

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2166 -1 REV:04/26/88

ASSEMBLY : AFT PCA-1 CRIT. FUNC: 1R
 P/N RI : ME451-0018-0300 CRIT. HDW: 3
 P/N VENDOR: VEHICLE 102 103 104
 QUANTITY : 3 EFFECTIVITY: X X X
 :THREE PHASE(S): PL LO X GO DO LS
 :

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

PREPARED BY:	APPROVED BY:	APPROVED BY (NASA):
DES <i>J. Brown</i> J BROWN	DES <i>A. Brown</i>	EPDC SSM <i>Lowell...</i>
REL <i>J. Defensor</i> DEFENSOR	REL <i>J. Kumui 6/27/88</i>	MPS SSM <i>B. 2/22/88</i>
QE <i>D. Masai</i> D MASAI	QE <i>J. J. P. 6/27/88</i>	EPDC REL <i>W. Woodard 7/1/88</i>
		MPS REL <i>W. Woodard 7/1/88</i>
		QE <i>J. J. P. 6/27/88</i>

ITEM:
 FUSE, (3 AMP), MAIN ENGINE LIMIT SHUTDOWN CIRCUIT.

FUNCTION:
 PROVIDES CONTROL BUS PROTECTION IN THE EVENT OF MAIN ENGINE LIMIT SHUTDOWN CONTROL CIRCUIT FAULTS. 35V73A3A1F5, F6, F7.

FAILURE MODE:
 FAILS OPEN, FAILS TO CONDUCT.

CAUSE(S):
 STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY, THERMAL STRESS.

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

(A) LOSS OF ONE OF THREE MANUAL "ENABLE", "AUTO", OR "INHIBIT" COMMANDS TO MAIN ENGINE LIMIT SHUTDOWN CIRCUIT.

(B) DEGRADATION OF MANUAL COMMAND REDUNDANCY TO LIMIT SHUTDOWN LOGIC.

(C,D) NO EFFECT - FIRST FAILURE.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - MAIN PROP. FMEA NO 05-6J -2166 -1 REV:04/26/88

- (E) 1R/3, 3 SUCCESS PATHS AFTER FIRST FAILURE. TIME FRAME - ASCENT.
1,2) TWO FUSES FAIL OPEN. CAPABILITY TO REINITIALIZE LIMIT CONTROL LOGIC IS LOST.
3) ONE SSME SHUTS DOWN CAUSING GPC TO AUTOMATICALLY INHIBIT LIMIT SHUTDOWN CAPABILITY. WHEN SINGLE ENGINE PRESS CAPABILITY IS ATTAINED, CREW WILL TRANSFER SWITCH TO "ENABLE", THEN "AUTO" POSITION IN ORDER TO REINITIALIZE LIMIT CONTROL LOGIC. HOWEVER, THIS CAPABILITY WAS LOST AS A RESULT OF THE FIRST TWO FAILURES, AND ENGINES REMAIN INHIBITED.
4) SECOND SSME EXCEEDS REDLINE CAUSING UNCONTAINED ENGINE DAMAGE.

FAILURES WILL RESULT IN UNCONTAINED ENGINE DAMAGE. POSSIBLE LOSS OF CREW/VEHICLE. MAIN ENGINE CONTROLLER HAS ACCESS TO NUMEROUS ENGINE OPERATING PARAMETERS AND HAS BEEN PROGRAMMED TO SENSE MAIN ENGINE OPERATING LIMITS WHICH WILL AUTOMATICALLY SHUT DOWN AFFECTED ENGINE IF LIMITS ARE EXCEEDED AND REDLINE SHUTDOWN CAPABILITY IS ENABLED. REDLINES ARE SET TO ADEQUATELY PROTECT ENGINE BY COMMANDING SSME SHUTDOWN IF AN OUT-OF-LIMITS CONDITION OCCURS.

FAILS B SCREEN BECAUSE NO INSTRUMENTATION IS AVAILABLE TO DETECT FAILURE.

DISPOSITION & RATIONALE:

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

(A-D) FOR DISPOSITION AND RATIONALE

REFER TO APPENDIX D, ITEM NO. 4 - FUSE, PLUG-IN.

(B) GROUND TURNAROUND TEST

SSME LIMIT SHUTDOWN SW VERIF V41AFO.280 EVERY FLIGHT.

(E) OPERATIONAL USE

MCC WILL MONITOR ENGINE REDLINE PARAMETERS AND ADVISE THE CREW TO MANUALLY SHUT DOWN AN ENGINE WITH REDLINE VIOLATION.

05-6J-276