

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2034 -2 REV:06/20/88

ASSEMBLY : AFT LCA - 1, 2, 3  
 P/N RI : JANTXVIN5551  
 P/N VENDOR:  
 QUANTITY : 12  
 : TWELVE  
 :

	VEHICLE	102	103	104	
CRIT. FUNC:					1R
CRIT. HDW:					2
EFFECTIVITY:		X	X	X	
PHASE(S):	PL	LO X	OO	DO	LS

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

PREPARED BY:  
 DES J BROWN  
 REL F DEFENSOR  
 QE D M MASAI

APPROVED BY:  
 DES [Signature]  
 REL J Kamura 6/27/88  
 QE J. J. Rousser 6/27/88

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

ITEM:

DIODE, BLOCKING (3 AMP), GH2/G02 FLOW CONTROL VALVE, TRANSDUCER REPLACEMENT INHIBIT SIGNAL.

FUNCTION:

DIODE ISOLATES TRANSDUCER REPLACEMENT INHIBIT SIGNAL FROM ANOTHER. CONDUCTS REPLACEMENT INHIBIT SIGNAL TO HDC I SO THAT ONLY ONE SPARE ULLAGE PRESSURE TRANSDUCER CAN BE SELECTED.  
 54V76A121J3(88), J3(89), J3(90), J3(91). 55V76A122J3(88), J3(89), J3(90), J3(91). 56V76A123J3(88), J3(89), J3(90), J3(91).

FAILURE MODE:

SHORT (END TO END).

CAUSE(S):

STRUCTURAL FAILURE (MECHANICAL STRESS, VIBRATION), CONTAMINATION, ELECTRICAL STRESS, THERMAL STRESS, PROCESSING ANOMALY.

EFFECT(S) ON:

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

(A) LOSS OF ISOLATION OF ONE TRANSDUCER REPLACEMENT INHIBIT SIGNAL.

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

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- (E) 1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE.  
TIME FRAME - ASCENT.  
1) PRELAUNCH, PRIMARY ULLAGE TRANSDUCER FAILS AND IS REPLACED BY NO. 4 TRANSDUCER.  
2) DIODE SHORTS (END TO END).

FAILURES WILL RESULT IN INPUT SIGNAL TO ULLAGE PRESSURE SIGNAL CONDITIONER ASSOCIATED WITH FAILED TRANSDUCER TOGGLING BETWEEN FAILED TRANSDUCER AND TRANSDUCER NO. 4. INPUT SIGNAL TO ULLAGE PRESSURE SIGNAL CONDITIONER ASSOCIATED WITH FAILED DIODE WILL TOGGLE BETWEEN PRIMARY AND NO. 4 TRANSDUCERS. ALTERNATING INPUTS TO TWO SIGNAL CONDITIONERS MAY RESULT IN LOSS OF ULLAGE PRESSURE CONTROL EITHER HIGH OR LOW WITH THE FOLLOWING CONSEQUENCES:

CASE I: LO2/LH2 "LOW" FAILURES.

RESULTS IN EXCESSIVE ULLAGE PRESSURE CAUSING ET VENT VALVE TO RELIEVE EXCESS PRESSURE. POTENTIAL FIRE/EXPLOSION HAZARD EXTERIOR TO THE VEHICLE. POSSIBLE VIOLATION OF THE ET MAXIMUM STRUCTURAL CAPABILITY REQUIREMENTS. POSSIBLE LOSS OF CREW/VEHICLE.

CASE II: LH2 "HIGH" FAILURES.

RESULTS IN INSUFFICIENT PRESSURIZATION GAS TO MAINTAIN LH2 ULLAGE PRESSURE IN THE REQUIRED FLIGHT CONTROL BAND (32-34 PSIA). POSSIBLE VIOLATION OF TANK MINIMUM STRUCTURAL CAPABILITY REQUIREMENTS AND UNCONTAINED SSME SHUTDOWN DUE TO LOW NPSP. POSSIBLE LOSS OF CREW/VEHICLE.

CASE III: LO2 "HIGH" FAILURES.

LOSS OF ET LO2 ULLAGE PRESSURE WILL RESULT IN VIOLATION OF TANK MINIMUM STRUCTURAL CAPABILITY REQUIREMENTS. MASS OF LO2 AND VEHICLE ACCELERATION SHOULD BE SUFFICIENT TO MAINTAIN PROPER ENGINE NPSP, DELAYING UNCONTAINED SSME SHUTDOWN DUE TO LOW NPSP UNTIL LATE IN POWERED FLIGHT. POSSIBLE LOSS OF CREW/VEHICLE.

FAILS B SCREEN BECAUSE NO INSTRUMENTATION IS AVAILABLE TO DETECT FAILURE.

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DISPOSITION & RATIONALE:

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

(A-D) DISPOSITION AND RATIONALE:

REFER TO APPENDIX F, ITEM NO. 4 - DIODE, AXIAL LEAD.

(B) GROUND TURNAROUND TEST

PRESS CNTL REDUNDANCY W/ET SIM V41ACO.030, V41ACO.060 EVERY FLIGHT.

(E) OPERATIONAL USE

NO CREW ACTION CAN BE TAKEN FOR LOSS OF GO2 ULLAGE PRESSURE CONTROL OR FAILURES WHICH RESULT IN EXCESSIVE GH2 ULLAGE PRESSURE. THE FOLLOWING ACTIONS CAN BE TAKEN FOR LOW GH2 ULLAGE PRESSURE:

LH2 ULLAGE PRESSURE IS ON SYSTEMS MANAGEMENT (SM) ALERT. CREW WILL OPEN THE LH2 FLOW CONTROL VALVES (VIA COCKPIT SWITCH S53 ON PANEL R2) FOR A LOW LH2 ULLAGE PRESSURE CONDITION.

IF THE LH2 NPSP DROPS BELOW THE PRE-FLIGHT ACCEPTED LEVELS (PER FLIGHT RULES), THE CREW WILL MANUALLY THROTTLE THE ENGINES TO KEEP THE NPSP HIGH ENOUGH TO PREVENT LH2 TURBOPUMP CAVITATION.

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