SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - MAIN PROP. FMEA NO 05-6J -2240 -3 REV:04/25/88

ASSEMBLY :MID PCA-3 CRIT. FUNC: 1R
P/N RI :JANTX1N1204RA CRIT. HDW: 2
P/N VENDOR: VEHICLE 102 103 104
QUANTITY :2 EFFECTIVITY: X X X
:TWO PHASE(S): PL X LO X OO DO LS
:

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

PREPARED BY: APPROVED BY: APPROVED BY (NASA);
DES J BROWN DES EPDC SSM
MPS SSM 5-13-88
REL F DEFENSOR REL 5-6-88 EPDC REL
MPS REL 5/13/88
QE D MASAI for QE 5-6 88 QE

ITEM:
DIODE, CROSSOVER (12 AMP), LO2/LH2 RELIEF SHUTOFF VALVE CLOSE SOLENOID (LV24/25).

FUNCTION:
PREVENTS SINGLE MDM COMMAND FROM ACTUATING CLOSE SOLENOID INADVERTENTLY. 40V76A27A4CR2, A4CR4.

FAILURE MODE:
SHORT TO STRUCTURE (GROUND).

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 POWER TO CLOSE SOLENOID - BOTH RPCs WILL TRIP. SERIES RPC WILL TRIP DUE TO THE LOAD TERMINAL DIRECTLY CONNECTING TO GROUND. PARALLEL RPC WILL TRIP DUE TO THE LOAD TERMINAL CONNECTING TO GROUND THROUGH THE HDC REVERSE BIAS DIODE.

(B) INADVERTENT OPENING OF LO2/LH2 RELIEF SHUTOFF VALVE (PV7/8).

(C,D) NO EFFECT - FIRST FAILURE.

(E) 1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE.
TIME FRAME - PRELAUNCH AND ASCENT.
1) DIODE SHORTS TO STRUCTURE (GROUND) CAUSING LO2/LH2 RELIEF SHUTOFF VALVE (PV7/8) TO OPEN. FEEDLINE RELIEF VALVE (RV5/6) WILL PREVENT OVERBOARD LEAKAGE OF LO2/LH2 (RELIEF VALVE CRACK PRESSURE IS ABOVE NOMINAL SYSTEM OPERATING PRESSURE).
2) RELIEF VALVE (RV5/6) FAILS TO REMAIN CLOSED.

LO2/LH2 WILL DUMP OVERBOARD RESULTING IN LOSS OF PROPELLANT AND POSSIBLE PREMATURE ENGINE SHUTDOWN. FIRE/EXPLOSION HAZARD EXTERIOR TO THE VEHICLE. POSSIBLE VIOLATION OF ET MINIMUM STRUCTURAL REQUIREMENTS DUE TO REDUCED ULLAGE PRESSURE. POSSIBLE LOSS OF CREW/VEHICLE.

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. 2 - DIODE, STUD-MOUNT.

(B) GROUND TURNAROUND TEST
COMPLETE ELECTRICAL VERIFICATION V41ABO.070N, V41ABO.080N EVERY FLIGHT.

(E) OPERATIONAL USE
FLIGHT: NO CREW ACTION CAN BE TAKEN.

GROUND: OMI S1003/S1004 (LO2/LH2 SYSTEM) SEQUENCE TITLED "EMERGENCY PROCEDURE FOR MAJOR LEAK OR FIRE . . . " CONTAINS SAFING SEQUENCE OF EVENTS FOR MAJOR LEAKS IN THE PROPELLANT SYSTEMS.