SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - AFT-RCS FMEA NO 05-6KA-2137 -2 REV:11/03/87

ASSEMBLY :AFT MCA 1,2
P/N RI :MC455-0135-0001
P/N VENDOR:
QUANTITY :8
:EIGHT
:

ABORT, RTLS,TAL		CRIT. FUNC:	1R
		CRIT. HDW:	2
VEHICLE EFFECTIVITY:	102 X	103 X	104 X
PHASE(S):	PL X LO X OO X DO X LS X		

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

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
DES	D SOVEREIGN	DES	SSM
REL	J BEEKMAN	REL	REL
QE		QE	QE

EPD/C SSM

ITEM:
HYBRID RELAY - LEFT AND RIGHT AFT RCS FUEL AND OXIDIZER TANK ISOLATION VALVES 3/4/5 A AND B DRIVER POWER "OPEN" RELAY.

FUNCTION:
UPON RECEIVING THE PROPER STIMULI (FROM EITHER THE GENERAL PURPOSE COMPUTER (GPC) OR THE CREW), THE HYBRID RELAYS OPERATE TO ENERGIZE TANK ISOLATION VALVES 3/4/5 A AND B. UNIQUE TO INTACT ABORT.
54V76A114K26,28,30,32. 55V76A115K24,28,29,30.

FAILURE MODE:
INADVERTENT OPERATION, INADVERTENTLY TRANSFERS

CAUSE(S):
PIECE PART FAILURE, VIBRATION, MECHANICAL SHOCK.

EFFECT(S) ON:
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE
(A) THE ASSOCIATED VALVE DRIVE CIRCUIT IS ENERGIZED CONTINUOUSLY.

(B) THE AFFECTED VALVE IS DRIVEN OPEN TO ITS MECHANICAL STOP AND SUPPLIES CONTINUOUS POWER TO THE VALVE. PRECLUDES TANK ISOLATION.

(C) POSSIBLE MISSION MODIFICATION OR EARLY MISSION TERMINATION DUE TO LOSS OF INTERCONNECT CAPABILITY.

(D) NO EFFECT FOR NOMINAL MISSION - CRITICALITY INCREASED TO 1/1 DURING RTLS AND TAL ABORT. VALVE UTILIZED BY MCA OPTIMIZATION SOFTWARE IN "LANDING HEAVY" CONDITION. WILL ALSO RESULT IN CONTROL PROBLEMS DURING ENTRY. RESULTS IN LOSS OF 12 AFT RCS THRUSTERS BEING USED DURING THE OMS DUMP.

(E) FUNCTIONAL CRITICALITY EFFECT - POSSIBLE LOSS OF CREW/VEHICLE DUE TO VALVE CONTINUOUS POWER IN CONJUNCTION WITH A BELLOWS LEAK LEADING TO VALVE RUPTURE AND PROPELLANT RELEASE. REQUIRES 1 OTHER FAILURE (BELLOWS LEAK) BEFORE EFFECT IS MANIFESTED. A BELLOWS LEAK IS UNDETECTABLE EXCEPT BY PERFORMING A SNIFF CHECK OF THE VALVE'S ACTUATOR ON THE GROUND.

ISPOSITION & 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
COMPONENT CHECKED OUT EVERY FLIGHT DURING GROUND TURNAROUND. THE TESTING CONSISTS OF CYCLING VALVE MANUAL SWITCHES AND/OR SENDING GPC COMMANDS TO CYCLE VALVES OR HEATERS WHILE MONITORING VEHICLE INSTRUMENTATION TO DETERMINE IF COMPONENTS HAVE FAILED.

(E) OPERATIONAL USE
NO ACTION FOR FIRST FAILURE. IF CONTINUOUS POWER SITUATION EXISTS, 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., ENTRY).