PRINT DATE: 12/05/00

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 06-1B-0563 -X

SUBSYSTEM NAME: ARS - COOLING

REVISION: 1 11/22/00

PART DATA

	PART NAME **VENDOR NAME**	**PART NUMBER** **VENDOR NUMBER**
LRU	: HEAT EXCHANGER, AV BAY	MC621-0008-0005
LRU	: HEAT EXCHANGER (AVIONICS BAY 3A) HAMILTON STANDARD	MC621-0008-0705 SV755522

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
HEAT EXCHANGER, AVIONICS BAY

QUANTITY OF LIKE ITEMS: 4
ONE PER BAY
THREE PER SUBSYSTEM

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

MC621-0008-0705: MCR 19393 "AVIONICS BAY 3A FAN MOD - LONG LEAD PROCUREMENT" PROVIDES FLEXIBILITY TO INSTALL EITHER CABIN OR AVIONICS FAN IN AVIONICS BAY 3A BASED ON INDIVIDUAL MISSION CONSUMABLES AND PAYLOAD COOLING NEEDS TO IMPROVE CRYO CONSUMABLES MARGIN.

FAILURE MODES EFFECTS ANALYSIS FMEA – CIL FAILURE MODE
NUMBER: 06-1B-0563- 04

REVISION#: 1 11/22/00

SUBSYSTEM NAME: ARS - COOLING
LRU: HEAT EXCHANGER, AV BAY
ITEM NAME: HEAT EXCHANGER, AV BAY

CRITICALITY OF THIS FAILURE MODE: 1R2

FAILURE MODE:
RESTRICTED FLOW, AIR

MISSION PHASE:

LO	LIFT-OFF
OO	ON-ORBIT
DO	DE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:

102	COLUMBIA
103	DISCOVERY
104	ATLANTIS
105	ENDEAVOUR

CAUSE:
MECHANICAL SHOCK, VIBRATION, CORROSION, CONTAMINATION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN

A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:
A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
INCREASE IN FAN OUTPUT PRESSURE & DECREASE IN FLOW.

(B) INTERFACING SUBSYSTEM(S):

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE NUMBER: 06-1B-0563- 04

REDUCED OR LOST COOLING CAPABILITY IN AFFECTED AVIONICS BAY.

(C) MISSION:
POSSIBLE EARLY MISSION TERMINATION. SOME AVIONICS EQUIPMENT WILL BECOME SINGLE STRING.

(D) CREW, VEHICLE, AND ELEMENT(S):
ASSOCIATED LOSS OF CRITICAL AVIONICS EQUIPMENT (MADE SINGLE STRING BY THE FIRST FAILURE) MAY RESULT IN LOSS OF CREW/VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

-DISPOSITION RATIONALE-

(A) DESIGN:
CRES, OVEN BRAZED ASSEMBLY, 300 MICRON AIR STREAM FILTER, OPERATING TEMPERATURE IS ABOVE DEW POINT. THE AIR FINS DIMENSIONS ARE 0.20 IN HIGH X 0.002 IN. THICK X 24 FINS PER INCH. CORE IS 2.98 INCH X 4.8 INCH X 11.6 INCH LONG. THE FILTER AREA IS 14 X 10 INCH AND ITS MATERIAL IS STAINLESS STEEL WIRE.

(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 AIR SIDE AND 135 PSIG ON H2O SIDE. TUBES INSPECTED. FLOW VS. DELTA-P CHECK PERFORMED.

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 SIDE. TUBES INSPECTED. SUBJECTED TO RANDOM VIBRATION SPECTRUM ENVELOPE OF 20 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 2000 HZ FOR 48 MINUTES PER AXIS IN THREE ORTHOGONAL AXES. DESIGN SHOCK - THREE TERMINAL SAWTOOTH PULSES OF 20 G PEAK AMPLITUDE AND 11 MS DURATION APPLIED IN BOTH DIRECTIONS ALONG EACH OF THREE ORTHOGONAL AXES.

IN-VEHICLE TESTING - AVIONICS BAY FAN DELTA-P IS MONITORED CONTINUOUSLY WHEN THE VEHICLE IS POWERED UP AND SERVES AS AN INDICATION OF BLOCKED AIR FLOW.

GROUND TURNAROUND TEST - ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD

(C) INSPECTION:

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL FAILURE MODE
NUMBER: 06-1B-0563- 04

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 INSPECTION. SURFACE FINISHES VERIFIED BY INSPECTION. DIMENSIONS VERIFIED BY INSPECTION.

CRITICAL PROCESSES
WELDING IS VERIFIED BY INSPECTION. ALL WELDS ARE STRESS RELIEVED AFTER 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 AND LEAK TESTS.

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

HANDLING/PACKAGING
HANDLING AND PACKAGING REQUIREMENTS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:
CURRENT DATA ON TEST FAILURES, FLIGHT FAILURES, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN THE PRACA DATA BASE.

(E) OPERATIONAL USE:
TBS.

- APPROVALS -

S&RE ENGINEERING	: P. CHAN	:
S&RE ENGINEERING ITM	: P. STENGER-NGUYEN	:
DESIGN ENGINEERING	: K. DUONG	:
DESIGN ENGINEERING SSM	: S. NGUYEN	:
MOD	: P. HASBROOK	: 1/12/01
USA / SAM	:	: 1-12-01

PRINT DATE: 12/05/00

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE
NUMBER: 06-1B-0563- 04

USA ORBITER ELEMENT :

Suzanne Little 1-12-01