

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP.

FMEA NO 05-6J -2141 -2
ABORT: RPLS, TAL.

REV: 06/15/88

ASSEMBLY : PANEL R2
P/N RI : ME452-0102-7203
P/N VENDOR:
QUANTITY : 3
: THREE
:

| | | | | |
|--------------|---------|---------|-----|-----|
| | VEHICLE | 102 | 103 | 104 |
| EFFECTIVITY: | | X | X | X |
| PHASE(S): | PL | LO X OO | DO | LS |

CRIT. FUNC: 1R

CRIT. HDW: 2

REDUNDANCY SCREEN: A-PASS B-PASS C-PASS

PREPARED BY:
DES W/B J. BROWN
REL g/f DEFENSOR
QE Dun D MASAI

APPROVED BY:
DES [Signature]
REL J. Kemura 6/27/88
QE S.J. Cowan 6/27/88

APPROVED BY (NASA):
EPDC SSM [Signature]
MPS SSM [Signature]
EPDC REL [Signature]
MPS REL [Signature]
QE [Signature]

ITEM:

SWITCH, TOGGLE, (TWO POLES, THREE POSITIONS), HELIUM INTERCONNECT VALVES (LV59, 61, 63) CONTROL CIRCUIT.

FUNCTION:

PROVIDES MANUAL CONTROL OF HELIUM INTERCONNECT VALVE SOLENOIDS. 32V73A2S9, S10, S11.

FAILURE MODE:

CONTACT-TO-CONTACT SHORTS ("IN OPEN" CONTACTS).

CAUSE(S):

PIECE PART STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY.

EFFECT(S) ON:

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

(A) INADVERTENT "IN OPEN" MANUAL SWITCH COMMAND TO HELIUM INTERCONNECT IN SOLENOID.

(B) INABILITY TO DEACTUATE HELIUM INTERCONNECT IN VALVE.

DURING MAINSTAGE, WITH THE CONSTANT ENGINE HELIUM PURGE, THE HIGHER PNEUMATIC SUPPLY PRESSURE WILL EQUALIZE WITH THE LOWER ASSOCIATED ENGINE SUPPLY.

(C,D) NO EFFECT - FIRST FAILURE.

05-6J-244

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - MAIN PROP. FMEA NO 05-6J -2141 -2 REV:06/16/88

- (E) 1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE.
- 1) RUPTURE OF INTERCONNECT LINE BETWEEN "IN" CHECK VALVE AND SOLENOID VALVE.
 - 2) CONTACT-TO-CONTACT SHORTS ("IN OPEN" CONTACTS), RESULTING IN OPENING OF HELIUM INTERCONNECT IN VALVE.

DURING ASCENT, PNEUMATIC SUPPLY WILL BE LOST. ESCAPING HELIUM MAY OVERPRESSURIZE THE AFT COMPARTMENT.

DURING ENTRY, VENT DOORS ARE CLOSED TO PREVENT INGESTION OF RCS AND APU GASES. RUPTURE DURING THE TIME PERIOD THAT THE VENT DOORS ARE CLOSED MAY RESULT IN OVERPRESSURIZATION OF THE AFT COMPARTMENT. VENT DOORS ARE OPENED WHEN VEHICLE VELOCITY DROPS BELOW 2400 FT/SEC. POSSIBLE LOSS OF CREW/VEHICLE.

CRITICALITY 1/1 FOR RTLS AND TAL ABORTS DUE TO LACK OF AFT COMPARTMENT PURGE DURING ENTRY. ASSUMES ABORT CAUSED BY UNISOLATABLE ENGINE HELIUM SYSTEM LEAK RESULTING IN PREMATURE ENGINE SHUTDOWN - HELIUM FROM OTHER TWO ENGINES WILL BE LOST WHEN VEHICLE SOFTWARE OPENS INTERCONNECT "OUT" VALVES AT MECO +20 SECONDS. POSSIBLE LOSS OF CREW/VEHICLE.

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 - SWITCH, TOGGLE.

(B) GROUND TURNAROUND TEST

HE INTCN VLVS COMPLETE CMD VERIF, V41AAO.020A, V41AAO.040A, V41AAO.060A EVERY FLIGHT.

(E) OPERATIONAL USE

HELIUM BOTTLE PRESSURE IS ON DEDICATED DISPLAY IN THE COCKPIT. PRIOR TO MECO, THE LEFT ENGINE LOW PRESSURE GHe CROSSOVER VALVE (LV10) CAN BE OPENED.

EFFECTIVE FOR OI-8D SOFTWARE, CR 89397B "MPS SYSTEM FDA AND DISPLAY - BFS" ADDS PNEUMATIC TANK, REGULATOR, AND ACCUMULATOR PRESSURE TO THE S/M ALERT FDA SYSTEM AND ADDS THE 3 MEASUREMENTS TO THE BFS SYSTEM SUMMARY DISPLAY. THIS ALLOWS THE FLIGHT CREW TO RESPOND TO A PNEUMATIC HELIUM SYSTEM LEAK INDEPENDENT OF GROUND CONTROL.