SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - AFT-RCS FMEA NO 05-6KA-2136 -2 REV:11/03/87

ASSEMBLY :AFT MCA 3
P/N RI :MC455-0135-0001
P/N VENDOR:
QUANTITY :8
:EIGHT
:

ABORT, RTLS,TAL
CRIT. FUNC: 1R
CRIT. HDW: 2

VEHICLE EFFECTIVITY:	102	103	104
	X	X	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

ITEM:
HYBRID RELAY - LEFT AND RIGHT AFT RCS FUEL AND OXIDIZER TANK ISOLATION VALVES 1/2 DRIVER POWER "OPEN" RELAYS.

FUNCTION:
UPON RECEIVING THE PROPER STIMULI (FROM THE GPC (GENERAL PURPOSE COMPUTER) OR MANUAL SWITCHES), THE HYBRID RELAYS OPERATE TO ENERGIZE THREE PHASE AC DRIVE MOTORS TO OPEN THE FUEL AND OXIDIZER TANK ISOLATION VALVES 1 AND 2. RELAYS ARE UTILIZED DURING THE MISSION FOR CROSSFEED OPERATIONS BETWEEN OMS AND RCS OR RCS TO RCS AND DURING RTLS, FOLLOWING OMS DEPLETION BURN, TO REOPEN RCS TANK PROPELLANT SUPPLIES FOR CONTROL DURING ENTRY.
56V76A116K27,K31,K35,K39,K29,K30,K37,K38.

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) CONTINUOUS POWER APPLIED TO VALVE. LOSS OF ABILITY TO CLOSE ONE PROPELLANT TANK ISOLATION VALVE 1/2. LOSS OF TANK ISOLATION CAPABILITY. LOSS OF 1 AND 2 MANIFOLDS DURING OMS INTERCONNECT OPERATIONS.

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

(D) NO EFFECT FIRST FAILURE - POSSIBLE CREW/VEHICLE LOSS AFTER BELLOWS LEAK FAILURE. RTLS, TAL ABORT - 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 CONTINUOUS DRIVE MOTOR OPERATION 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.

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
COMPONENT CHECKED OUT EVERY FLIGHT DURING GROUND TURNAROUND. THE TESTING CONSISTS OF CYCLING VALVE MANUAL SWITCHES AND/OR SENDING GENERAL PURPOSE COMPUTER (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).