SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3E -0311 -5 REV: 03/03/88

ASSEMBLY :FLASH EVAPORATOR ASSY
P/N RI :MC250-0017-0970
P/N VENDOR:SV764170
QUANTITY :1
:ONE PER SUBSYSTEM.
:

CRIT. FUNC: 1
CRIT. HDW: 1

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X

PHASE(S): PL LO X OO X DO X LS

REDUNDANCY SCREEN: A- B- C-

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
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ITEM:
FLASH EVAPORATOR, WATER.

FUNCTION:
REMOVES WASTE HEAT FROM THE FREON COOLANT LOOPS BY THE EVAPORATION OF SUPPLY WATER. THE ASSEMBLY CONSISTS OF A HIGH LOAD AND A TOPPING EVAPORATOR. THE HIGH LOAD AND TOPPING BOTH OPERATE DURING LAUNCH AND REENTRY PHASES. THE TOPPING OPERATES ALONE DURING THE ON-ORBIT PHASE T SUPPLEMENT RADIATOR COOLING.

FAILURE MODE:
INTERNAL LEAKAGE, FREON INTO FES CORE.

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

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

(A) POSSIBLE FREON SPRAY ON THE HEAT TRANSFER SURFACE RESULTS IN UNCONTROLLED COOLING AND MAY CAUSE THE FREON COOLANT LOOPS TO DROP BELOW 32

(B) POSSIBLE FREEZING OF ARS WATER INTERCHANGER WHICH MAY RUPTURE BOTH WATER AND BOTH FREON 21 COOLANT LOOPS.

(C) ABORT DECISION FOR LOSS OF ONE FREON COOLANT LOOP.

(D) INTERNAL LEAKAGE OF FREON INTO FES CORE CAN LOWER THE FREON COOLANT LOOPS TEMPERATURES WHICH MAY FREEZE THE INTERCHANGER AND RUPTURE THE WATER AND FREON COOLANT LOOPS. LOSS OF COOLING LOOPS WILL CAUSE LOSS C VEHICLE COOLING AND CAN RESULT IN LOSS OF CREW/VEHICLE.

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

(A) DESIGN
PROOF PRESSURE OF 1.5 AND BURST OF 2.0 TIMES MAXIMUM OPERATING PRESSURE OF 320 PSI. INNER WALL THICKNESS IS .039 NOMINAL. WORST CASE EFFECT REQUIRES LEAKAGE ≥ 39 LB/HR THROUGH .039 INCH WALL. THE FLASH EVAPORAT

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DESIGN HAS A LOW PROBABILITY FOR THE IDEAL HOLE IN THE INNER FREON LOOP TO HAVE THE CORRECT SIZE AND SPRAY PATTERN TO COOL THE OUTER FREON LOOP MATERIAL IS ANODIZED ALUMINUM WHICH IS COMPATIBLE WITH WATER AND F-21.

(B) TEST
QUALIFICATION TEST - QUALIFICATION TESTED FOR A 100 MISSION LIFE. VIBRATION TESTED AT 0.3 G^2/HZ FOR 60 MIN/AXIS AND SHOCK TESTED AT +/- 20 G/AXIS.

ACCEPTANCE TEST - PRE-ASSEMBLY AND ATP LEAK CHECKS ARE PERFORMED. CORE LEAK INTEGRITY IS VERIFIED DURING ATP VACUUM TESTING.

OMRSD - FREON COOLANT LOOPS ARE MONITORED FOR LEAKAGE PRIOR TO EACH FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION
RAW MATERIAL CERTIFICATIONS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
INTERNAL CLEANLINESS OF EACH LOOP IS VERIFIED BY INSPECTION. ANALYSIS OF SYSTEMS FLUID SAMPLES FOR CONTAMINATION ARE VERIFIED BY INSPECTION. CONTAMINATION CONTROL PROCESSES AND CORROSION PROTECTION PROVISIONS VERIFIED.

ASSEMBLY/INSTALLATION
MANUFACTURING, INSTALLATION AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION. MATERIAL AND HANDLING EQUIPMENT CONFORMANCE TO REQUIREMENT ARE VERIFIED BY INSPECTION. THREADED INSERTS ARE INSTALLED WITH KOROPO COATING AND VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
WELDS ARE PENETRANT INSPECTED. X-RAY INSPECTION OF CYLINDRICAL CORE-RI AND CORE-INLET, VERIFIED BY INSPECTION.

CRITICAL PROCESSES
ANODIZING AND WELDING REQUIREMENTS ARE VERIFIED BY INSPECTION.

TESTING
SYSTEM PROOF PRESSURE TEST AND LEAK TEST VERIFIED BY INSPECTION.

HANDLING/PACKAGING
HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY
NO APPLICABLE FAILURE HISTORY.

(E) OPERATIONAL USE
ON-BOARD ALARM FOR LOW EVAPORATOR OUT TEMPERATURE WILL INDICATE FAILURE SWITCH RADIATOR FLOW CONTROL ASSEMBLY TO BYPASS TO INCREASE HEAT LOAD. IMPLEMENT POWERDOWN FOR LOSS OF ONE FREON COOLANT LOOP. DEORBIT AT NEA PRIMARY LANDING SITE.