FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL HARDWARE
NUMBER: 05-6N-2014-X

SUBSYSTEM NAME: EPD&C - AUXILIARY POWER UNIT
REVISION: 1 08/30/93

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	AFT LCA 1	MC450-0057-0001
LRU	:	AFT LCA 2	MC450-0058-0001
LRU	:	AFT LCA 3	MC450-0059-0001
SRU	:	CONTROLLER, HYBRID DRIVER	MC477-0261-0002
SRU	:	CONTROLLER, HYBRID DRIVER	MC477-0263-0002
SRU	:	CONTROLLER, HYBRID DRIVER	MC477-0264-0002

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CONTROLLER, HYBRID DRIVER, HDC TYPE 1 AND 3 - AUXILIARY POWER UNIT (APU) FUEL TANK 1, 2, AND 3 ISOLATION VALVE CONTROL

REFERENCE DESIGNATORS: TYPE 1:
MC477-0261-0002
56V76A123AR(J4-97)
56V76A123AR(J4-115)

TYPE 3:
MC477-0263-0002
54V76A121AR(J6-R)
54V76A121AR(J6-V)
54V76A121AR(J6-Z)
54V76A121AR(J11-z)
55V76A122AR(J3-63)
55V76A122AR(J3-114)
55V76A122AR(J6-N)
55V76A122AR(J6-R)
56V76A123AR(J6-e)
56V76A123AR(J8-32)
56V76A123AR(J11-CC)
56V76A123AR(J11-DD)

QUANTITY OF LIKE ITEMS: 14
FOURTEEN
2 TYPE 1, 12 TYPE 3

PRINT DATE: 09/01/93

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FUNCTION:

SERIES POWER DRIVERS IN EACH APU FUEL TANK 1, 2, AND 3 ISOLATION VALVE CONTROL CIRCUITS WHICH PROVIDE OPERATIONAL PROTECTION AGAINST SINGLE FAILURES THAT COULD ENERGIZE A VALVE DURING PERIODS OF APU NONOPERATION.

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL FAILURE MODE
NUMBER: 05-6N-2014-02

REVISION# 1 08/30/93

SUBSYSTEM NAME: EPD&C - AUXILIARY POWER UNIT
LRU: AFT LCA 1, 2, 3 **CRITICALITY OF THIS**
ITEM NAME: CONTROLLER, HYBRID DRIVER **FAILURE MODE:** 1R3

FAILURE MODE:
INADVERTENT OUTPUT, FAILS "ON", FAILS TO TURN "OFF"

MISSION PHASE:

PL	PRELAUNCH
OO	ON-ORBIT
LS	LANDING SAFING

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) FAIL
C) PASS

PASS/FAIL RATIONALE:
A)

B)
FIRST FAILURE FAILS "B" SCREEN BECAUSE THE INADVERTENT OUTPUT OF ANY ONE OF THE SERIES DRIVERS (HDC-1 OR HDC-3) IS NOT MONITORED IN A MANNER TO BE DETECTABLE IN FLIGHT.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
DEGRADATION OF REDUNDANCY AGAINST INADVERTENT ENERGIZING OF THE FUEL TANK ISOLATION VALVE SOLENOID.

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT - FIRST FAILURE. REDUNDANT SERIES DRIVERS WILL PRECLUDE INADVERTENT ENERGIZING OF THE ASSOCIATED VALVE SOLENOID. A THIRD SIMILAR FAILURE IN THE SAME CIRCUIT COULD ALLOW SOLENOID ENERGIZING AND OVERHEATING ON ORBIT WHEN APU FLOW COOLING IS ABSENT.

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(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 TWO OTHER FAILURES (HDC-3 POWER DRIVER AND HDC-4 GROUND DRIVER FAILED "ON") DUE TO FUEL (HYDRAZINE) DECOMPOSITION AND VALVE/LINE RUPTURE.

-DISPOSITION RATIONALE-

(A) DESIGN:
REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER

(B) TEST:
REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER

GROUND TURNAROUND TEST - FUEL ISOLATION VALVE CIRCUIT CHECK WITHOUT BUS DROPS PERFORMED DURING ORBITER MAINTENANCE DOWN PERIOD (OMDP), NOT TO EXCEED 10 FLIGHT INTERVALS.

(C) INSPECTION:
REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER

(D) FAILURE HISTORY:
REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER

(E) OPERATIONAL USE:
NONE (CONTROL LOGIC CIRCUIT BREAKER WILL NOT CORRECT A FAILED ON DRIVER).

- APPROVALS -

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