

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2055B -3 REV:11/18/87  
 ASSEMBLY : PANEL R4 ABORT: RTLS, TAL  
 P/N RI : ME452-0102-7153 CRIT. FUNC: 1R  
 P/N VENDOR: CRIT. HDW: 2  
 QUANTITY : 1 VEHICLE 102 103 104  
 : ONE EFFECTIVITY: X X X  
 : 1 PER LO2 OUTBOARD FILL/DRAIN VALVE PHASE(S): PL X LO X OO DO LS

REDUNDANCY SCREEN: A-PASS B-PASS C-PASS  
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):  
 DES J. BROWN DES R. Bunn EPDC SSM M. J. ...  
 REL F DEFENSOR REL M. J. ... 12-287 MPS SSM ...  
 QE D MASAI QE B. J. ... EPDC REL ...  
 MPS REL ...  
 QE ...

ITEM:

TOGGLE SWITCH (1 POLE, 2 POSITION, LEVER LOCKED), LO2 OUTBOARD FILL/DRAIN VALVE CONTROL.

FUNCTION:

PROVIDES MANUAL CONTROL OF POWER TO THE OPEN AND CLOSE SOLENOIDS OF LO2 OUTBOARD FILL/DRAIN VALVE. 32V73A4S6.

FAILURE MODE:

FAILS CLOSED, CONTACT-TO-CONTACT SHORT.

CAUSE(S):

PIECE PART STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, VIBRATION, THERMAL STRESS

EFFECT(S) ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A) CASE 1: ACROSS OPEN CONTACTS PROVIDING AN INADVERTENT OPEN COMMAND AND CLOSE INHIBIT COMMAND.

CASE 2: ACROSS CLOSE CONTACTS PROVIDING AN INADVERTENT CLOSE COMMAND AND OPEN INHIBIT COMMAND.

(B) CASE 1: PREMATURE OPENING OF THE LO2 OUTBOARD FILL/DRAIN VALVE.  
 CASE 2: NO EFFECT - FIRST FAILURE. BISTABLE FEATURE WILL MAINTAIN FILL/DRAIN VALVE IN OPEN POSITION.

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(C,D) NO EFFECT - FIRST FAILURE. POSSIBLE LOSS OF CREW AND VEHICLE AFTER SECOND FAILURE:

CASE 1 - LO2 INBOARD FILL/DRAIN VALVE FAILS OPEN RESULTING IN OVERBOARD LEAKAGE OF LO2. LOSS OF USABLE PROPELLANT WILL LEAD TO A PREMATURE ENGINE CUTOFF. ACCELERATION LOADS MAY ALSO RUPTURE THE FILL/DRAIN LINE CAUSING AFT COMPARTMENT OVERPRESSURIZATION AND FIRE/EXPLOSION HAZARD.

CRITICALITY 1/1 FOR RTLS AND TAL ABORTS; RESULTS IN POSSIBLE LOSS OF AFT COMPARTMENT PURGE (RTLS AND TAL CRITICAL). HELIUM IS REQUIRED TO MAINTAIN CONCENTRATIONS OF O2/H2 BELOW FLAMMABILITY LIMITS.

CASE 2 - LOSS OF GROUND OPEN COMMAND RESULTING IN PREMATURE CLOSURE OF LO2 OUTBOARD FILL/DRAIN VALVE. TERMINATION OF PROPELLANT LOADING WHICH MAY CAUSE A PRESSURE SPIKE AND POSSIBLE RUPTURE OF ORBITER FILL LINE AND/OR GSE INTERFACE/FACILITY LINES. POSSIBLE AFT COMPARTMENT OVERPRESSURIZATION AND FIRE/EXPLOSION HAZARD. POSSIBLE LOSS OF ADJACENT CRITICAL FUNCTIONS DUE TO CRYO EXPOSURE.

DISPOSITION & RATIONALE:

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

(A-D) DISPOSITION AND RATIONALE:

REFER TO APPENDIX A, ITEM NUMBER 1 - TOGGLE SWITCH.

(B) GROUND TURNAROUND TEST

MDM COMMAND/COPPER PATH VERIFICATION, V41AB0.091B, E EVERY FLIGHT.

(E) OPERATIONAL USE

FLIGHT - FOR RTLS OR TAL ABORTS, ON GROUND CALL, CREW CAN CLOSE INBOARD FILL/DRAIN VALVE IF TIME PERMITS.

GROUND - TERMINATE LOADING.