

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE
NUMBER: 06-3B-0401-X****SUBSYSTEM NAME: ATCS - AMMONIA BOILER SYSTEM****REVISION: 1 08/25/93 W**

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: AMMONIA BOILER SUB-SYSTEM	MC250-0005-0007 74716050
SRU	: BOILER, AMMONIA	74716050

PART DATA

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
BOILER, AMMONIA****QUANTITY OF LIKE ITEMS: 1
ONE****FUNCTION:
PROVIDES COOLING FOR FREON COOLANT LOOPS WITH VAPORIZATION OF AMMONIA
AS THE COOLING SOURCE. THE AMMONIA BOILER SYSTEM IS USED DURING
POSTLANDING OPERATIONS, LAUNCH ABORTS, AND AS A BACKUP DURING NORMAL
DEORBITS.**

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3B -0401 -4 REV:08/25/88

ASSEMBLY : AMMONIA BOILER SUBSYSTEM CRIT. FUNC: 1R
P/N RI : MC250-0005-0007 CRIT. EDW: 2
P/N VENDOR: 74716050 VEHICLE 102 103 104
QUANTITY : 1 EFFECTIVITY: X X X
: ONE PER VEHICLE PHASE(S): PL LO X OO X DO X LS
:

REUNDANCY SCREEN: A-PASS B-PASS C-PASS
PREPARED BY: APPROVED BY: APPROVED BY (NASA):
DES J. MORGAN DES [Signature] SSM [Signature]
REL D. RISING REL [Signature]
OE W. SMITH OE [Signature]

ITEM:
BOILER, AMMONIA.

FUNCTION:
PROVIDES COOLING FOR FREON COOLANT LOOPS WITH VAPORIZATION OF AMMONIA AS THE COOLING SOURCE. THE AMMONIA BOILER SYSTEM IS USED DURING POSTLANDIN OPERATIONS, LAUNCH ABORTS, AND AS A BACKUP SYSTEM DURING NORMAL DEORBITS

FAILURE MODE:
EXTERNAL LEAKAGE, FREON 21.

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

EFFECT(S) ON:
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
(A, B) LOSS OF ONE FREON COOLANT LOOP FOR VEHICLE COOLING.
(C) POSSIBLE LOSS OF MISSION. EARLY MISSION TERMINATION FOR LOSS OF ONE FREON COOLANT LOOP.
(D) SECOND ASSOCIATED FAILURE (LOSS OF REDUNDANT FREON COOLANT LOOP) WILL CAUSE LOSS OF ALL VEHICLE COOLING AND MAY RESULT IN LOSS OF CREW/VEHICLE

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

(A) DESIGN
STANDARD BRAZED TUBE-SHELL CONSTRUCTION. SHELL IS 0.020 INCH THICK. DESIGN PROOF PRESSURE OF 1.5 AND BURST PRESSURE OF 2.0 TIMES MAXIMUM OPERATING PRESSURE. MATERIALS ARE CRES STAINLESS STEEL, WHICH IS CORROSION RESISTANT AND COMPATIBLE WITH AMMONIA AND FREON 21.
(B) TEST
QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 0.01 G²/HZ FOR 48 MIN/AXIS AND SHOCK TESTED AT +/- : G/AXIS.

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ACCEPTANCE TEST - THE SHELL-SIDE AND TUBE-SIDE SYSTEMS ARE INDEPENDENTLY LEAK CHECKED BY HELIUM MASS SPECTROMETER DURING ACCEPTANCE TESTS. OESIC PROOF PRESSURE OF 1.5 TIMES MAXIMUM EXPECTED OPERATING PRESSURE.

OMRSD - PCL'S ARE LEAK CHECKED PRIOR TO EACH MISSION. FLUIDS CONTROLLED TO SE-S-0073. FUNCTIONAL TEST IS MONITORED TO VERIFY FREON FLOWRATE IS WITHIN SPECIFIED LIMITS EVERY TURNAROUND

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL CERTIFICATION VERIFIED BY INSPECTION. PART PROTECTION, COATING AND PLATING PROCESSES ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

CONTAMINATION CONTROL PROCESSES, CONTAMINATION CONTROL PLAN, AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION. SYSTEM FLUID SAMPLES FOR CONTAMINATION VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

MANUFACTURING, INSTALLATION, AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

PENETRANT INSPECTION OF INDUCTION BRAZED JOINTS IS VERIFIED.

CRITICAL PROCESSES

TUBE BRAZING PROCESS IS VERIFIED BY INSPECTION. PASSIVATION OF CRES MATERIALS IS VERIFIED BY INSPECTION.

TESTING

FLOWRATES ARE VERIFIED TO SPECIFIED LIMITS BY INSPECTION.

HANDLING/PACKAGING

HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY.

(E) OPERATIONAL USE

ON-BOARD ALARMS, FREON INLET PRESSURE AND ACCUMULATOR QUANTITY, WILL PROVIDE INDICATION OF HARDWARE FAILURE. FREON PUMP WILL BE TURNED OFF AND LOSS OF ONE FREON LOOP POWERDOWN WILL BE PERFORMED. ENTRY AT NEXT PRIMARY LANDING SITE.