

SHUTTLE CRITICAL ITEMS LIST - ORBITER

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

ASSEMBLY : AFT MCA 3 CRIT. FUNC: 1R
 P/N RI : MC455-0135-0001 CRIT. HDW: 3
 P/N VENDOR: VEHICLE 102 103 104
 QUANTITY : 8 EFFECTIVITY: X X X
 : EIGHT PHASE(S): PL X LO X OO X DO X LS X
 :

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):
 DES D SOVEREIGN DES D. J. R. Quinn SSM [Signature]
 REL J BEEKMAN REL Melvin C. [Signature] 11-10-87 REL [Signature]
 QE [Signature] QE [Signature]

ITEM:
 HYBRID RELAY - LEFT AND RIGHT AFT RCS FUEL AND OXIDIZER TANK ISOLATION VALVES 1/2 DRIVER POWER "CLOSE" RELAY.

FUNCTION:
 UPON RECEIVING THE PROPER STIMULI (FROM THE GPC (GENERAL PURPOSE COMPUTER) OR MANUAL SWITCHES), THE HYBRID RELAYS OPERATE TO ENERGIZE THREE PHASE AC DRIVE MOTORS TO CLOSE THE AFT RCS FUEL AND OXIDIZER TANK ISOLATION VALVES 1/2. "CLOSE" RELAYS ARE ENERGIZED DURING THE MISSION FOR CROSSPEED OPERATIONS BETWEEN OMS AND RCS OR RCS TO RCS AND DURING RTLS, OMS DEPLETION BURN, TO RESERVE RCS PROPELLANTS FOR CONTROL DURING ENTRY. UNIQUE TO INTACT ABORT. 56V76A116K26, K33, K28, K32, K34, K40, K41, K36.

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) "CLOSE" RELAY, NO EFFECT - VALVE DRIVES REQUIRE CLOSURE OF TWO SETS OF RELAY CONTACTS IN SERIES BEFORE THE DRIVE IS ENERGIZED.
 (C) NO EFFECT.
 (D) NO EFFECT.

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(E) FUNCTION CRITICALITY EFFECT - POSSIBLE LOSS OF CREW/VEHICLE DUE TO CONTINUOUS DRIVE MOTOR OPERATION IN CONJUNCTION WITH A BELLOWS LEAK LEADING TO VALVE RUPTURE AND PROPELLANT RELEASE. REQUIRES 2 OTHER FAILURES (SECOND CLOSE RELAY, 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.

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 (E.G., ENTRY).