FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL HARDWARE
NUMBER: 06-1B-0670-X

SUBSYSTEM NAME: ARS - COOLING

REVISION: 9 01/12/94

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	REGENERABLE CO2 REMOVAL SYSTEM	MC623-0016
LRU	:	MUFFLER, COMPRESSOR	SV807617

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
ULLAGE SAVE COMPRESSOR OUTLET MUFFLER

QUANTITY OF LIKE ITEMS: 1

FUNCTION:
ATTENUATE NOISE AT THE OUTLET OF THE ULLAGE SAVE COMPRESSOR

PRINT DATE: 08/30/93

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL FAILURE MODE
NUMBER: 06-1B-0870-01

REVISION# 8 08/30/93 R

SUBSYSTEM NAME: ARS - COOLING
LRU: REGENERABLE CO2 REMOVAL SYSTEM
ITEM NAME: MUFFLE, COMPRESSOR

CRITICALITY OF THIS FAILURE MODE: 1/1

FAILURE MODE:
EXTERNAL LEAKAGE

MISSION PHASE:
ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
105 ENDEAVOUR

CAUSE:
MECHANICAL SHOCK, VIBRATION, CORROSION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN
A) N/A
B) N/A
C) N/A

PASS/FAIL RATIONALE:
A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
COMPRESSOR WILL OPERATE AT HIGH NOISE LEVEL.

(B) INTERFACING SUBSYSTEM(S):
REDUCED COOLING AIR FLOW THROUGH FLIGHT DECK AVIONICS LRU'S.

(C) MISSION:
POSSIBLE EARLY MISSION TERMINATION IF WORKAROUND CANNOT LOWER SOUND TO AN ACCEPTABLE LEVEL AND COMPRESSOR MUST BE TURNED OF. THUS INCREASING CONSUMABLE USE. DECISION MUST BE MADE IF MAGNITUDE OF LEAK IS LARGE.

(D) CREW, VEHICLE, AND ELEMENT(S):
CREW EFFICIENCY MAY DETERIORATE DUE TO HIGH NOISE LEVEL. POTENTIAL LOSS OF CREW/VEHICLE DUE TO POSSIBLE FAILURE OF THE AFFECTED AVIONICS AS THE RESULT OF LRU OVERHEATING.

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(E) FUNCTIONAL CRITICALITY EFFECTS:
NONE

- DISPOSITION RATIONALE-

(A) DESIGN:
THE COMPRESSOR MUFFLER CONSISTS OF TWO PERFORATED TUBES WHICH ARE ENCLOSED BY THICK OPEN CELL POLYAMIDE ACOUSTIC FOAM. ALL, ALONG WITH THE COMPRESSOR CHECK VALVE ARE PACKAGED INSIDE AN ALUMINUM HOUSING. THE MUFFLER HAS A USEFUL LIFE/SHELF LIFE OF 43,200 HOURS WHICH IS THE EQUIVALENT OF A TEN YEAR PERIOD.

(B) TEST:
QUALIFICATION TEST FOR 100 MISSIONS:
THE COMPRESSOR MUFFLER IS SUBJECT TO RANDOM VIBRATION TESTING AT THE RCRS ASSEMBLY LEVEL; INCREASING AT 6 db/oct FROM 20 TO 45 HZ; CONSTANT AT 0.003 g2/HZ FROM 45 TO 1000 HZ; DECREASING AT 6 db/oct FROM 1000 TO 2000 HZ FOR THE DURATION OF 48 MINUTES PER AXIS IN THREE ORTHOGONAL AXES. SHOCK TESTED BY ANALYSIS AT 20 G TERMINAL SAWTOOTH SHOCK PULSE FOR 11 MILLISECOND DURATION. ACOUSTIC NOISE TESTED WITH SOUND PRESSURE LEVEL IN THE LIMITS FROM 56 db TO 35 db AT THE FREQUENCY RANGE FROM 63 HZ TO 8000 HZ.

ACCEPTANCE TEST:
PROOF PRESSURE AT 1.5 TIMES OPERATING PRESSURE (18 PSIA MAX.) WITH NO EVIDENCE OF DAMAGE OR DEGRADATION IN PERFORMANCE. LEAKAGE TESTED AT RCRS PACKAGE LEVEL OF LESS THAN 9 SCCM LEAK RATE AT CABIN PRESSURE OF 14.7 PSIA. PERFORMANCE CHARACTERISTICS ARE VERIFIED.
OMRSD:
ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD AT SYSTEM LEVEL..

(C) INSPECTION:
RECEIVING INSPECTION
INCOMING PART IDENTIFICATION AND CERTIFICATION VERIFIED BY INSPECTION. DIMENSIONAL VERIFICATION AT VENDOR BY H. S. SOURCE INSPECTION.

CONTAMINATION CONTROL
CONTAMINATION CONTROL PROCESSES AND CLEAN AREAS VERIFIED BY INSPECTION. CLEAN LEVEL VERIFIED BY INSPECTION. INTERNAL PRECISION CLEANLINESS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
ASSEMBLY AND INSTALLATION VERIFIED BY INSPECTION.

CRITICAL PROCESSES
ANODIZE PROCESS VERIFIED BY INSPECTION. BONDING PROCESS VERIFIED BY INSPECTION. TORQUE OPERATIONS VERIFIED TO H. S. REQUIREMENTS. WELD DYE PENETRANT AND VISUAL VERIFICATION OF WELDS PERFORMED BY INSPECTION.

TESTING
IN PROCESS PROOF, LEAK, AND FLOW TEST PERFORMED. RCRS UNIT ATP TEST VERIFIED BY INSPECTION. VIBRATION TEST OF ORIGINAL DEVELOPMENT TEST UNIT

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AS A DETAIL OF RCRS ASSEMBLY VERIFIED BY INSPECTION DURING QUALIFICATION TESTING.

HANDLING/PACKAGING
HANDLING AND PARTS PROTECTION PER H. S. REQUIREMENTS.

(D) FAILURE HISTORY:
NO FAILURE HISTORY.

(E) OPERATIONAL USE:
1) SHUT DOWN THE RCRS WHEN THE ACOUSTIC LEVEL IS UNACCEPTABLE.

2) INSTALL NEW LIOH CANISTERS FOR CO2 REMOVAL. THE LIOH CANISTER SUPPLY IS ADEQUATE FOR 3 DAYS (MINIMUM).

- APPROVALS -

EDITORIALLY APPROVED : RI
EDITORIALLY APPROVED : JSC
TECHNICAL APPROVAL : VIA CR :ORB0061