

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - AUXILIARY PWR FMEA NO 05-6N -201000-2 REV:08/02/90

ASSEMBLY : AFT LCA 1,2,3 CRIT. FUNC: 1R  
 P/N RI : MC477-0261-0002 CRIT. HDW: 3  
 P/N VENDOR: VEHICLE 102 103 104  
 QUANTITY : 3 EFFECTIVITY: X X X  
 : THREE, ONE/APU PHASE(S): EL LO OO X DO LS

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS  
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):  
 DES T NGUYEN DES [Signature] 8-13-90 SSM [Signature] 9/6/90  
 REL T KIMURA REL [Signature] 9-14-90 REL [Signature]  
 QE J T COURSEN QE [Signature] 8-15-90 QE [Signature]

EPD&C Rel [Signature] 8/30/90  
 EPD&C SSM [Signature] 9-5-90

ITEM:  
 CONTROLLER, HYBRID DRIVER, HDC TYPE 1 - AUXILIARY POWER UNIT (APU) 1, 2,  
 AND 3 FUEL SHUTOFF VALVE PURGE NO. 1

FUNCTION:  
 UPON GSE COMMAND FROM MDM LA1 THROUGH THE HYBRID DRIVER TO THE APU  
 CONTROLLER IN CONJUNCTION WITH THE SIGNAL FROM THE CONTROLLER CHECKOUT  
 UNIT, THE FUEL SHUTOFF VALVE IS OPENED.

- 54V76A121AR(J7-11);
- 55V76A122AR(J7-11);
- 56V76A123AR(J7-11)

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

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) DEGRADATION OF REDUNDANCY <sup>AGAINST</sup> ~~IN-THE~~ INADVERTENT POWERING OF THE FUEL  
 SHUTOFF VALVE SOLENOID.

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

(E) POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE OTHER FAILURES (TW  
 PREFLIGHT-TO-ESSENTIAL BUS DIODES FAIL SHORT WHICH ENERGIZES THE  
 PREFLIGHT TEST BUS, A CONTROLLER TRANSISTOR FAILING "ON" IN THE FUEL  
 SHUTOFF VALVE RELAY CIRCUIT CAUSING THE FUEL SHUTOFF VALVE TO OPEN)  
 RESULTING IN A POTENTIAL FOR AN APU HOT RESTART FOR THE TIME PERIOD  
 BETWEEN APU SHUTDOWN AND THE CLOSING OF THE APU FUEL ISOLATION VALVE  
 SWITCH.

FAILS SCREEN "B" BECAUSE FIRST FAILURE NOT DETECTABLE SINCE THE  
 PREFLIGHT TEST BUS IS NOT POWERED DURING FLIGHT UNLESS REQUIRED BY FLIGHT  
 RULE 9-41.

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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 - APU CONTROL VALVE FUNCTIONAL TEST PERFORMED  
AFTER IRU REPLACEMENT OF APU OR CONTROLLER ASSEMBLY OR AFTER CIG RETEST.

(E) OPERATIONAL USE

NONE