

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - OMS FMEA NO 05-6L -2130 -2 REV:10/30/87

ASSEMBLY :AFT MCA 1,2,3 CRIT. FUNC: 1R  
 P/N RI :MC455-0135-0001 CRIT. HDW: 2  
 P/N VENDOR: VEHICLE 102 103 104  
 QUANTITY :16 EFFECTIVITY: X X X  
 :SIXTERN PHASE(S): PL X LO X OO X DO X LS X  
 : (TWO PER VALVE)

PREPARED BY: DES D SOVEREIGN APPROVED BY: DES D. J. Ruben REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS  
 REL F DEFENSOR REL D. J. Ruben 11-12-87 APPROVED BY (NASA): SSM John Harris  
 QE J COURSEN QE DM/2141/11/87 REL John Harris 12-9-87 QE John Harris  
 ERK SSN GPC Computer for v.c. Stagg

ITEM:  
 RELAY, HYBRID, 4 POLES, NONLATCHING, LEFT AND RIGHT OMS - OXIDIZER AND FUEL CROSSFEED ISOLATION VALVE A AND B "OPEN" CIRCUIT.

FUNCTION:  
 UPON RECEIVING THE PROPER STIMULI FROM THE GENERAL PURPOSE COMPUTER (GPC) THROUGH FLIGHT MDMS OR CREW PANEL SWITCHES, THE HYBRID RELAY CONTACTS CONNECT THE PROPER AC PHASE VOLTAGE TO ENERGIZE ASSOCIATED DRIVE CIRCUIT TO OPEN THE OXIDIZER AND FUEL CROSSFEED ISOLATION VALVE A AND B OF THE LEFT OR RIGHT OMS. 54V76A114K51, 52, 55, 56. 5V76A115K40, 43, 44, 45, 48, 51, 52, 53. 56V76A116K75, 77, 78, 79.

FAILURE MODE:  
 INADVERTENT OPERATION, INADVERTENTLY TRANSFERS, FAILS CLOSED.

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

EFFECT(S) ON:  
 (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE (E) FUNCTIONAL CRITICALITY  
 (A) ONE SET OF CONTACTS OF ONE "OPEN" HYBRID RELAY CLOSE. ASSOCIATED AC MOTOR VALVE DRIVE CIRCUIT IS ENERGIZED CONTINUOUSLY.  
 (B) CONTINUOUS POWER WILL BE APPLIED TO THE AC MOTOR VALVE DRIVE. VALVE WILL BE MAINTAINED IN THE "OPEN" POSITION. THERMAL SWITCHES IN VALVE WILL INTERRUPT POWER ON A CYCLIC BASIS.  
 (C,D) FIRST FAILURE HAS NO EFFECT.

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(E) POSSIBLE LOSS OF CREW/VEHICLE DUE TO CONTINUOUS POWER APPLIED TO THE AC MOTOR VALVE IN CONJUNCTION WITH A BELLOWS LEAK LEADING TO VALVE RUPTURE AND PROPELLANT RELEASE, A POSSIBLE DETONATION CONDITION. REQUIRES ONE OTHER FAILURE (BELLOWS LEAK) BEFORE THE EFFECT IS MANIFESTED. FAILURE NOT READILY DETECTABLE IN FLIGHT DUE TO LACK OF CREW VISIBILITY TO MCA STATUS MEASUREMENTS. BELLOWS FAILURE NOT DETECTABLE IN FLIGHT.

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

V43CA0.070 - REDUNDANT CIRCUIT VERIFICATION (PERIODIC) - ORB/POD; PERFORMED FOR FIRST FLIGHT AND AT FIVE FLIGHT INTERVALS OR FOR LRU RETEST PER FIGURE V43Z00.000 OR FOR ORBITER DISRUPTED COPPER PATHS. FUNCTIONAL CHECKOUT OF AC MOTOR VALVE CONTROL CIRCUITS PER FIGURE V43CA0.070-2.

V43CA0.072 - REDUNDANT CIRCUIT VERIFICATION; PERFORMED EACH FLIGHT (AFTER FIRST FLIGHT). FUNCTIONAL CHECKOUT OF AC MOTOR VALVE CONTROL CIRCUITS PER FIGURE V43CA0.070-2.

V43CBO.165 - AC MOTOR VALVE ACTUATOR SNIFF CHECK; PERFORMED EACH FLIGHT. ALL AC MOTOR VALVE ACTUATORS CHECKED FOR PRESENCE OF PROPELLANT VAPORS.

V43CFO.010 - PROPELLANT SERVICING TO FLIGHT LOAD; PERFORMED EACH FLIGHT. ALL AC MOTOR VALVES CYCLED DURING LOADING OPERATION.

(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 (E.G. DEORBIT BURN).