

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2162 -1 REV:06/13/88
 ABORT: RTLS.

ASSEMBLY : D & C PANEL R2		CRIT. FUNC: 1R
P/N RI : ME452-0102-7201		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 <u>J BROWN</u>	DES <u>J Brown</u>	EPDC SSM <u>James M. Adams 4/18/88</u>
REL <u>DEFENSOR</u>	REL <u>J. Cannon 4/27/88</u>	MPS SSM <u>J. Cannon 4/27/88</u>
QE <u>D. Masai</u>	QE <u>J. Cannon 4/27/88</u>	EPDC RES <u>James M. Adams 4/18/88</u>
		MPS RES <u>James M. Adams 4/18/88</u>

ITEM:

SWITCH, TOGGLE (TWO POLES, THREE POSITIONS, LEVER LOCKED) MPS PROPELLANT DUMP SEQUENCE CONTROL CIRCUIT.

FUNCTION:

PROVIDES MANUAL "START" AND "STOP" CONTROL OF MPS PROPELLANT DUMP SEQUENCE CONTROL CIRCUIT. 32V73A2S1.

FAILURE MODE:

FAILS CLOSED IN "GPC" POSITION, SHORT-TO-CASE (GROUND).

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) LOSS OF MANUAL "START" COMMAND CAPABILITY OF MPS PROPELLANT DUMP SEQUENCE CONTROL CIRCUIT.

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

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- (E) CASE I: LH2
1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE.
TIME FRAME - DIRECT INSERTION MISSION, POST MECO, PRIOR TO DUMP.
1) SWITCH FAILS CLOSED IN "GPC" POSITION, RESULTING IN LOSS OF MANUAL START COMMAND CAPABILITY.
2) LH2 MANIFOLD RELIEF SYSTEM FAILS TO RELIEVE.

FOR DIRECT INSERTION MISSIONS, CREW USES SWITCH TO MANUALLY INITIATE DUMP SEQUENCE (OMS-1 BURN AUTOMATICALLY STARTS DUMP FOR NOMINAL INSERTION MISSIONS). FIRST FAILURE RESULTS IN LOSS OF THIS CAPABILITY.

LH2 REMAINING IN MANIFOLD CANNOT BE RELIEVED. RESULTS IN OVERPRESSURIZATION AND RUPTURE OF THE FEEDLINE MANIFOLD. RTLS DUMP VALVES ARE OPENED FOLLOWING MECO, BUT NOT LONG ENOUGH TO DUMP THE MAJORITY OF REMAINING LH2. AFT COMPARTMENT OVERPRESSURIZATION AND FIRE/EXPLOSION HAZARD. POSSIBLE LOSS OF CRITICAL ADJACENT FUNCTIONS DUE TO CRYOGENIC EXPOSURE. POSSIBLE LOSS OF CREW/VEHICLE.

- CASE II: LO2
1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE.
TIME FRAME - DIRECT INSERTION MISSION, POST MECO, PRIOR TO DUMP.
1) SWITCH FAILS CLOSED IN "GPC" POSITION, RESULTING IN LOSS OF MANUAL START COMMAND CAPABILITY.
2) LO2 MANIFOLD RELIEF SYSTEM FAILS TO RELIEVE.

FOR DIRECT INSERTION MISSIONS, CREW USES SWITCH TO MANUALLY INITIATE DUMP SEQUENCE (OMS-1 BURN AUTOMATICALLY STARTS DUMP FOR NOMINAL INSERTION MISSIONS). FIRST FAILURE RESULTS IN LOSS OF THIS CAPABILITY.

LO2 REMAINING IN MANIFOLD CANNOT BE RELIEVED. RESULTS IN OVERPRESSURIZATION AND RUPTURE OF THE FEEDLINE MANIFOLD. AFT COMPARTMENT OVERPRESSURIZATION AND FIRE/EXPLOSION HAZARD. POSSIBLE LOSS OF CRITICAL ADJACENT FUNCTIONS DUE TO CRYOGENIC EXPOSURE. POSSIBLE LOSS OF CREW/VEHICLE.

A VENT PATH EXISTS (APPROXIMATELY 4 SCFM PER BLEED CHECK VALVE) THROUGH THE POGO SYSTEM TO THE SSME HPOT SEAL AND RELEASED OVERBOARD. THIS VENT PATH IS NOT CONSIDERED SUFFICIENT TO RELIEVE THE LO2 MANIFOLD IF THE MANIFOLD RELIEF SYSTEM FAILS.

ABORT 1/1 FOR OI-8C CONTINGENCY RTLS MISSION. CREW USES SWITCH TO MANUALLY INITIATE CONTINGENCY RTLS DUMP. FAILURE TO DUMP CAUSES GH2 VENTING THROUGH FLAME ARRESTOR (FL1). INGESTION OF VENTED GH2 RESULTS IN HAZARDOUS CONCENTRATION IN AFT COMPARTMENT PRIOR TO BAILOUT OPPORTUNITY. POSSIBLE AFT COMPARTMENT FIRE/EXPLOSION. POSSIBLE LOSS OF CREW.

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

PROPELLANT DUMP SEQUENCE SW VERIF V41AFO.260B, D EVERY FLIGHT.

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(E) OPERATIONAL USE

LH2/LO2 MANIFOLD PRESSURE IS ON CAUTION AND WARNING. CREW WILL OPEN THE APPROPRIATE LH2/LO2 FILL AND DRAIN VALVES TO INERT THE SYSTEM.

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