SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3E -0330 -2 REV: 03/09/

ASSEMBLY :FLASH EVAPORATOR
P/N RI :MC250-0017-0970
P/N VENDOR:
QUANTITY :2
:TWO SUPPLY LINES
:

CRIT. FUNC: 2
CRIT. HDW:

VEHICLE EFFECTIVITY:	102	103	104
PHASE(S): PL LO		OO X DO	LS
	X	X	X

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

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
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ITEM:
FEEDWATER COMPONENTS.

FUNCTION:
PROVIDES WATER TO THE FLASH EVAPORATORS FOR VEHICLE COOLING. EACH WATE LINE HAS AN ACCUMULATOR TO REDUCE THE PRESSURE PULSES CAUSED BY "WATER HAMMER". THE ACCUMULATOR HAS A BELLOWS POSITION SWITCH, WHICH PROVIDES FULL ACCUMULATOR INDICATION. EACH FEEDWATER LINE AND ACCUMULATOR HAS REDUNDANT HEATERS, TEMPERATURE SENSORS, AND THERMOSTATS.

FAILURE MODE:
SWITCH FAILS ELECTRICALLY OPEN.

CAUSE(S):
VIBRATION, MECHANICAL SHOCK, CONTAMINATION.

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

(A,B) INCORRECT INDICATION OF ACCUMULATOR LOSS.

(C,D) NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECT - SECOND ASSOCIATED FAILURE (REDUNDANT FEEDWATER LINE INDICATOR SWITCH) WOULD CAUSE EARLY MISSION TERMINATION - DEORBIT AT NEXT PRIMARY LANDING SITE. REDUNDANCY SCREEN 'B' FAILS BECAUSE SYSTEM OPERATION CANNOT DISTINGUISH BETWEEN AN INSTRUMENT FAILURE (FAILED SWITCH) AND A HARDWARE FAILURE (FAILED ACCUMULATOR).

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

(A) DESIGN
DESIGN SAFETY FEATURES - LOW CURRENT FLOW (0.07 - 0.09 mA AT 28 VDC) THROUGH HIGH RELIABILITY POSITION SWITCH. SWITCH IS NORMALLY CLOSED AN AN EVENT SIGNAL IS ACTIVATED WHEN IT IS OPEN. SAFETY DESIGN FEATURE INCORPORATES SWITCH CONTACT ACTIVATION DUE TO COLLAPSED BELLOWS. SWITCHES ARE IN AN INERT GASEOUS ENVIRONMENT OF N_2 AND HE, WHICH ARE CONTROLLED TO MIL-P-27401C AND MIL-P-27407, RESPECTIVELY.

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(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. ACCUMULATOR QUALIFICATION TESTED AS A PART OF THE FLASH EVAPORATOR ASSEMBLY. VIBRATION TESTED AT 0.3 G^2/AXIS FOR 60 MIN/AXIS AND SHOCK TESTED AT +/- 20 G/AXIS.

ACCEPTANCE TEST - THE ACCUMULATOR IS SUBJECT TO 10 CYCLES FROM 17 PSIA T 200 PSIA TO 17 PSIA. THE POSITION SWITCH IS POWERED AND IS VERIFIED CLOSED THROUGHOUT THE CYCLE EXCURSIONS. CLEAN LEVEL 300.

PROOF PRESSURE TEST - THE POSITION SWITCH IS POWERED AND ACTIVATION VERIFIED AT MINIMUM STROKE OF THE BELLOWS DURING PROOF PRESSURE TEST (30 PSID WATER SIDE TO GAS SIDE)

OMRSD - BELLOWS CYCLE AND SWITCH VERIFICATION EVERY FIVE FLIGHTS.

(C) INSPECTION

RECEIVING INSPECTION
RAW MATERIAL CERTIFICATIONS ARE VERIFIED BY INSPECTION. VISUAL INSPECTION AND IDENTIFICATION OF PARTS AND MATERIAL ARE PERFORMED BY INSPECTION. MATERIAL AND EQUIPMENT CONFORMANCE TO CONTRACT REQUIREMENTS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
FORMAL CONTAMINATION CONTROL PLAN IS VERIFIED BY INSPECTION. CONTAMINATION CONTROL PROCESSES AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
MANUFACTURING, INSTALLATION AND ASSEMBLY OPERATIONS VERIFIED BY SHOP TRAVELER MIPS. PROCESSING EQUIPMENT CONTROLS CONFORMANCE TO CONTRACT REQUIREMENTS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES
SOLDERING IS VERIFIED BY INSPECTION.

TESTING
ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING
PROPERLY MONITORED HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION. PARTS PROTECTION IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY
NO APPLICABLE FAILURE HISTORY.

(E) OPERATIONAL USE
WHEN FEEDWATER ACCUMULATOR LIGHT INDICATES FAILURE TO GROUND CONTROLLERS CREW WOULD BE DIRECTED TO SWITCH TO REDUNDANT FEED LINE BY SWITCHING FES CONTROLLERS.