

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - OMS

FMEA NO 05-6L -2127 -2

REV: 10/30/87

ASSEMBLY : AFT MCA 1,3

P/N RI : MC455-0135-0001

P/N VENDOR:

QUANTITY : 16

: SIXTEEN

: (TWO PER VALVE)

CRIT. FUNC: 1R

CRIT. HDW: 3

VEHICLE 102 103 104

EFFECTIVITY: X X X

PHASE(S): PL X LO X OO X DO X LS X

PREPARED BY:

DES D SOVEREIGN

REL F DEFENSOR

QE J COURSEN

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

APPROVED BY:

DES *P. J. R. B...* APPROVED BY (NASA):

REL *[Signature]* SSM *[Signature]*

QE *[Signature]* *[Signature]*

*epcc ss, n [Signature] for u.s. staff*

ITEM:

RELAY, HYBRID, 4 POLES, NONLATCHING, LEFT AND RIGHT OMS - OXIDIZER AND FUEL TANK ISOLATION VALVE A AND B "CLOSE" 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 DRIVE MOTORS TO CLOSE THE ASSOCIATED OXIDIZER AND FUEL TANK ISOLATION VALVE A AND B OF THE LEFT OR RIGHT OMS. 54V76A114K41, 42, 45, 46, 57, 58, 61, 62. 56V76A116K58, 60, 64, 65, 68, 69, 72, 73.

FAILURE MODE:

INADVERTENT OPERATION, INADVERTENTLY TRANSFERS, FAILS CLOSED.

CAUSE(S):

PIECE PART STRUCTURAL FAILURE, VIBRATION, MECHANICAL SHOCK, CONTAMINATION, THERMAL STRESS.

EFFECT(S) ON:

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

(A) LOSS OF REDUNDANCY - ONE SET OF "CLOSE" RELAY CONTACTS CLOSE. FIRST FAILURE HAS NO EFFECT.

(B) FIRST FAILURE HAS NO EFFECT. ASSOCIATED VALVE DRIVE REQUIRES CLOSURE OF TWO SETS OF RELAY CONTACTS IN SERIES BEFORE THE "CLOSE" AC MOTOR VALVE DRIVE IS ENERGIZED. A SECOND SIMILAR FAILURE WOULD ENERGIZE THE DRIVE AND CLOSE THE ASSOCIATED PROPELLANT ISOLATION VALVE, APPLYING CONTINUOUS POWER ON THE VALVE. THERMAL SWITCHES IN VALVE WILL INTERRUPT POWER ON A CYCLIC BASIS.

(C, D) NO EFFECT.

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(E) POSSIBLE LOSS OF CREW/VEHICLE DUE TO CONTINUOUS MOTOR OPERATION IN CONJUNCTION WITH A BELLOWS LEAK LEADING TO VALVE RUPTURE AND PROPELLANT RELEASE. REQUIRES TWO OTHER FAILURES (SECOND "CLOSE" RELAY FAILS ON, BELLOWS LEAK) BEFORE THE EFFECT IS MANIFESTED. FAILURE IS NOT DETECTABLE IN FLIGHT DUE TO LACK OF MONITORING MEASUREMENTS FOR EACH "CLOSE" HYBRID RELAY. BELLOWS LEAKAGE 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

V43CAO.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 V43CAO.070-2.

V43CAO.072 - REDUNDANT CIRCUIT VERIFICATION; PERFORMED EACH FLIGHT (AFTER FIRST FLIGHT). FUNCTIONAL CHECKOUT OF AC MOTOR VALVE CONTROL CIRCUITS PER FIGURE V43CAO.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

NO ACTION FOR FIRST FAILURE. IF REDUNDANT "CLOSE" RELAY OPERATES INADVERTENTLY, REMOVE POWER TO RELAY BY PULLING APPROPRIATE CIRCUIT BREAKERS. CIRCUIT BREAKER WILL BE RESET DURING CRITICAL RECONFIGURATION RESPONSE PERIODS (E.G. DEORBIT BURN).