

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - OMS FMEA NO 05-6L -2255 -1 REV:10/30/87

ASSEMBLY : APT MCA 1,3 CRIT. FUNC: 1R  
P/N RI : JANTXVIN4246 CRIT. HDW: 3  
P/N VENDOR: VEHICLE 102 103 104  
QUANTITY : 16 EFFECTIVITY: X X X  
:SIXTEEN PHASE(S): PL X LO X OO X DO X LS X  
:(TWO PER VALVE)

PREPARED BY: DES D SOVEREIGN APPROVED BY: DES *D. S. R. B...* REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS  
REL F DEFENSOR APPROVED BY (NASA): SSM *John Harris Knight*  
QE J COURSEN REL *W. M. ... 11-19-87* REL *W. M. ... 12-29-87*  
*on 12/11/87* QE *W. M. ...*  
*EPD&C SSM Approval for use.*

ITEM:

DIODE, BLOCKING (LAMP), OMS LEFT AND RIGHT, FUEL AND OXIDIZER TANK ISOLATION VALVE A AND B RELAY "CLOSE" INHIBIT CONTROL CIRCUITS. ("CLOSE" LIMIT SWITCH INHIBIT DIODE).

FUNCTION:

PROVIDES INHIBIT INPUT FROM THE "CLOSE" LIMIT SWITCH TO THE "CLOSE" HYBRID RELAY AND PROVIDES BLOCKING FROM THE "OPEN" MANUAL SWITCH TO THE "CLOSE" LIMIT SWITCH FOR THE CONTROL OF THREE PHASE AC MOTOR THAT ACTIVATES THE OMS LEFT AND RIGHT, FUEL AND OXIDIZER TANK ISOLATION VALVE A AND B. FOR OV-102 - VALVE A; RIGHT - 54V76A114A1CR94, 103, 104, 115. LEFT - 54V76A114A1CR71, 72, 105, 106. VALVE B; RIGHT - 56V76A116A3CR1, 2, 58, 59. LEFT - 56V76A116A2CR5, 6, 69, 96. FOR OV-103 AND SUBSEQUENT - VALVE A; RIGHT - 54V76A114A1CR111, 112, 117, 118. LEFT - 54V76A114A1CR75, 76, 119, 120. VALVE B; RIGHT - 56V76A116A2CR49, 71, 93, 94. LEFT - 56V76A116A3CR1, 2, 58, 59.

FAILURE MODE:

OPENS, FAILS TO CONDUCT, HIGH RESISTANCE. (COCKPIT SWITCH IN THE "CLOSE" POSITION.)

CAUSE(S):

CONTAMINATION, THERMAL STRESS, MECHANICAL SHOCK, VIBRATION.

EFFECT(S) ON:

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

(A) FIRST FAILURE HAS NO EFFECT.

(B) FIRST FAILURE HAS NO EFFECT. ASSOCIATED AC MOTOR VALVE DRIVE "CLOSE" CIRCUIT REQUIRES CLOSURE OF TWO SETS OF RELAY CONTACTS IN SERIES BEFORE THE DRIVE IS ENERGIZED. A SECOND SIMILAR FAILURE WOULD CONTINUOUSLY ENERGIZE THE ASSOCIATED "CLOSE" VALVE DRIVER CIRCUIT.

(C,D) NO EFFECT FIRST FAILURE.

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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. DECOMPOSITION AND POTENTIAL FOR IGNITION EXISTS. REQUIRES TWO OTHER FAILURES (INHIBIT DIODE OF THE SERIES RELAY FAILS OPEN, BELLOWS LEAK) BEFORE THE EFFECT IS MANIFESTED. FAILURE IS NOT READILY DETECTABLE IN FLIGHT DUE TO LACK OF MONITORING MEASUREMENTS.

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A-D) FOR DISPOSITION AND RATIONALE  
REFER TO APPENDIX F, ITEM NO. 3 - DIODE.

(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

REMOVE POWER FROM RELAY BY PLACING MANUAL SWITCH IN GENERAL PURPOSE  
COMPUTER (GPC) POSITION.