

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2198 -4 REV: 11/04/87

ASSEMBLY : D & C PANEL R4 CRIT. FUNC: 1R
 P/N RI : ME452-0102-7354 CRIT. HDW: 3
 P/N VENDOR:
 QUANTITY : 3 VEHICLE 102 103 104
 : THREE EFFECTIVITY: X X X
 : 1 PER PREVALVE 1, 2, & 3. PHASE(S): PL X LO X CO DO LS

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS
 PREPARED BY: DES J BROWN APPROVED BY: DES [Signature] APPROVED BY (NASA):
 REL F DEFENSOR REL [Signature] 12-5-87 EPDC SSM [Signature]
 QE D MASAI QE [Signature] 4/5/87 EPDC REL [Signature]
 MPS SSM [Signature]
 MPS REL [Signature]
 QE [Signature]

ITEM:
 TOGGLE SWITCH, 3 POLE/3 POSITION, CENTER LEVER LOCK, LH2 PREVALVES 1, 2, & 3 MANUAL CONTROL POWER.

FUNCTION:
 PROVIDES MANUAL CONTROL OF LH2 PREVALVE. SOFTWARE CONTROLS NORMAL PREVALVE FUNCTIONS. 32V73A4S14, 15, 16.

FAILURE MODE:
 SHORT TO GROUND, OPEN OR CLOSE CONTACTS SHORT TO GROUND.

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

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

(A) ROLLER/SPRING BRIDGES TWO CONTACTS TO GROUND. CASE 1 - OPEN CONTACTS; CASE 2 - CLOSE CONTACTS.

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

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(E) POSSIBLE LOSS OF CREW/VEHICLE AFTER FOURTH FAILURE (SECOND AND THIRD FAILURES - SWITCH/MDM BLOCKING DIODES SHORT, GROUNDING MDM COMMANDS. FOURTH FAILURE - CASE 1: PREMATURE ACTUATION OF CLOSE SOLENOID; CASE 2: SSME SHUTDOWN WITH UNCONTAINED DAMAGE REQUIRING PROPELLANT SUPPLY ISOLATION).

CASE 1 RESULTS IN PREMATURE LH2 PREVALVE CLOSURE WHILE ENGINE IS RUNNING. UNCONTAINED ENGINE DAMAGE DUE TO STARVATION CUTOFF. NOTE - HYSTABLE FEATURE NOT DEMONSTRATED BY TEST (CERTIFIED BY ANALYSIS). A FULL FLOW DETENT VERIFICATION TEST IS SCHEDULED FOR GFY 1988.

CASE 2 RESULTS IN INABILITY TO ISOLATE PROPELLANT SUPPLY FROM FAILED SSME DUE TO FAILURE TO CLOSE LH2 PREVALVE. FAILS B SCREEN BECAUSE SWITCH IS IN GPC POSITION FOR ASCENT - FAILURE NOT DETECTED BY SWITCH SCANS.

DISPOSITION & RATIONALE:

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

(A-D) FOR DISPOSITION AND RATIONALE

REFER TO APPENDIX A ITEM NO.1 - TOGGLE SWITCH.

(B) GROUND TURNAROUND TEST

D & C CONTROL BUS REDUNDANCY, V41AFO.1000-F, J-L; 1200-F, J-L; 1400-F, J-L EVERY FLIGHT.

(E) OPERATIONAL USE

FLIGHT - NO CREW ACTION CAN BE TAKEN

GROUND - IF A MAJOR LEAK IS DETECTED, CLOSE PREVALVES (PV4, 5, 6), LH2 17-INCH DISCONNECT (PD2), LH2 4-INCH RECIRC DISCONNECT (PO3), LH2 RECIRC VALVES (PV14-16); DRAIN MANIFOLD.

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