

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - OMS

FMEA NO 05-6L -2126 -2

REV:12/04/87

ASSEMBLY : AFT MCA 1,3  
 P/N RI : MC455-0135-0001  
 P/N VENDOR:  
 QUANTITY : 16  
 : SIXTEEN  
 : (TWO PER VALVE)

	VEHICLE	102	103	104
EFFECTIVITY:		X	X	X
PHASE(S):		PL X	LO X	OO X
		DO X	LS X	

CRIT. FUNC: 1R  
 CRIT. HDW: 2

PREPARED BY:  
 DES D SOVEREIGN  
 REL F DEFENSOR  
 QE J COURSEN

REDUNDANCY SCREEN:  
 APPROVED BY:  
 DES *D.S. R. B...*  
 REL *M...*  
 QE *J.C. COURSEN*

A-PASS B-FAIL C-PASS  
 APPROVED BY (NASA):  
 SSM *John Harris*  
 REL *...*  
 QE *...*  
 EPDC 2307 ABC info for WSC Stage

ITEM:

RELAY, HYBRID, 4 POLES, NONLATCHING, LEFT AND RIGHT OMS - OXIDIZER AND FUEL TANK 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 RELAYS OPERATE TO ENERGIZE THREE PHASE AC DRIVE MOTORS TO OPEN THE ASSOCIATED OXIDIZER AND FUEL TANK ISOLATION VALVE A AND B OF THE LEFT OR RIGHT OMS.  
 54V76A114K43, 44, 47, 48, 59, 60, 63, 64. 56V76A116K59, 61, 62, 63, 66, 67, 70, 71.

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) NO EFFECT-SINCE PROPELLANT ISOLATION VALVES ARE NORMALLY OPEN.

(B) CONTINUOUS VOLTAGE IS APPLIED TO THE ASSOCIATED AC MOTOR VALVE RESULTING IN INCREASED HEATING BUT MAINTAINING THE VALVE IN ITS NORMAL POSITION. THE CONDITION PRECLUDES ISOLATION OF THE ASSOCIATED PROPELLANT LINES BY THE AFFECTED ISOLATION VALVE. 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 EFFECT IS MANIFESTED. FAILURE IS DETECTABLE BY MCA STATUS INDICATION BUT MCA STATUS IS NOT MONITORED BY THE CREW. BELLOWS LEAK 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.

S00.FBO.285 - PERFORMS FUNCTIONAL TEST OF CRITICALITY ONE VALVE PRE LAUNCH.

(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)."