

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2225 -1 REV:09/02/88
ABORT: PAD.

ASSEMBLY : APT LCA-1,2 CRIT. FUNC: 1R
P/N RI : MC477-0250-0002 CRIT. HDW: 1
P/N VENDOR: VEHICLE 102 103 104
QUANTITY : 4 EFFECTIVITY: X X X
: FOUR PHASE(S): PL X LO OO DC LS

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

PREPARED BY: DES J.B. J BROWN APPROVED BY: DES J. Brown APPROVED BY (NASA):
REL J.F. DEFENSOR REL J. Komisar Col M. Hove EPDC SSM [Signature]
QE D.M. MASAI QE J. Brown MPS SSM [Signature]
EPDC REL [Signature]
MPS REL [Signature]
QE [Signature]

ITEM:
CONTROLLER, HYBRID DRIVER (HDC), TYPE III; LO2 POGO RECIRCULATION VALVE
CLOSE SOLENOID CONTROL POWER (LV77/LV78).

FUNCTION:
CONDUCTS MAIN BUS POWER TO CLOSE SOLENOID OF LO2 POGO RECIRCULATION
VALVE. THE TWO HDCs ARE IN SERIES.
S4V75A121J1(43). S5V76A122J1(43).

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 A LO2 POGO RECIRCULATION VALVE CLOSE SOLENOID.
- (B) ONE OF TWO POGO VALVES OPENS.

DURING LOADING, FAILURE OF EITHER POGO RECIRCULATION VALVE TO
CLOSE/REMAIN CLOSED WILL RESULT IN THE INABILITY TO OBTAIN SSME START
CONDITIONS.

FOR POST ENGINE SHUTDOWN (PRF), DEGRADATION OF REDUNDANCY AGAINST L2
GEYSER FORMATION.

(C) DURING LOADING, NO EFFECT - VIOLATION OF LCC WILL RESULT IN LAUNCH
SCRUB. FOR PRF, NO EFFECT FIRST FAILURE.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2223 -1 REV:09/02/88

- (D) NO EFFECT - FIRST FAILURE.
- (E) 1X/3, 2 SUCCESS PATHS AFTER FIRST FAILURE.
TIME FRAME - POST ENGINE SHUTDOWN/FRF.
- 1) HDC LOSS OF OUTPUT CAUSING ONE LO2 POGO VALVE (PV20/21) TO OPEN.
 - 2) LO2 OVERBOARD BLEED VALVE (PV19) FAILS TO OPEN/REMAIN OPEN.
 - 3) INBOARD OR O TBOARD FILL & DRAIN VALVE (PVS/10) FAILS TO OPEN/REMAIN OPEN.

TO PREVENT GEYSERING, BOTH POGO VALVES AND PREVALVES ARE REQUIRED TO BE CLOSED TO LIMIT HEAT SOAKBACK FROM THE MAIN ENGINES INTO THE FEED SYSTEM FOR EITHER POGO VALVE FAILURE TO CLOSE, HELIUM INJECTION IS NOT SUFFICIENT TO PREVENT GEYSERING. OVERBOARD BLEED MUST BE INITIATED WITHIN 2 MINUTES OR FILL/DRAIN DETANK MUST BE INITIATED WITHIN 12 MINUTES. FAILURE OF A POGO RELIEF VALVE TO REMAIN SEATED WILL NOT CONTRIBUTE TO GEYSER FORMATION.

GEYSER FORMATION WILL RESULT IN LO2 FEEDLINE RUPTURE. FIRE/EXPLOSION HAZARD BOTH INTERIOR AND EXTERIOR TO THE VEHICLE. POSSIBLE AFT COMPARTMENT OVERPRESSURIZATION AND LOSS OF ADJACENT CRITICAL COMPONENTS DUE TO CRYO EXPOSURE. POSSIBLE LOSS OF CREW/VEHICLE.

CRITICALITY 1/1 DURING PAD ABORT. THIS FAILURE RESULTS IN INABILITY TO ISOLATE AN SSME WITH UNCONTAINED DAMAGE (ASSUMES ENGINE DAMAGED ONLY TO THE EXTENT THAT ISOLATION OF THE DAMAGE WILL SAVE THE SYSTEM). POSSIBLE AFT COMPARTMENT OVERPRESSURIZATION AND FIRE/EXPLOSION HAZARD DUE TO ICE LEAKAGE.

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

COMPLETE ELECTRICAL VERIFICATION V41ABO.2100, V41ABO.2150 EVERY FLIGHT.

(E) OPERATIONAL USE

FLIGHT: N/A

GROUND: OMI S1003 (LO2 SYSTEM) SEQUENCE TITLED "EMERGENCY PROCEDURE FOR MAJOR LEAK OR FIRE ..." CONTAINS SAFING SEQUENCE OF EVENTS FOR MAJOR LEAKS IN THE PROPELLANT SYSTEMS.

05-6J-354