SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - MAIN PROP. FMEA NO 05-6J -2095 -2 REV:09/02 88

ASSEMBLY :AFT PCA - 2
P/N RI :JANTX1N1204RA
P/N VENDOR:
QUANTITY :1
:ONE
:

CRIT. FUNC: 1R
CRIT. HDW: 3

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

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

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

APPROVED BY:
DES
REL
QE

APPROVED BY (NASA):
EPDC SSM
MPS SSM
EPDC REL
MPS REL
QE

ITEM:
DIODE, CROSSOVER (12 AMP), LO2 OVERBOARD BLEED VALVE CLOSE SOLENOID (LV76).

FUNCTION:
PREVENTS SINGLE MDM COMMAND FROM ACTUATING CLOSE SOLENOID INADVERTENTLY. S5V76A132A3CR15.

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) DEGRADATION OF REDUNDANCY AGAINST INADVERIENT ACTUATION OF CLOSE SOLENOID.

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

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SUBSYSTEM :EPD&C - MAIN PROP. FMEA NO 05-6J -2095 -2 REV:05/02/93

(E) CASE I: 1R/3, 3 SUCCESS PATHS AFTER FIRST FAILURE.
TIME FRAME - DETANK FOLLOWING FRF OR TANKING TEST.
1) DIODE SHORTS.
2) INADVERTENT MDM COMMAND B OR HDC I FAILS "ON" CAUSING LO2 OVERBOARD BLEED VALVE (PV19) TO CLOSE/REMAIN CLOSED.
3) INBOARD OR OUTBOARD FILL & DRAIN VALVES (PV9,10) FAIL TO OPEN/REMAIN OPEN.
4) ONE OF THREE PREVALVES (PV1,2,3) OR ONE OF TWO LO2 POGO VALVES (PV20,21) FAILS TO CLOSE/REMAIN CLOSED OR HELIUM INJECT FAILS TO RESUME/CONTINUE.

TO PREVENT GEYSERING, PREVALVE CLOSURE IS REQUIRED TO LIMIT HEAT SOAKBACK FROM THE MAIN ENGINES INTO THE FEED SYSTEM. FOR PREVALVE FAILURE TO CLOSE, HELIUM INJECTION IS NOT SUFFICIENT TO PREVENT GEYSERING AND OVERBOARD BLEED MUST BE INITIATED WITHIN 2 MINUTES OR FILL/DRAIN DETANK MUST BE INITIATED WITHIN 12 MINUTES.

GEYSERING MAY RESULT IN FEEDLINE RUPTURE, EXTERNAL LEAKAGE OF LO2, AND POSSIBLE AFT COMPARTMENT OVERPRESSURIZATION. FIRE/EXPLOSIVE HAZARD BOTH INTERIOR AND EXTERIOR TO THE VEHICLE. POSSIBLE LOSS OF CRITICAL ADJACENT COMPONENTS DUE TO CRYO EXPOSURE. POSSIBLE LOSS OF CREW/VEHICLE.

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

CASE II: 1R/3, 2 SUCCESS PATHS AFTER FIRST FAILURE.
TIME FRAME - PROPELLANT LOADING.
1) DIODE SHORTS.
2) INADVERTENT MDM COMMAND B OR HDC I FAILS "ON" CAUSING LO2 OVERBOARD BLEED VALVE (PV19) TO CLOSE/REMAIN CLOSED.
3) ONE OF THREE PREVALVES (PV1,2,3) OR ONE OF TWO LO2 POGO VALVES (PV20,21) FAILS TO CLOSE/REMAIN CLOSED OR HELIUM INJECT FAILS TO CONTINUE.

TO PREVENT GEYSERING, PREVALVE CLOSURE IS REQUIRED TO LIMIT HEAT SOAKBACK FROM THE MAIN ENGINES INTO THE FEED SYSTEM. FOR PREVALVE FAILURE TO CLOSE, HELIUM INJECTION IS NOT SUFFICIENT TO PREVENT GEYSERING AND OVERBOARD BLEED MUST BE INITIATED WITHIN 2 MINUTES OR FILL/DRAIN DETANK MUST BE INITIATED WITHIN 12 MINUTES. FOR UNPLANNED DETANK, OPENING THE FILL AND DRAIN VALVES TO BEGIN DRAIN CANNOT BE COUNTED AS A SUCCESS PATH SINCE IT REQUIRES A CREW AND/OR GROUND ACTION.

GEYSERING MAY RESULT IN FEEDLINE RUPTURE, EXTERNAL LEAKAGE OF LO2, AND POSSIBLE AFT COMPARTMENT OVERPRESSURIZATION. FIRE/EXPLOSIVE HAZARD BOTH INTERIOR AND EXTERIOR TO THE VEHICLE. POSSIBLE LOSS OF CRITICAL ADJACENT COMPONENTS DUE TO CRYO EXPOSURE. POSSIBLE LOSS OF CREW/VEHICLE.

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

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - MAIN PROP. FMEA NO 05-6J -2095 -2 REV:08/22/88

DISPOSITION & RATIONALE:
(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE

(A-D) FOR DISPOSITION AND RATIONALE
REFER TO APPENDIX F, ITEM NO. 2 - DIODE, STUD-MOUNT.

(B) GROUND TURNAROUND TEST
COMPLETE ELECTRICAL VERIFICATION V41AB0.200F EVERY FLIGHT.

(E) OPERATIONAL USE
FLIGHT: N/A

GROUND: FOR LOSS OF BLEED DURING LOADING OR INABILITY TO ACHIEVE THE BLEED FOLLOWING TANKING TEST, PERFORM OMRSD FILE II REQUIREMENTS S00E00.122 TO SAFE MPS SYSTEM. MONITOR LO2 SYSTEM TEMPERATURE REQUIREMENTS: IF EXCEEDED, CLOSE LO2 PREVALVES AND POGO VALVES AND INITIATE DRAIN.

FOR INABILITY TO REESTABLISH BLEED WITHIN TWO MINUTES AFTER FPF ENGINE SHUTDOWN, PERFORM OMRSD FILE II REQUIREMENT S00E00.390. CLOSE POGO VALVES WITHIN 30 SECONDS AND INITIATE DRAIN WITHIN 12 MINUTES. AFTER ENGINE SHUTDOWN HELIUM INJECTION IS INITIATED WITHIN 30 SECONDS AND LO2 PREVALVES ARE CLOSED AS A ROUTINE OPERATION.

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.