

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - FWD-RCS FMEA NO 05-6KF-2128 -2 REV:11/03/87

ASSEMBLY : FWD MCA 1,2,3 CRIT. FUNC: LR
 P/N RI : MC455-0135-0001 CRIT. HDW: 2
 P/N VENDOR: VEHICLE 102 103 104
 QUANTITY : 4 EFFECTIVITY: X X X
 : FOUR PHASE(S): PL X LO X CO X DO X LS X
 :

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):
 DES D SOVEREIGN DES R. J. Buene SSM [Signature]
 REL J BECKMAN REL Michael J. Hore 11-14-87 REL [Signature]
 QE [Signature] QE [Signature]
 EPD&C SSM [Signature]
 50 - 6.51464

ITEM:

HYBRID RELAY - FORWARD RCS FUEL AND OXIDIZER MANIFOLD 1, 2, 3, AND 4 ISOLATION VALVES DRIVER POWER (CLOSE RELAY).

FUNCTION:

UPON RECEIVING THE PROPER STIMULI (FROM THE GENERAL PURPOSE COMPUTER (GPC) OR MANUAL SWITCHES), THE HYBRID RELAYS OPERATE TO ENERGIZE THREE PHASE AC DRIVE MOTORS TO CLOSE THE FUEL AND OXIDIZER MANIFOLDS 1, 2, 3, AND 4 ISOLATION VALVES. 81V76A111K2. 82V76A112K2. 83V76A113K8,10.

FAILURE MODE:

INADVERTENT OPERATION, INADVERTENTLY TRANSFERS.

CAUSE(S):

PIECE PART FAILURE, VIBRATION, MECHANICAL SHOCK.

EFFECT(S) ON:

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

(A) THE ASSOCIATED VALVE DRIVE CIRCUIT IS ENERGIZED CONTINUOUSLY.

(B) THE VALVE CLOSSES, STOPPING PROPELLANT TO THE ASSOCIATED MANIFOLD AND ATTACHED THRUSTERS. POWER IS CONTINUOUSLY SUPPLIED TO THE VALVE DRIVE EVEN AFTER THE VALVE HAS REACHED ITS END OF TRAVEL (POSSIBLE HAZARDOUS CONDITION).

(C,D) NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECT - POSSIBLE LOSS OF CREW/VEHICLE DUE TO CONTINUOUS MOTOR OPERATION IN CONJUNCTION WITH A BELLOWS LEAK LEADING TO VALVE RUPTURE AND PROPELLANT RELEASE. REQUIRES 1 OTHER FAILURE (BELLOWS LEAK) BEFORE EFFECT IS MANIFESTED. A BELLOWS LEAK IS UNDETECTABLE EXCEPT BY PERFORMING A SNIFF CHECK OF THE VALVE'S ACTUATOR ON THE GROUND ALSO, POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO PERFORM EXTERNAL TANK SEPARATION DUE TO LOSS OF ONE MANIFOLD IN CONJUNCTION WITH THE LOSS OF TWO THRUSTERS IN A CRITICAL AXIS.

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DISPOSITION & RATIONALE:

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

(A-D) FOR DISPOSITION AND RATIONALE REFER TO APPENDIX C, ITEM NO. 1 - HYBRID RELAY.

(B) GROUND TURNAROUND TEST

COMPONENT CHECKED OUT EVERY FLIGHT DURING GROUND TURNAROUND. THE TESTING CONSISTS OF CYCLING VALVE MANUAL SWITCHES AND/OR SENDING GENERAL PURPOSE COMPUTER (GPC) COMMANDS TO CYCLE VALVES OR HEATERS WHILE MONITORING VEHICLE INSTRUMENTATION TO DETERMINE IF COMPONENTS HAVE FAILED.

(E) OPERATIONAL USE

REMOVE POWER TO RELAY BY PULLING APPROPRIATE CIRCUIT BREAKERS. CIRCUIT BREAKERS WILL BE RESET WHEN VALVES ARE TO BE MOVED AND DURING TIME CRITICAL RECONFIGURATION RESPONSE PERIODS.