

PAGE: 1

PRINT DATE: 02/24/95

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 05-6J-2143 -X**

SUBSYSTEM NAME: EPD&C MAIN PROPULSION SYSTEM

REVISION: 1 02/06/95

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: AFT PCA 1	V070-765310
LRU	: AFT PCA 2	V070-765320
LFU	: AFT PCA 3	V070-765330
SRU	: CONTROLLER, REMOTE POWER	MC450-0017-1050
SRU	: CONTROLLER, REMOTE POWER	MC450-0017-2050
SRU	: CONTROLLER, REMOTE POWER	MC450-0017-3050
SRU	: CONTROLLER, REMOTE POWER	MC450-0017-4050

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

CONTROLLER, REMOTE POWER (RPC) 5 AMP, HELIUM INTERCONNECT VALVES (LV 59, 61, 63) CONTROL CIRCUIT.

REFERENCE DESIGNATORS: 40V76A25RPC38
40V76A25RPC39
40V76A26RPC37
40V76A26RPC38
40V76A27RPC33
40V76A27RPC34

QUANTITY OF LIKE ITEMS: 3
THREE

FUNCTION:

CONDUCTS POWER TO THE HELIUM INTERCONNECT IN VALVE SOLENOIDS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE
NUMBER: 05-6J-2143 -X

- APPROVALS -

PRODUCT ASSURANCE MGR : K. L. PRESTON
 PRODUCT ASSURANCE ENGR : N. HAFEZIZADEH
 DESIGN ENGINEERING : J. PECK
 NASA EPD&C SUBSYS MGR :
 NASA MPS SUBSYS MGR :
 NASA EPD&C SSMA :
 NASA MPS SSMA :

K.L. Preston
N. Hafezizadeh
J. Peck
W. E. ... for ... 3/10/96
NH
Donald Brunson 3-17-94
N/P

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2143 -2 REV:06/16/88
 ASSEMBLY : PCA 1, 2, 3 ABORT: RTLS, TAL.
 P/N RI : MC450-0017-1050/2050 CRIT. FUNC: 1R
 P/N VENDOR: VEHICLE 102 103 104 CRIT. HDW: 2
 QUANTITY : 3 EFFECTIVITY: X X X
 :THREE PHASE(S): PL LO X CO DO LS

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

PREPARED BY:	APPROVED BY:	APPROVED BY (NASA):
DES <i>J BROWN</i>	DES <i>[Signature]</i>	EPDC SSM <i>[Signature]</i>
REL <i>F DEFENSOR</i>	REL <i>[Signature] 6/27/88</i>	MPS SSM <i>[Signature]</i>
QE <i>D MASAI</i>	QE <i>[Signature] 6/27/88</i>	EPDC REC <i>[Signature]</i>
		MPS REL <i>[Signature]</i>

ITEM:

CONTROLLER, REMOTE POWER (RPC) 5 AMP, HELIUM INTERCONNECT VALVES (LV59, 61, 63) CONTROL CIRCUIT.

FUNCTION:

CONDUCTS POWER TO THE HELIUM INTERCONNECT IN VALVE SOLENOIDS. 40V76A25RPC38, 39. 40V76A26RPC37, 38. 40V76A27RPC33, 34.

FAILURE MODE:

INADVERTENT OUTPUT, FAILS "ON", FAILS TO TURN "OFF".

CAUSE(S):

PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY, THERMAL STRESS.

EFFECT(S) ON:

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

- (A) INADVERTENT POWER TO HELIUM INTERCONNECT IN SOLENOID.
- (B) INABILITY TO DEACTUATE HELIUM INTERCONNECT IN VALVE.

DURING MAINSTAGE, WITH THE CONSTANT ENGINE HELIUM PURGE, THE HIGHER PNEUMATIC SUPPLY PRESSURE WILL EQUALIZE WITH THE LOWER ASSOCIATED ENGINE SUPPLY.

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

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2143 -2 REV:06/16/88

- (E) 1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE.
 - 1) RUPTURE OF INTERCONNECT LINE BETWEEN "IN" CHECK VALVE AND SOLENOID VALVE.
 - 2) RPC FAILS "ON" RESULTING IN OPENING OF HELIUM INTERCONNECT IN VALVE.

DURING ASCENT, PNEUMATIC SUPPLY WILL BE LOST. ESCAPING HELIUM MAY OVERPRESSURIZE THE AFT COMPARTMENT.

DURING ENTRY, VENT DOORS ARE CLOSED TO PREVENT INGESTION OF RCS AND AFU GASES. RUPTURE DURING THE TIME PERIOD THAT THE VENT DOORS ARE CLOSED MAY RESULT IN OVERPRESSURIZATION OF THE AFT COMPARTMENT. VENT DOORS ARE OPENED WHEN VEHICLE VELOCITY DROPS BELOW 2400 FT/SEC. POSSIBLE LOSS OF CREW/VEHICLE.

CRITICALITY 1/1 FOR RTLS AND TAL ABORTS DUE TO LACK OF AFT COMPARTMENT PURGE DURING ENTRY. ASSUMES ABORT CAUSED BY UNISOLATABLE ENGINE HELIUM SYSTEM LEAK RESULTING IN PREMATURE ENGINE SHUTDOWN - HELIUM FROM OTHER TWO ENGINES WILL BE LOST WHEN VEHICLE SOFTWARE OPENS INTERCONNECT "OUT" VALVES AT MECO +20 SECONDS. POSSIBLE LOSS OF CREW/VEHICLE.

DISPOSITION & RATIONALE: -

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

(A-D) FOR DISPOSITION AND RATIONALE:

REFER TO APPENDIX B, ITEM NO. 2 - REMOTE POWER CONTROLLER.

(B) GROUND TURNAROUND TEST

- HE INTCN VLVS COMPLETE CMD VERIF, V41AAO.020A, V41AAO.040A, V41AAO.060A EVERY FLIGHT.

(E) OPERATIONAL USE

HELIUM BOTTLE PRESSURE IS ON DEDICATED DISPLAY IN THE COCKPIT. PRIOR TO MECO, THE LEFT ENGINE LOW PRESSURE GHe CROSSOVER VALVE (LV10) CAN BE OPENED.

EFFECTIVE FOR OI-8D SOFTWARE, CR 89397B "MPS SYSTEM FDA AND DISPLAY - BFS" ADDS PNEUMATIC TANK, REGULATOR, AND ACCUMULATOR PRESSURE TO THE S/M ALERT FDA SYSTEM AND ADDS THE 3 MEASUREMENTS TO THE BFS SYSTEM SUMMARY DISPLAY. THIS ALLOWS THE FLIGHT CREW TO RESPOND TO A PNEUMATIC HELIUM SYSTEM LEAK INDEPENDENT OF GROUND CONTROL.