SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ATMOSPHERIC REVIT. FMEA NO 06-1B -0563 -2 REV:09/08/8

ASSEMBLY :HEAT EXCHANGER, AVIONICS BAY
P/N RI :MC621-0008-0005
P/N VENDOR:SV755522 HAM STD
QUANTITY :3
:ONE PER BAY
:THREE PER SUBSYSTEM

CRIT. FUNC: 1R
CRIT. HDW: 2

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

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

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

PREPARED BY:
DES N. K. DUONG
REL N. L. STEISSLINGER
QE D. STOICA

APPROVED BY:
DES
REL
QE

APPROVED BY (NASA):
SSM
REL
QE

ITEM:
HEAT EXCHANGER, AVIONICS BAY

FUNCTION:
REMOVES EXCESS HEAT FROM AVIONICS EQUIPMENT BY COOLING CIRCULATED AIR IN BAY AND TRANSFERRING THE HEAT TO THE WATER COOLANT LOOPS.

FAILURE MODE:
EXTERNAL LEAKAGE, WCL

CAUSE(S):
VIBRATION, MECHANICAL SHOCK, CORROSION, MATERIAL DEFECT

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

(A) LOSS OF REDUNDANCY - LOSS OF ONE WATER COOLANT LOOP.

(B) LOSS OF COOLING OF AFFECTED WATER COOLING LOOP. FREE WATER IN ASSOCIATED AVIONICS BAY.

(C) POSSIBLE EARLY MISSION TERMINATION FOR LOSS OF ONE WATER COOLANT LOOP.

(D) POTENTIAL LOSS OF CREW/VEHICLE UPON SUBSEQUENT LOSS OF REDUNDANT WATER COOLANT LOOP.

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

(A) DESIGN
HEAT EXCHANGER IS AN OVEN-BRAZED CRES PLATE-FIN UNIT. HEADER, BOSSES & FLUID LINES WELDED ON THE PLATE-FIN CORE. THE HEAT TRANSFER FLUID IS HIGH PURITY/LOW OXYGEN CONTENT WATER. HOUSING IS 0.04 INCH THICK.

(B) TEST
ACCEPTANCE TEST - LEAKAGE: AIR SIDE AT 5 IN OF H2O 0.18 LB/MIN GN2 MAX WATER SIDE 0.001 CC/HR AT 75 PSIG. PROOF PRESSURE AT 5 IN OF H2O ON A SIDE AND 135 PSIG ON H2O SIDE. TUBES INSPECTED. FLOW VS. DELTA-P CK PERFORMED.

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QUALIFICATION TEST - LEAKAGE: AIR SIDE AT 5 IN OF H2O 0.18 LB/MIN GN2 MAX. PROOF PRESSURE AT 5 IN OF H2O ON AIR SIDE AND 135 PSIG ON H2O SI TUBES INSPECTED. SUBJECTED TO RANDOM VIBRATION SPECTRUM ENVELOPE OF 2 TO 150 HZ INCREASING AT 6 DB/OCTAVE TO 0.03 G**2/HZ, CONSTANT AT 0.03 G**2/HZ FROM 150 TO 1000 HZ, DECREASING AT 6 DB/OCTAVE FROM 1000 TO 2 HZ FOR 48 MINUTES PER AXIS IN THREE ORTHOGONAL AXES. DESIGN SHOCK - THREE TERMINAL SAWTOOTH PULSES OF 20 G PEAK AMPLITUDE AND 11 MS DURATI APPLIED IN BOTH DIRECTIONS ALONG EACH OF THREE ORTHOGONAL AXES.

IN-VEHICLE TESTING - SYSTEM DECAY TEST IS PERFORMED AT 85 - 95 PSIG, 8 CC/MIN MAX LEAKAGE. PUMP OUT PRESSURE AND ACCUMULATOR QUANTITY ARE CONTINUOUSLY MONITORED WHEN THE VEHICLE IS POWERED UP AND SERVE AS AN INDICATION OF EXTERNAL LEAKAGE.

OMRSD - PUMP ACCUMULATOR QUANTITY AND OUTLET PRESSURE ARE CONTINUOUSLY MONITORED WHILE THE VEHICLE IS POWERED UP DURING EACH TURNAROUND, AND SERVE AS AN INDICATION OF EXTERNAL LEAKAGE. WATER IS SAMPLED PER SPEC SE-S-0073 DURING SERVICING.

(C) INSPECTION

RECEIVING INSPECTION
RAW MATERIAL AND PURCHASED COMPONENTS REQUIREMENTS ARE VERIFIED BY INSPECTION. PARTS PROTECTION IS VERIFIED BY INSPECTION

CONTAMINATION CONTROL
SYSTEMS FLUID ANALYSES FOR CONTAMINATION ARE VERIFIED BY INSPECTION. CONTAMINATION CONTROL PLAN IS VERIFIED BY INSPECTION. CONTAMINATION CONTROL PROCESSES AND CLEAN AREAS ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
MANUFACTURING, INSTALLATION AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION. SHEET METAL PARTS ARE INSPECTED AND VERIFIED BY INSPECTI SURFACE FINISHES VERIFIED BY INSPECTION. DIMENSIONS VERIFIED BY INSPECTION

CRITICAL PROCESSES
WELDING IS VERIFIED BY INSPECTION. ALL WELDS ARE STRESS RELIEVED AFTE WELDING, VERIFIED BY INSPECTION. BRAZING IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
HEADER WELDS TO THE TUBES ARE PENETRANT AND X-RAY INSPECTED. OTHER WELDS (MOUNTING PADS AND HEADER WELDS TO THE CORES) ARE PENETRANT AND 10X MAGNIFICATION VISUALLY INSPECTED. BRAZES ARE VERIFIED BY PROOF AN LEAK TESTS.

TESTING
INSPECTION VERIFIES THAT RESULTS OF ACCEPTANCE TESTING AND FLOWRATES A WITHIN SPECIFIED LIMITS.

HANDLING/PACKAGING
HANDLING AND PACKAGING REQUIREMENTS VERIFIED BY INSPECTION.

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(D) FAILURE HISTORY
NO FAILURE HISTORY APPLICABLE TO EXTERNAL LEAKAGE, WCL FAILURE MODE. T
AVIONICS BAY HEAT EXCHANGER HAS SUCCESSFULLY PERFORMED WITHOUT FAILURE
THROUGH THE DURATION OF THE SHUTTLE PROGRAM.

(E) OPERATIONAL USE
TBS.