

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 06-1B-0720-X

SUBSYSTEM NAME: ARS - COOLING

REVISION : 7 06/26/92

| | PART NAME VENDOR NAME | PART NUMBER VENDOR NUMBER |
|---------|--------------------------------|------------------------------|
| ■ LRU : | REGENERABLE CO2 REMOVAL SYSTEM | MC623-0016 |
| ■ LRU : | FILTER, ASSEMBLY | SV806019 |

PART DATA

- EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
REGENERABLE CO2 REMOVAL SYSTEM INLET FILTER

- QUANTITY OF LIKE ITEMS: 1

- FUNCTION:
THE REGENERABLE CO2 REMOVAL SYSTEM INLET FILTER PROTECTS DOWNSTREAM COMPONENTS FROM CONTAMINATION.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 06-18-0720-02

REVISION# 7 06/26/92 R

SUBSYSTEM: ARS - COOLING
LRU :REGENERABLE CO2 REMOVAL SYSTEM
ITEM NAME: FILTER, ASSEMBLY

CRITICALITY OF THIS
FAILURE MODE:2/2

■ FAILURE MODE:
DAMAGED ELEMENT

MISSION PHASE:
00 ON-ORBIT

■ VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 105 ENDEAVOUR

■ CAUSE:
CORROSION, VIBRATION, MANUFACTURING DEFECT, MISHANDLING.

■ 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)

■ MASTER MEAS. LIST NUMBERS: V61P2923A

- FAILURE EFFECTS -

■ (A) SUBSYSTEM:
LOSS OF RCRS FILTRATION.

■ (B) INTERFACING SUBSYSTEM(S):
POSSIBILITY OF SEVERE DOWNSTREAM COMPONENT DAMAGE.

■ (C) MISSION:
EARLY MISSION TERMINATION IF CONTAMINATION INTERFERES WITH SYSTEM'S
COMPONENTS OPERATION.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 06-18-0720-02

- (D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT.
- (E) FUNCTIONAL CRITICALITY EFFECTS:
LOSS OF ABILITY TO REMOVE CO₂, LIOH CANISTERS MUST BE USED UNTIL LANDING
THE LIOH CANISTER SUPPLY IS ADEQUATE TO ACCOMMODATE A 3 DAY MISSION.
LOSS OF ALL OF THESE BACKUPS MAY RESULT IN LOSS OF CREW/VEHICLE. A
1R3 PPP CRITICALITY SCENARIO RESULTS.

- DISPOSITION RATIONALE -

- (A) DESIGN:
THE FILTER IS A 40/70 MICRON RATING, STAINLESS STEEL WIRE MESH. MESH
SIZE IS 50 (0.0055 INCH) x 250 (0.0040 INCH) PER SQUARE INCH. PLAIN
DUTCH SINGLE WEAVE FILTER CLOTH DESIGN. THE SCREENS ARE BONDED AND
RIVETED TO THE INSIDE OF THE FILTER FRAME. A RUBBER SEAL IS BONDED TO
THE SIDE OF THE FRAME TO PREVENT AIR BYPASS LEAKAGE. THE FILTER IS
SLID INTO A BRAZED ALUMINUM BOX WHICH IS MOUNTED DIRECTLY AT THE INLET
OF THE RCRS FAN. THE FILTER IS ACCESSIBLE FOR CLEANING IN FLIGHT.
- (B) TEST:
QUALIFICATION TEST FOR 100 MISSIONS:
THE RCRS FILTER (40/70 MICRON) IS CERTIFIED BY SIMILARITY WITH THE
SHUTTLE CABIN FAN FILTER. QUALIFICATION TESTING WILL BE PERFORMED AT
THE HIGHER ASSEMBLY LEVEL. RANDOM VIBRATION 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 FOR THREE ORTHOGONAL AXES.
ACCEPTANCE TEST:
ACCEPTANCE TESTING IS AT HIGHER ASSEMBLY LEVEL. PROOF PRESSURE TESTED
AT 1.5 TIMES THE OPERATING PRESSURE DIFFERENTIAL AND HELD FOR 5 MINUTES
WITH NO STRUCTURE DAMAGE OR PERMANENT DEFORMATION.
OMRSD:
ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD
AT SYSTEM LEVEL.
- (C) INSPECTION:
RECEIVING INSPECTION
INCOMING MATERIAL IDENTIFICATION AND CERTIFICATION VERIFIED BY
INSPECTION. INCOMING MATERIAL DIMENSIONAL CHARACTERISTICS ARE VERIFIED
AT VENDOR BY SOURCE INSPECTION. INCOMING PART ANODIZE VERIFIED BY
INSPECTION.

CONTAMINATION CONTROL
CONTAMINATION CONTROL PROCESSES AND CLEAN AREAS ARE VERIFIED BY

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 06-1B-0720-02

INSPECTION. TEST EQUIPMENT AND GAS CLEANLINESS VERIFIED BY INSPECTION.
PRODUCT CLEANLINESS VERIFIED TO DRAWING REQUIREMENTS BY INSPECTION.

ASSEMBLY/INSTALLATION
FABRICATION/ASSEMBLY OPERATIONS VERIFIED BY INSPECTION.

CRITICAL PROCESSES
TORQUE OPERATIONS VERIFIED TO H. S. REQUIREMENTS. ADHESIVE BONDING
PROCESSES VERIFIED BY INSPECTION. DIP BRAZING PROCESSING VERIFIED BY
INSPECTION (VISUAL).

TESTING
FUNCTIONAL PERFORMANCE VERIFIED AT RCRS UNIT ATP. RCRS UNIT ATP
WITNESSED AND VERIFIED TO BE WITHIN REQUIREMENTS BY INSPECTION. PROOF,
LEAK AND FLOW TESTED AT FILTER ASSEMBLY LEVEL.

HANDLING/PACKAGING
HANDLING AND PART PROTECTION MAINTAINED PER H. S. REQUIREMENTS.

- (D) FAILURE HISTORY:
THERE HAVE BEEN NO CASES OF LOSS OF FILTRATION WITH SIMILAR CABIN FAN
FILTER.
- (E) OPERATIONAL USE:
SHUT DOWN THE RCRS AND INSTALL NEW LIOH CANISTERS FOR CO2 REMOVAL. THE
LIOH CANISTER SUPPLY IS ADEQUATE FOR 3 DAYS.

- APPROVALS -

| | | |
|------------------------|------------------|---|
| RELIABILITY MANAGER | : T. J. EAVENSON | : <u>K.L. Preston for 6/30/92</u> |
| DESIGN ENGINEERING | : P. J. CHEN | : <u>[Signature]</u> |
| QUALITY ENGINEERING | : E. OCHOA | : <u>5/16 K.L. Preston for T.J. Eavenson 6/3/92</u> |
| NASA RELIABILITY | : | : <u>J. B. [Signature] 7/1/92</u> |
| NASA SUBSYSTEM MANAGER | : | : <u>[Signature] 7/9/92</u> |
| NASA QUALITY ASSURANCE | : | : <u>[Signature] 8-2-92</u> |
| | | : <u>K. [Signature]</u> |