SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - MAIN PROP. FMEA NO 05-6J -2059 -1 REV:11/23/87

ASSEMBLY :AFT LCA-2
P/N RI :MC477-0263-0002
P/N VENDOR:
QUANTITY :1
:ONE
:1 PER LO2 INBOARD FILL/DRAIN VALVE

CRIT. FUNC: 1R
CRIT. HDW: 2

| VEHICLE EFFECTIVITY: | 102 X | 103 X | 104 X |
|---|---|---|---|
| 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 | |
| REL | F DEFENSOR | REL 12-5-87 | MPS SSM | |
| QE | D MASAI | QE | EPDC REL | |
| | | | MPS REL | |
| | | | QE | |

ITEM:
CONTROLLER, HYBRID DRIVER (HDC), TYPE III, LO2 INBOARD FILL/DRAIN VALVE CONTROL POWER, CLOSE SOLENOID.

FUNCTION:
CONDUCTS MAIN BUS POWER TO THE CLOSE SOLENOID FOR THE LO2 INBOARD FILL/DRAIN VALVE. 56V76A122AR-J3(58).

FAILURE MODE:
LOSS OF OUTPUT, FAILS TO CONDUCT

CAUSE(S):
PIECE PART FAILURE, MECHANICAL SHOCK, VIBRATION, THERMAL SHOCK

EFFECT(S) ON:
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE

(A) LOSS OF POWER TO THE LO2 INBOARD FILL/DRAIN VALVE CLOSE SOLENOID.

(B) FIRST FAILURE - NO EFFECT. BISTABLE FEATURE MAINTAINS FILL/DRAIN VALVE IN CLOSE POSITION.

(C,D) NO EFFECT - FIRST FAILURE. POSSIBLE LOSS OF CREW AND VEHICLE AFTER SECOND FAILURE:

CASE 1 - PREMATURE ACTUATION OF OPEN SOLENOID RESULTING IN PREMATURE OPENING OF FILL/DRAIN VALVE. POTENTIAL WATER HAMMER EFFECT OF APPROXIMATELY 700 PSI (AT 1-G). LO2 FILL/DRAIN LINE IS ONLY CERTIFIED TO WITHSTAND FLIGHT LOADS WHILE EMPTY. FAILURE RESULTS IN POSSIBLE RUPTURE OF THE LO2 FILL LINE, AFT OVERPRESS, AND FIRE/EXPLOSIVE HAZARD. POSSIBLE LOSS OF CRITICAL ADJACENT FUNCTIONS DUE TO CRYO EXPOSURE. DISPLACED GAS MAY ENTER ONE OR MORE SSMEs. POSSIBLE SHUTDOWN OF ONE OR MORE SSMEs.

SUBSYSTEM :EPD&C - MAIN PROP. FMEA NO 05-6J -2059 -1 REV:11/23/87

CASE 2 - FAILURE OF GROUND SYSTEM TO DETECT LOSS OF CLOSE SOLENOID POWER AND INHIBIT SLAM OPENING OF INBOARD VALVE AT INITIATION OF DETANK FOLLOWING FRF OR TANKING TEST. WATER HAMMER IN FILL LINE RESULTS IN POSSIBLE RUPTURE, AFT OVERPRESS, FIRE/EXPLOSIVE HAZARD, POSSIBLE LOSS OF CRITICAL ADJACENT FUNCTIONS DUE TO CRYO EXPOSURE.

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

**(A-D) DISPOSITION AND RATIONALE:**
REFER TO APPENDIX B, ITEM NUMBER 1 - HYBRID DRIVER CONTROLLER.

**(B) GROUND TURNAROUND TEST**
MDM COMMAND/COPPER PATH VERIFICATION, V41AB0.101E EVERY FLIGHT

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

GROUND -

CASE 1: FOR PAD ABORT IF A MAJOR LEAK IS DETECTED, CLOSE 17-INCH DISCONNECT (PD1).

CASE 2: DO NOT INITIATE DETANK UNTIL CLOSE POWER IS RESTORED.