

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - FWD-RCS FMEA NO 05-6KF-2126 -2 REV:11/03/87

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

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS
 PREPARED BY: DES D SOVEREIGN APPROVED BY: DES D.J. R. Burns APPROVED BY (NASA):
 REL J BEEKMAN REL M. P. ... 11-14-87 SSM
 QE QE ... QE ...
 EPD&C SSM ...

ITEM:
 HYBRID RELAY - FORWARD RCS FUEL AND OXIDIZER TANK ISOLATION VALVES 1/2 DRIVER POWER (OPEN RELAY).

FUNCTION:
 UPON RECEIVING THE PROPER STIMULI (FROM THE GENERAL PURPOSE COMPUTER OR MANUAL SWITCHES), THE HYBRID RELAYS OPERATE TO ENERGIZE THREE PHASE AC DRIVE MOTORS TO OPEN THE FUEL AND OXIDIZER TANK ISOLATION VALVES 1/2. 83V76A113K1 AND K4.

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) AC CONTACTS OF ONE HYBRID RELAY CLOSE.
 (B) CONTINUOUS VOLTAGE IS APPLIED TO THE ASSOCIATED DRIVE MOTOR COIL RESULTING IN INCREASED HEATING BUT MAINTAINING THE VALVE IN ITS NORMAL OPEN POSITION. THE CONDITION PRECLUDES ISOLATION OF THE ASSOCIATED PROPELLANT LINES BY THE AFFECTED 1/2 ISOLATION VALVE. BOTH THE MANIFOLD 1 AND 2 VALVES CAN BE USED TO ISOLATE DOWNSTREAM THRUSTER LEAKS.
 (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 ONE OTHER FAILURE (BELLOWS LEAK) BEFORE AN EFFECT IS MANIFESTED. A BELLOWS LEAK IS UNDETECTABLE EXCEPT BY PERFORMING A SNIFF CHECK OF THE VALVE'S ACTUATOR ON THE GROUND.

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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

NO ACTION FOR FIRST FAILURE. IF CONTINUOUS POWER SITUATION EXISTS, 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.