

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - OMS FMEA NO 05-6L -2207 -1 REV:10/30/87

ASSEMBLY : AFT LCA 1, 2, 3 CRIT. FUNC: 1R
 P/N RI : MC477-0263-0002 CRIT. HDW: 3
 P/N VENDOR:
 QUANTITY : 12 VEHICLE 102 103 104
 EFFECTIVITY: X X X
 : TWELVE-2 GROUPS OF THREE PHASE(S): PL LO X OO OO X LS
 : IN EACH OMS ENGINE CONTROL

PREPARED BY: DES D SOVEREIGN APPROVED BY: REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS
 REL F DEFENSOR REL *P. E. R. Burns* APPROVED BY (NASA):
 QE J COURSEN QE *Paul H. ... 11-12-87* REL *John ... 12-9-87*
 EPEC 33M AB Lamp for 1st Stage

ITEM:
 DRIVERS, HYBRID, TYPE III, LEFT AND RIGHT OMS ENGINE CONTROL VALVE 1 AND 2, OFF/ON.

FUNCTION:
 UPON CREW INITIATED COMMANDS, EACH GROUP OF THREE DRIVERS (ONE POWER HYBRID DRIVER FEEDING GPC COMMAND HYBRID DRIVERS, EACH OF WHICH ENERGIZES ONE OF THE TWO COILS IN THE SERIES CONTROL VALVES) ACT TOGETHER TO ENERGIZE ONE OF THE TWO COILS IN ENGINE OMS CONTROL VALVE 1 AND 2. IDENTICAL CIRCUITS ARE USED IN BOTH LEFT AND RIGHT OMS. 54V76A121AR (J3-93), 54V76A121AR (J11-E, F). 55V76A122AR (J3-93, 109), 55V76A122AR (J6-MM, NN), (J11-E', F'). 56V76A123AR (J3-93), 56V76A123AR (J6-NN, PP).

FAILURE MODE:
 LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY OPENS.

CAUSE(S):
 PIECE PART STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL STRESS, VIBRATION.

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

(A) LOSS OF REDUNDANCY. ONE OF TWO REDUNDANT COILS ON EITHER ONE OR BOTH ENGINE CONTROL VALVES CAN NOT BE ENERGIZED.

(B) FIRST FAILURE HAS NO EFFECT. LOSS OF INTERFACE REDUNDANCY. REDUNDANT CIRCUIT WILL COMPLETE THE FUNCTION. A SECOND SIMILAR FAILURE MAY PRECLUDE OPERATION OF THE AFFECTED OMS ENGINE.

(C,D) FIRST FAILURE HAS NO EFFECT.

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(E) POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF ELECTRICAL POWER NECESSARY FOR THE OPERATION OF OMS ENGINE CONTROL VALVE 1 AND 2. REQUIRES TWO OTHER FAILURES (REDUNDANT UPSTREAM CONTROL CIRCUIT HYBRID DRIVER FAILED OPEN, LOSS OF OTHER OMS ENGINE) BEFORE THE EFFECT IS MANIFESTED. FAILURE CANNOT BE DETECTED IN FLIGHT DUE TO LACK OF MONITORING MEASUREMENTS.

DISPOSITION & RATIONALE:

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

(A-D) FOR DISPOSITION AND RATIONALE

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

(B) GROUND TURNAROUND TEST

V43CEO.100 PNEUMATIC SYSTEM ELECTRICAL CONTROL VERIFICATION; PERFORMED EACH FLIGHT. REDUNDANCY VERIFICATION OF CONTROL CIRCUIT PER FIGURE V43CAO.070-5.

(E) OPERATIONAL USE

NO ACTION FOR FIRST FAILURE - NOT DETECTABLE. FOR SECOND DRIVER FAILURE REDLINE ADDITIONAL PROPELLANT FOR RCS BACKUP ORBIT, POSSIBLE MISSION IMPACT (DECREASED PROPELLANT AVAILABLE FROM OMS TO RCS THROUGH INTERCONNECT FOR ON-ORBIT OPERATIONS). NEXT PLS DEORBIT IF PROPELLANT FOR RCS BACKUP NOT AVAILABLE.