOR:
QUANTITY : 18
: EIGHTEEN

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X
PHASE(S):	PL X LO X OO X DO X		

CRIT. FUNC.
CRIT. HDW:

PREPARED BY:

DES T NGUYEN
REL T KIMURA
QE W R HIGGINS

REDUNDANCY SCREEN: A-PASS B-FAIL C-

APPROVED BY:

APPROVED BY (NASA):

[Handwritten signatures and dates]
1-19-94
2-19-92
2-20-92
OE
EPDC
EPDC SSU

ITEM:

DIODE, ISOLATION (3 AMP) - IMPROVED AUXILIARY POWER UNIT (IAPU) HEAT GAS GENERATOR/FUEL PUMP 1, 2, AND 3 POWER CIRCUIT

FOR THE GROUND TYPE I HBC CIRCUIT

FUNCTION:

PROVIDES ~~CRITICAL~~ ISOLATION ~~BY PREVENTING SWITCH COMMANDS FROM BEING TIED TOGETHER.~~
~~TOGETHER AND PREVENTS SWITCH COMMANDS FROM BEING TIED TOGETHER.~~

54V76A121 (J3-2), (J3-3), (J3-17), (J3-18), (J3-35), (J3-37);
55V76A122 (J3-2), (J3-3), (J3-17), (J3-18), (J3-35), (J3-37);
56V76A123 (J3-2), (J3-3), (J3-17), (J3-18), (J3-35), (J3-37)

FAILURE MODE:

SHORT (END TO END)

CAUSE(S):

STRUCTURAL FAILURE (MECHANICAL STRESS, VIBRATION), CONTAMINATION
ELECTRICAL STRESS, THERMAL STRESS, PROCESSING ANOMALY

EFFECT(S) ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE (E) FUNCTIONAL
CRITICALITY EFFECT:

(A) DEGRADATION OF REDUNDANCY AGAINST INADVERTENT ENERGIZING OF HEAT

(B,C,D) NO EFFECT - FIRST FAILURE

(E) POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE OTHER FAILURES (ONE SW: CONTACT SET FAILED CLOSED, THERMOSTAT CONTACTS FAIL CLOSED, OVERTEMPERATURE THERMOSTAT CONTACTS FAIL CLOSED) ENERGIZING HEAT CONTINUOUSLY RESULTING IN FUEL DECOMPOSITION AND LINE RUPTURE.

FIRST FAILURE NOT DETECTABLE IN FLIGHT SINCE THE SHORT FAILURE MODE OF DIODE DOES NOT AFFECT THE FUNCTIONAL OPERATION OF THE SYSTEM UNLESS THERE ARE ADDITIONAL ASSOCIATED FAILURES.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

10502700
ATTACHMENT -
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SUBSYSTEM : EPD&C - AUXILIARY PWR FMEA NO 05-6N-2066-IM-2

REV: 02/18/57

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE:

(A-D) DISPOSITION AND RATIONALE

REFER TO APPENDIX F, ITEM NO. 4 - DIODE

(B) TEST

GROUND TURNAROUND TEST - APU 1/2/3 FUEL PUMP AND GAS GENERATOR HEATER
CIRCUIT TESTS PERFORMED DURING ORBITER MAINTENANCE DOWN PERIOD (OMDP).

(E) OPERATIONAL USE

NONE