

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - AUXILIARY PWR FMEA NO 05-6N -2014A -1 REV:10/07/9

ASSEMBLY : AFT LCA 1,2,3 CRIT. FUNC: 1R
 P/N RI : MC477-0264-0002 CRIT. HDW: 3
 P/N VENDOR: VEHICLE 102 103 104 10
 QUANTITY : 6 EFFECTIVITY: X X X X
 : SIX PHASE(S): PL LO OO DO LS

PREPARED BY: DES T NGUYEN
 REL T KIMURA
 QE W R HIGGINS

REDDUNDANCY SCREEN: A-PASS B-FAIL C-PAS
 APPROVED BY (NASA):
 SSM [Signature] 1-24-91
 REL [Signature] 10-16-91
 QE [Signature] 10-17-91
 EPD&C REL [Signature]
 EPD&C SSM [Signature]

ITEM:
 CONTROLLER, HYBRID DRIVER, HDC TYPE 4 - AUXILIARY POWER UNIT (APU) FUEL TANK 1, 2, AND 3 ISOLATION VALVE CONTROL

FUNCTION:
 SERIES 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.
 54V76A121AR(J6-a), (J6-HH);
 55V76A123AR(J6-a), (J6-b);
 56V76A123AR(J6-a), (J6-b)

FAILURE MODE:
 LOSS OF OUTPUT, FAILS TO CONDUCT, FAILS TO TURN "ON"

CAUSE(S):
 PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK PROCESSING ANOMALY, THERMAL STRESS

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

- (A) LOSS OF ABILITY TO POWER ONE OF TWO FUEL TANK ISOLATION VALVES.
- (B) LOSS OF ONE OF TWO REDUNDANT VALVE CONTROL CIRCUITS. LOSS OF ABILITY TO OPEN ONE OF THE TWO PARALLEL FUEL TANK ISOLATION VALVES.
- (C,D) NO EFFECT - FIRST FAILURE.
- (E) POSSIBLE LOSS OF CREW/VEHICLE AFTER TWO OTHER FAILURES (HDC-3 POWER DRIVER OF REDUNDANT FUEL TANK ISOLATION VALVE CIRCUIT FAILED, RESULTING IN THE LOSS OF ONE APU AND THE LOSS OF A SECOND APU SYSTEM) DUE TO THE LOSS OF 2 OF 3 APU'S.

(FAILS SCREEN "B") "OFF"

FIRST FAILURE NOT DETECTABLE IN FLIGHT (SINCE THE OUTPUT OF THE SERIES GROUND DRIVER IS NOT MONITORED, VALVE OPERATION IS ASSUMED BY THE PRESENCE OF VOLTAGE, ~~PERIOD~~ THE VALVE SOLENOID AND THAT THE PARALLEL OPERATION OF THE FUEL TANK ISOLATION VALVES MASKS THE FAILURE TO OPEN ANY ONE VALVE.

AT THE INPUT OF

SHUTTLE CRITICAL ITEMS LIST - ORBITER

5050270H
ATTACHMENT -
PAGE 178 OF 180

SUBSYSTEM :EPD&C - AUXILIARY PWR FMEA NO 05-6N -2014A -1 REV:10/07/97

DISPOSITION & RATIONALE:

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

(A-D) DISPOSITION AND RATIONALE

REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER

(B) TEST

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

(E) OPERATIONAL USE

NONE