PAGE 1 PRINT DATE: 02/24/95

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL HARDWARE
NUMBER: 05-6-2807 -X

SUBSYSTEM NAME: ELECTRICAL POWER DISTRIBUTION & CONTROL
REVISION: 1 02/06/95

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	FWD PCA 1	V070-763320
LRU	:	FWD PCA 2	V070-763340
LRU	:	FWD PCA 3	V070-763360
SRU	:	CONTROLLER, REMOTE POWER	MC450-0017-1050
SRU	:	CONTROLLER, REMOTE POWER	MC450-0017-2050
SRU	:	CONTROLLER, REMOTE POWER	MC450-0017-3050
SRU	:	CONTROLLER, REMOTE POWER	MC450-0017-4050

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CONTROLLER, REMOTE POWER, 5 AMP - FORWARD MCA 1, 2 AND 3 DC BUS A, B, AND C POWER CONTROL

REFERENCE DESIGNATORS: 81V76A22RPC12
82V76A23RPC11
83V76A24RPC12

QUANTITY OF LIKE ITEMS: 3
THREE

FUNCTION:
FOLLOWING A CREW INITIATED COMMAND, EACH REMOTE POWER CONTROLLER (RPC) CONDUCTS THE ASSOCIATED DC BUS A, B OR C TO THE RELATED FORWARD MOTOR-CONTROL ASSEMBLY 1, 2 AND 3 FOR CONTROL OF REACTION CONTROL SYSTEM ISOLATION MOTOR VALVES AND VENT DOOR, AIR DATA PROBE DEPLOY AND STAR TRACKER DOOR MOTORS, ATMOSPHERIC REVITALIZATION SYSTEM H20 LOOP 1 PUMPS A AND B AND GSE CONTROL OF AVIONICS BAY FANS. THE RPC DESIGN INCORPORATES OVERCURRENT TRIP PROTECTION PLUS TIMED CURRENT LIMITING FOR TRANSIENT CONDITIONS. REMOTE RESET IS ACCOMPLISHED THROUGH CONTROL SIGNAL REMOVAL AND REAPPLICATION.

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL FAILURE MODE
NUMBER: 05-6-2807 -X

- APPROVALS -

PAE MANAGER	: K. L. PRESTON	K L Preston 4/6/95
PRODUCT ASSURANCE ENGR	: N. HAFEZ-ZADEH	N. Hafez
DESIGN ENGINEERING	: P. L. PHAN	P Phan
NASA EPD&C SUBSYS MGR	:	for F. Davis 3/16
NASA SUBSYS MGR	:	N/A
NASA EPD&C SSMA	:	3-19-96
NASA SSMA	:	N/A

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ELECT POWER DIST & CONT FMEA NO 05-6 -2807 -1 REV:05/03/88

ASSEMBLY :FWD PCA 1,2,3 CRIT.FUNC: 1R
P/N RI :MC450-0017-1050 CRIT. HDW: 2
P/N VENDOR:
QUANTITY :3
:THREE
:

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

PHASE(S): PL LO X-GO X DO X LS

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

PREPARED BY:			APPROVED BY:	APPROVED BY (NASA):
DES	R	PHILLIPS	DES	SSM
REL	M	HOVE	REL	REL
QE	J	COURSEN	QE	QE

ITEM:
CONTROLLER, REMOTE POWER, 5 AMP - FORWARD MCA 1, 2 AND 3 DC BUS A, B AND C POWER CONTROL

FUNCTION:
FOLLOWING A CREW INITIATED COMMAND, EACH REMOTE POWER CONTROLLER (RPC) CONDUCTS THE ASSOCIATED DC BUS A, B OR C TO THE RELATED FORWARD MOTOR CONTROL ASSEMBLY 1, 2 AND 3 FOR CONTROL OF REACTION CONTROL SYSTEM ISOLATION MOTOR VALVES AND VENT DOOR, AIR DATA PROBE DEPLOY AND STAR TRACKER DOOR MOTORS, ATMOSPHERIC REVITALIZATION SYSTEM H2O LOOP 1 PUMPS A AND B AND GSE CONTROL OF AVIONICS BAY FANS. THE RPC DESIGN INCORPORATES OVERCURRENT TRIP PROTECTION PLUS TIMED CURRENT LIMITING FOR TRANSIENT CONDITIONS. REMOTE RESET IS ACCOMPLISHED THROUGH CONTROL SIGNAL REMOVAL AND REAPPLICATION. 81V76A22RPC12, 82V76A23RPC11, 83V76A24RPC12

FAILURE MODE:
LOSS OF OUTPUT, FAILS TO CONDUCT, FAILS TO TURN "ON"

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

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

(A) LOSS OF MAIN DC BUS RELAY LOGIC POWER INPUT TO THE ASSOCIATED FORWARD MOTOR CONTROL ASSEMBLY.

(B) LOSS OF INTERFACE REDUNDANCY. NO EFFECT FOR FIRST FAILURE. FOR THE FORWARD RCS, CAPABILITY TO OPERATE THE ISOLATION VALVES CONTROLLED BY THE ASSOCIATED FORWARD MOTOR CONTROL ASSEMBLY IS LOST; HOWEVER, REDUNDANT VALVES ARE PROVIDED FOR REQUIRED ISOLATION FUNCTIONS. FOR VENT DOOR, AIR DATA PROBE AND STAR TRACKER FUNCTIONS, THE REDUNDANT MOTOR CONTROLLED BY A DIFFERENT RPC COMPLETES THE FUNCTION.

(C,D) FIRST FAILURE - NO EFFECT.

SUBSYSTEM :ELECT POWER DIST & CONT FMEA NO 05-6 -2807 -1 REV:05/03/88

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

(E) POSSIBLE LOSS OF CREW/VEHICLE AFTER SECOND FAILURE VIA THE FOLLOWING SCENARIO:

(1) LEAK IN FORWARD RCS MANIFOLD 2 DURING EARLY ASCENT PHASE NECESSITATING CLOSURE OF ALL FORWARD RCS TANK AND MANIFOLD ISOLATION VALVES TO ISOLATE LEAK.
(2) FAILURE OF FORWARD POWER CONTROLLER ASSEMBLY 1, RPC 12 OR FORWARD POWER CONTROLLER ASSEMBLY 3, RPC 12 TO CONDUCT RESULTING IN LOSS OF ALL FORWARD RCS FOR SAFE ET/ORB SEPARATION.

ALSO, POSSIBLE LOSS OF CREW/VEHICLE AFTER SECOND FAILURE (LOSS OF REDUNDANT MOTOR OR POWER/CONTROL CIRCUIT) DUE TO INABILITY TO OPEN VENT DOOR DURING DESCENT (RESULTS IN VEHICLE STRUCTURAL DAMAGE DUE TO PRESSURE DIFFERENTIALS). LEFT AND RIGHT VENT DOORS ARE NOT CONSIDERED TO BE REDUNDANT TO EACH OTHER. "B" SCREEN PASSES SINCE THE FAILURE CAN BE DETECTED BY CREW MONITORING STAR TRACKER DOOR OPERATION TIMES OR BY LOSS OF MCA OPERATIONAL STATUS MEASUREMENTS AVAILABLE TO GROUND PERSONNEL.

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

(A,B,C,D) DISPOSITION AND RATIONALE
REFER TO APPENDIX B, ITEM NO. 2 - REMOTE POWER CONTROLLER

(B) GROUND TURNAROUND TEST
VERIFY MCA OPERATIONAL STATUS INDICATORS ARE "ON" (ALL MOTOR CONTROL RELAYS RESET) DURING NO OPERATION OF THE AC MOTOR MECHANISMS. TEST IS PERFORMED FOR ALL FLIGHTS.

(E) OPERATIONAL USE
FOR LOSS OF REDUNDANT VENT DOOR OPEN CAPABILITY, OPEN VENT DOORS PRIOR TO ENTRY.