

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2262 -1 REV:04/25/88

ASSEMBLY : APT LCA-1 CRIT. FUNC: 1R
P/N RI : MC477-0263-0002 CRIT. HDW: 2
P/N VENDOR: VEHICLE 102 103 104
QUANTITY : 1 EFFECTIVITY: X X X
: ONE PHASE(S): PL LO X OO DO LS
:

REDUNDANCY SCREEN: A-PASS B-PASS C-PASS
PREPARED BY: APPROVED BY: APPROVED BY (NASA):
DES *JHB* J BROWN DES *[Signature]* EPDC SSM *[Signature]*
REL F DEFENSOR *[Signature]* REL *[Signature]* 5-6-88 EPDC REL *[Signature]*
QE *9.6 for* D MASAI QE *[Signature]* 5-6-88 MPS REL *[Signature]*
QE *[Signature]*

ITEM:

CONTROLLER, HYBRID DRIVER (HDC), TYPE III, LH2 TOPPING VALVE OPEN SOLENOID (LV 39).

FUNCTION:

CONDUCTS MAIN BUS A POWER TO OPEN SOLENOID OF LH2 TOPPING VALVE. 54V76A121J10(U).

FAILURE MODE:

LOSS OF OUTPUT, FAILS TO CONDUCT, FAILS TO TURN "ON".

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 POWER TO LH2 TOPPING VALVE OPEN SOLENOID.

(B) FIRST FAILURE HAS NO EFFECT. FAILURE DURING PRELAUNCH WILL PREVENT TOPPING OF LH2 TANK. LOSS OF BACKUP METHODS TO DETANK (INBOARD FILL AND DRAIN VALVE IS PRIMARY MODE OF DETANKING). FAILURE DURING NOMINAL DUMP RESULTS IN AN INCOMPLETE DUMP BECAUSE THE INBOARD FILL AND DRAIN VALVE (PV12) IS ONLY OPEN 6 SECONDS. LH2 PRESSURE BUILDUP IS RELIEVED THROUGH MANIFOLD RELIEF SYSTEM (RV6). POTENTIAL FOR ADDITIONAL VACUUM INERTINGS.

NO EFFECT ON RTLS/TAL BECAUSE DUMP OF PROPELLANT IN THE RECIRCULATION SYSTEM WILL BE ACCOMPLISHED THROUGH THE SSME FUEL BLEED SYSTEM. PROPELLANT IN THE MANIFOLD WILL BE DUMPED THROUGH THE INBOARD AND OUTBOARD FILL & DRAIN VALVES AND THE RTLS DUMP VALVES.

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(C) PRELAUNCH FAILURE WILL RESULT IN LAUNCH SCRUB. NO EFFECT FOR RTLS AND TAL ABORTS.

(D) NO EFFECT.

(E) 1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE. TIME FRAME - LH2 DUMP.
1) HDC LOSS OF OUTPUT CAUSES TOPPING VALVE (PD13) TO CLOSE FOR DUMP.
2) LH2 MANIFOLD RELIEF SYSTEM FAILS TO RELIEVE.

RESULTS IN LH2 MANIFOLD RUPTURE AND LH2 LEAKAGE INTO AFT COMPARTMENT.
POSSIBLE AFT COMPARTMENT OVERPRESSURIZATION AND FIRE/EXPLOSION HAZARD.
POSSIBLE LOSS OF CRITICAL ADJACENT COMPONENTS DUE TO CRYO EXPOSURE.
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 B; ITEM NO. 1 - HYBRID DRIVER CONTROLLER.

(B) GROUND TURNAROUND TEST

MDM COMMAND/COPPER PATH VERIFICATION, V41ABO.131B EVERY FLIGHT.

(E) OPERATIONAL USE

THE CREW WILL BE DIRECTED TO OPEN THE BACKUP LH2 (RTLS) DUMP VALVES.
THESE VALVES WILL BE CLOSED AT TERMINATION OF VACUUM INERTING
OPERATIONS PRIOR TO TRANSITIONING OUT OF OPS 1.

05-6J-428