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PRINT DATE: 06/29/92

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE  
NUMBER: 06-1B-0880-X

SUBSYSTEM NAME: ARS - COOLING

REVISION : 7 06/26/92

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	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
■ LRU :	REGENERABLE CO2 REMOVAL SYSTEM	MC623-0016
■ SRU :	MUFFLER, OUTLET	SV807090

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PART DATA

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■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
RCRS OUTLET MUFFLER

■ QUANTITY OF LIKE ITEMS: 1

■ FUNCTION:  
ATTENUATE NOISE AT THE REGENERABLE CO2 REMOVAL SYSTEM OUTLET, WHERE AIR  
WILL RETURN TO THE ATMOSPHERE REVITALIZATION SYSTEM CABIN RETURN AIR.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
NUMBER: 06-18-0880-01

REVISION# 7 06/26/92 R

SUBSYSTEM: ARS - COOLING  
LRU :REGENERABLE CO2 REMOVAL SYSTEM  
ITEM NAME: MUFFLER, OUTLET

CRITICALITY OF THIS  
FAILURE MODE:1/1

■ FAILURE MODE:  
EXTERNAL LEAKAGE

MISSION PHASE:  
00 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:  
THE RCRS WILL BE PUMPING WARM AIR INTO CABIN. ALSO, THE SYSTEM WILL OPERATE AT HIGH NOISE LEVEL.
- (B) INTERFACING SUBSYSTEM(S):  
REDUCED AIR FLOW THROUGH FLIGHT DECK AVIONICS LRU'S AND MADS.
- (C) MISSION:  
POSSIBLE EARLY MISSION TERMINATION IF WORKAROUND CANNOT LOWER SOUND TO AN ACCEPTABLE LEVEL AND RCRS MUST BE SHUT OFF. DECISION MUST BE MADE IF

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MAGNITUDE OF LEAK IS AFFECTING AVIONICS COOLING.

- (D) CREW, VEHICLE, AND ELEMENT(S):  
CREW EFFICIENCY MAY DETERIORATE DUE TO HIGH NOISE LEVEL. ALSO,  
POTENTIAL LOSS OF CREW/VEHICLE DUE TO FAILURE OF THE AFFECTED AVIONICS  
AS THE RESULT OF LRU OVERHEATING.
- (E) FUNCTIONAL CRITICALITY EFFECTS:  
NONE

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- DISPOSITION RATIONALE -  
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- (A) DESIGN:  
THE OUTLET MUFFLER USES 0.500 INCH THICK OPEN CELL POLYIMIDE ACOUSTIC  
FOAM AND LINED WITH A THIN ALUMINUM SHELL. MUFFLER HOUSING IS MADE OF  
6061-T6 ALUMINUM TUBING WITH 2" BEADED TUBE CONNECTIONS AT BOTH ENDS.  
PRESSURE DROP OF 0.10 INCH OF WATER AT A MINIMUM FLOW OF 20 CFM. THE  
MUFFLER HAS A USEFUL LIFE/SHELF LIFE OF 43,200 HOURS WHICH IS THE  
EQUIVALENT OF A 10 YEAR PERIOD.
- (B) TEST:  
QUALIFICATION TEST FOR 100 MISSIONS:  
THE RCRS OUTLET MUFFLER IS SUBJECT TO RANDOM VIBRATION OF INCREASING AT  
6 db/oct FROM 20 TO 150 HZ; CONSTANT AT 0.03 g2/HZ FROM 150 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 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. ANODIZE  
PROCESS VERIFIED BY INSPECTION.  
  
CONTAMINATION CONTROL

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CONTAMINATION CONTROL PROCESSES AND CLEAN AREAS VERIFIED BY INSPECTION.  
VISUAL CLEAN MAINTAINED IN-PROCESS, UNIT INTERNAL PRECISION CLEAN LEVEL  
VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION  
FABRICATION OPERATIONS VERIFIED BY INSPECTION.

CRITICAL PROCESSES  
BONDING PROCESS VERIFIED BY INSPECTION.

TESTING  
PROOF, LEAK, AND FLOW ACCEPTANCE TESTING VERIFIED BY INSPECTION.  
VIBRATION TEST PERFORMED 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 IF NOISE LEVEL BECOMES UNACCEPTABLE.
  - 2) INSTALL NEW LIQH CANISTERS FOR CO2 REMOVAL. THE LIQH CANISTER  
SUPPLY IS ADEQUATE FOR 3 DAYS (MINIMUM).

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- APPROVALS -  
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RELIABILITY MANAGER : T. J. EAVENSON  
DESIGN ENGINEERING : P. J. CHEN  
QUALITY ENGINEERING : E. OCHOA  
NASA RELIABILITY :  
NASA SUBSYSTEM MANAGER :  
NASA QUALITY ASSURANCE :

*K. L. Paster for 6/29/92*  
*P. J. Chen*  
*for K. L. Paster for T. J. Eavenson 6/30/92*  
*John Steinsinger 9/8/92*  
*9/8/92*  
*11/15/92 8:21/92*  
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