

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2228 -2 REV: <sup>S/S</sup>04/23/88  
 ASSEMBLY : AFT LCA-3 CRIT. FUNC: 1R  
 P/N RI : MC477-0261-0002 CRIT. HDW: 3  
 P/N VENDOR: VEHICLE 102 103 104  
 QUANTITY : 4 EFFECTIVITY: X X X  
 : FOUR PHASE(S): PL LO X OO DO LS  
 :

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS  
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):  
 DES J BROWN DES [Signature] EPDC SSM [Signature]  
 REL F DEFENSOR [Signature] REL [Signature] 5-6-88 MPS SSM [Signature]  
 QE [Signature] D MASAI QE [Signature] 5-6-88 EPDC REL [Signature]  
 MPS REL [Signature]

ITEM:

CONTROLLER, HYBRID DRIVER (HDC), TYPE I, ENGINE CUTOFF (ECO) WET SIMULATION COMMAND, POINT SENSOR ELECTRONICS BOX CHECKOUT CIRCUIT.

FUNCTION:

UPON GROUND MDM COMMAND, CONDUCTS MAIN BUS C POWER TO WET SIMULATION COMMAND INPUT OF POINT SENSOR ELECTRONICS BOX. IN COMBINATION WITH ALL OPEN SIMULATION COMMAND, STIMULATES INDIVIDUAL LO2/LH2 ECO WET SIGNAL. IN COMBINATION WITH ALL DRY SIMULATION COMMAND, STIMULATES INDIVIDUAL LO2/LH2 ECO DRY SIGNAL.  
 56V76A123J1(114), J1(115), J1(116), J1(117).

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

- (A) LOSS OF CAPABILITY TO REMOVE WET SIMULATION COMMAND BY GROUND MDM.
- (B) DEGRADATION OF REDUNDANCY AGAINST FALSE DRY ECO SIGNALS.
- (C,D) NO EFFECT - FIRST FAILURE.

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REV <sup>S/S</sup> (04/25/88)  
DEF 5-13

- (E) 1R/3, 2 SUCCESS PATHS AFTER FIRST FAILURE.  
TIME FRAME - ASCENT, AFTER ECO SENSORS ARE ARMED.  
1) SIM WET HDC FAILS "ON" - NO EFFECT. ASSOCIATED LO2/LH2 ECO CHANNELS OPERATE NORMALLY.  
2) SIM DRY HDC FAILS "ON", RESULTING IN A FALSE DRY SIGNAL.  
NOTE: ORBITER SOFTWARE WILL DISABLE A SINGLE FALSE DRY SENSOR PER PROPELLANT SYSTEM AT ARM COMMAND (CR89325), HOWEVER, THIS SCENARIO ASSUMES SECOND FAILURE OCCURS AFTER ARM COMMAND.  
3) SECOND SIM WET HDC FAILS "ON", RESULTING IN A SECOND FALSE DRY SIGNAL.

RESULTS IN PREMATURE MECO. SSME CUTOFF MAY OCCUR TOO LATE FOR A TAL OR BE SHORT OF VELOCITY REQUIRED FOR AOA (OMS CANNOT SUPPLY THE REQUIRED DELTA-VELOCITY NEEDED FOR AOA). POSSIBLE LOSS OF CREW/VEHICLE.

FAILS B SCREEN BECAUSE NO INSTRUMENTATION IS AVAILABLE TO DETECT FAILURE.

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 CONTROLLER.

(B) GROUND TURNAROUND TEST

LO2 & LH2 LIQ LVL SENSOR CONT VFY SOOFFO.204 ~~EVERY FLIGHT~~ <sup>9-1</sup> <sup>DEF</sup> <sup>5-13</sup>  
(PERFORM DURING REPLENISH PHASE OF PROPELLANT LOADING)

(E) OPERATIONAL USE

PRIOR TO THE ARM COMMAND: CREW WILL PERFORM TAL ABORT IF THERE ARE THREE OR MORE FALSE DRY SIGNALS AND LESS THAN TWO SIGMA CONFIDENCE OF ACHIEVING AOA CAPABILITY.

AFTER THE ARM COMMAND: NO CREW ACTION CAN BE TAKEN.

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