

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ELECT POWER DIST & CONT FMEA NO 05-6 -2142 -1 REV:07/18/88

ASSEMBLY :MAIN DC DISTR ASSY 3 CRIT.FUNC: 1R
P/N RI :MC455-0126-0001 CRIT. HDW: 2
P/N VENDOR: VEHICLE 102 103 104
QUANTITY :1 EFFECTIVITY: X X X
:ONE, MN DC DIST ASSY-3 PHASE(S): PL X LO X OD X DO X LS X

PREPARED BY: REDUNDANCY SCREEN: A-PASS B-PASS C-PASS
DES R PHILLIPS APPROVED BY: APPROVED BY (NASA):
REL M HOVE DES *[Signature]* SSM *[Signature]*
QE J COURSEN REL *[Signature]* REL *[Signature]*
QE *[Signature]* QE *[Signature]*

ITEM:
CONTACTOR, POWER - FUEL CELL NO. 3 STRUCTURE RETURN

FUNCTION:
UPON MANUAL COMMAND, THE MOTOR DRIVEN SWITCH ACTUATES ITS POWER CONTACTS, CONNECTING THE FUEL CELL NO. 3 RETURN TO STRUCTURE GROUND (STATION 636). THE MOTOR SWITCH HAS AUXILIARY CONTACTS FOR POSITION MONITOR AND ON/OFF CONTROL. SWITCH ONCE CLOSED, CANNOT BE COMMANDED OPEN. THIS CONTACTOR IS NORMALLY CLOSED. MCR 11954 MODIFIED THE CONTROL CIRCUIT BY DELETION (DISCONNECTED AT BOTH ENDS) OF THE "OFF" CONTROL WIRING. CAPABILITY TO MANUALLY RECLOSE THE CONTACTOR WAS RETAINED. 40V76A33S4

FAILURE MODE:
FAILS OPEN, INADVERTENTLY OPENS

CAUSE(S):
PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY

EFFECT(S) ON:
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE (E)FUNCTIONAL CRITICALITY EFFECT:
(A) LOSS OF FUEL CELL NO. 3 STRUCTURE RETURN.
(B) HAZARDOUS OPERATING CONDITION FOR FCP3 DUE TO VOLTAGE DIFFERENTIAL BETWEEN FCP3 RETURN AND ACCESSORY SECTION MOUNTED TO STRUCTURE. ALSO LOSS OF FCP3 AS AN ELECTRICAL POWER SOURCE FOR MAIN DC BUS C LOADS.
(C) POSSIBLE MISSION LOSS DUE TO OVERSTRESS (HIGH VOLTAGE) TO PAYLOAD EQUIPMENT IF FAILURE OCCURS WHILE SUPPLYING PAYLOAD POWER FROM MAIN BUS B WITH NO MAIN BUS B/C CROSS TIE (REF. HAZARD REPORT ORBI 298). (THIS IS AN OFF-NOMINAL PAYLOAD PRIMARY POWER CONFIGURATION)

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EFFECT(S) ON (CONTINUED):

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

(D) REQUIRES SAFING OF FCP3 BY CLOSING ITS REACTANT VALVES DUE TO
HAZARDOUS OPERATING CONDITION.

(E) POSSIBLE LOSS OF CREW/VEHICLE AFTER SECOND FAILURE (LOSS OF ABILITY
TO CLOSE FCP3 REACTANT VALVES) DUE TO CURRENT LEAKAGE THROUGH AN
ELECTROLYTE FILM IN REACTANT PASSAGES LEADING TO HEATING AND POSSIBLE
IGNITION OF INSULATOR PLATE OR FUEL CELL SEPARATOR PLATE MATERIALS AND
SUBSEQUENT FUEL CELL FIRE AND/OR EXPLOSION.

DISPOSITION & RATIONALE:

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

(A,B,C,D) DISPOSITION AND RATIONALE

REFER TO APPENDIX C, ITEM NO. 6 - POWER CONTACTOR

(B) GROUND TURNAROUND TEST

VERIFY STRUCTURE RETURN IS PRESENT FOR PRIMARY PAYLOAD BUS LOADS BY
MONITORING PAYLOAD PRIMARY STRUCTURAL GROUND INDICATION AND FCP3
CURRENT. ONCE POWER CONTACTOR IS COMMANDED CLOSED, OPEN COMMAND IS
INHIBITED AND PAYLOAD PRIMARY RETURN WILL REMAIN ON. TEST IS PERFORMED
FOR ALL FLIGHTS.

(E) OPERATIONAL USE

IF FUEL CELL NO. 3 STRUCTURE RETURN CANNOT BE RE-CLOSED VIA SWITCH
COMMAND CLOSE, FUEL CELL NO. 3 MUST BE SHUTDOWN AND LOADS MANAGED FOR
LOSS OF ONE FUEL CELL. CAPABILITY TO MANUALLY OPEN THE CONTACTOR HAS
BEEN DELETED. PRIMARY PAYLOAD IS NORMALLY POWERED FROM MAIN DC BUS C.