FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 06-1B-0750-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
■ SRU	:	VALVE, MANUAL	SV807021

PART DATA

■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
FLOW CONTROL VALVE

■ QUANTITY OF LIKE ITEMS: 1

■ FUNCTION:
THE VALVE IS SET BEFORE LAUNCH BASED ON CREW SIZE. THIS VALVE MODULATES THE RCRS PROCESS AIR FLOW TO MAINTAIN PROPER CABIN PPCO2 AND RELATIVE HUMIDITY.

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SUBSYSTEM: ARS - COOLING
LRU :REGENERABLE CO2 REMOVAL SYSTEM
ITEM NAME: VALVE, MANUAL

CRITICALITY OF THIS FAILURE MODE:2/2

■ 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:
POTENTIAL SYSTEM CONTAMINATION DUE TO PROCESSING OF UNFILTERED AIR (FILTER IS UPSTREAM OF VALVE). POSSIBLE LOSS OF USE OF THE RCRS.

■ (B) INTERFACING SUBSYSTEM(S):
LOSS OF USE OF THE RCRS WILL RESULT IN HIGH CABIN PPCO2. POSSIBLE REDUCED COOLING AIR FLOW THROUGH FLIGHT DECK AVIONICS LRU'S.

■ (C) MISSION:
POSSIBLE EARLY MISSION TERMINATION. DECISION BASED ON MAGNITUDE OF

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LEAK.

■ (D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT. EARLY MISSION TERMINATION WILL PRECLUDE LOSS OF CREW OR VEHICLE.

■ (E) FUNCTIONAL CRITICALITY EFFECTS:
N/A

- DISPOSITION RATIONALE -

■ (A) DESIGN:
THE VALVE IS A MANUALLY ACTUATED ALUMINUM BUTTERFLY VALVE. VALVE HAS TWO FLOW POSITION SETTINGS WITH A POSITIVE LOCK NUT TO ELIMINATE ANY POTENTIAL VALVE MOVEMENT. HOUSING IS CONSTRUCTED FROM MACHINED ALUMINUM STOCK.

■ (B) TEST:
QUALIFICATION TEST FOR 100 MISSIONS:
VALVE IS QUAL TESTED WHILE IS INSTALLED AT THE RCRS ASSEMBLY LEVEL. RANDOM VIBRATION INCREASING AT PLUS 6 db/oct FROM 20 TO 45 HZ; CONSTANT AT 0.003 g2/HZ FROM 45 TO 1000 HZ; DECREASING AT MINUS 6 db/oct FROM 1000 TO 2000 HZ FOR 48 MINUTES PER AXIS IN THREE ORTHOGONAL AXES.
ACCEPTANCE TEST:
PROOF PRESSURE TESTED AT 0.5 PSID INTERNALLY APPLIED, WITH THE BUTTERFLY FULLY OPEN, WITHOUT PERMANENT DEFORMATION OR DEGRADING THE PERFORMANCE. FLOW TEST IS PERFORMED DURING ACCEPTANCE TESTING TO VERIFY NO FLOW RESTRICTION. VALVE WAS CYCLED FOR 300 TIMES TO VERIFY THE DESIGN IS CAPABLE OF MEETING LIFE REQUIREMENT.
OMRSD:
ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD AT SYSTEM LEVEL.

■ (C) INSPECTION:
RECEIVING INSPECTION
INCOMING PART/MATERIAL IDENTIFICATION AND CERTIFICATION VERIFIED BY INSPECTION. VALVE ATP VERIFIED AT VENDOR BY H. S. SOURCE INSPECTION.

CONTAMINATION CONTROL
CONTAMINATION CONTROL PROCESSES AND CLEAN AREAS VERIFIED BY INSPECTION. VALVE CLEAN REQUIREMENTS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
DIMENSIONAL VERIFICATION PERFORMED AT VENDOR BY INSPECTION. POSITIVE LOCK-NUT POSITION VERIFICATION BY INSPECTION. ASSEMBLY AND INSTALLATION VERIFIED BY INSPECTION.

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CRITICAL PROCESSES
TORQUE OPERATIONS VERIFIED TO H. S. REQUIREMENTS.

TESTING
FUNCTIONAL PERFORMANCE VERIFIED AT THE RCRS ASSEMBLY ATP WHICH IS WITNESSED BY INSPECTION. VENDOR ATP INCLUDES PROOF, EXTERNAL LEAKAGE, DECAY, FLOW AND OPERATING TORQUE TESTING. TEST IS VERIFIED BY H. S. SOURCE INSPECTION. VIBRATION TEST OF ORIGINAL DEVELOPMENT TEST UNIT AS A DETAIL OF THE RCRS ASSEMBLY VERIFIED BY INSPECTION DURING QUALIFICATION.

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

■ (D) FAILURE HISTORY:
NO FAILURE HISTORY IS AVAILABLE - NEW HARDWARE.

■ (E) OPERATIONAL USE:
SHUTDOWN THE RCRS AND INSTALL NEW LIOH CANISTERS IF CO2 REMOVAL IS NOT ADEQUATE. THE LIOH SUPPLY IS ADEQUATE FOR 3 DAYS.

- APPROVALS -

RELIABILITY MANAGER	: T. J. EAVENSON	: K.L. Preston for 6/30/92
DESIGN ENGINEERING	: P. J. CHEN	:
QUALITY ENGINEERING	: E. OCHOA	: for K.L. Preston for T.J. Eavenson 6/30/92
NASA RELIABILITY	:	: 9/8/92
NASA SUBSYSTEM MANAGER	:	: 9/9/92
NASA QUALITY ASSURANCE	:	: 9-21-92
		8/24/92