SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ATMOSPHERIC REVIT. FMEA NO 06-1B -0340 -2 REV:08/11/83

ASSEMBLY :CO2 ABS & TEMP CONTROL
P/N RI :MC621-0008-0412
P/N VENDOR:SV755503 HAM STD
QUANTITY :1
:ONE PER SUBSYSTEM
:

CRIT. FUNC: 2
CRIT. HDW: 2

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X
PHASE(S):	PL LO X	X DO	LS

REDUNDANCY SCREEN: A- B- C-

PREPARED BY:	APPROVED BY:	APPROVED BY (NASA):
DES N. K. DUONG	DES	SSM
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ITEM:
CO2 ABSORBER & TEMP CONTROLLER ASSEMBLY

FUNCTION:
HOLDS TWO CO2 ABSORBER ELEMENTS WHICH REMOVE CO2, ODORS AND TRACE CONTAMINANTS FROM THE CABIN AIR. EACH ELEMENT IS ON-LINE FOR A PREDETERMINED TIME BASED ON CREW SIZE. A TEMPERATURE CONTROL VALVE CAN BE LINKED TO EITHER OF TWO ACTUATORS WHICH CONNECT TO THE CONTROLLER. THIS VALVE BYPASSES AIR FLOW AROUND THE CABIN HEAT EXCHANGER TO PROVIDE CONTROL OF CABIN AIR TEMPERATURE.

FAILURE MODE:
EXTERNAL LEAKAGE

CAUSE(S):
MECHANICAL SHOCK, VIBRATION, CORROSION, SEAL MATERIAL DEGRADATION

EFFECT(S) ON:
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE

(A) DECREASE IN CABIN FAN DELTA PRESSURE. REDUCED AIR CIRCULATION.

(B) REDUCED AIR FLOW RESULTS IN INCREASED CABIN TEMP, CO2 PARTIAL PRESSURE AND HUMIDITY. INCREASED CABIN TEMPERATURE WILL EVENTUALLY DEGRADE AVIONICS COOLING CAPABILITY AND RESULT IN INCREASED TEMPERATURE OF FLIGHT DECK AVIONICS LRU'S.

(C) POSSIBLE EARLY MISSION TERMINATION FOR SIGNIFICANT DECREASE OF AVIONICS COOLING.

(D) NO EFFECT. EARLY MISSION TERMINATION WILL PRECLUDE LOSS OF CREW/VEHICLE.

DISPOSITION & RATIONALE:
(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE

(A) DESIGN
ASSEMBLY IS CONSTRUCTED OF 6061-T6 ALUMINUM WELDED TOGETHER EXCEPT THE TEMPERATURE CONTROL VALVE PLATE WHICH IS BOLTED TO THE MAIN HOUSING ASSEMBLY. A FOAM SEAL IS USED AROUND THE PLATE PERIMETER TO PREVENT AIR LEAKAGE. TWO LITHIUM HYDROXIDE (LIOH) CANISTER CONTAINERS ARE MADE OF

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ALUMINUM WELDED TO THE MAIN HOUSING OF THE ASSEMBLY. EACH CONTAINER H/
A LID WITH A QUICK RELEASE/LOCK HANDLE HINGED ON THE SIDE OF THE CANIS
HOUSING. A VITON O-RING SEAL IS USED AROUND THE PERIMETER OF THE LID T
PREVENT AIR FLOW LEAKAGE. THE OPERATING PRESSURE WITHIN THE ASSEMBLY
LOW, SUCH THAT THE OCCURRENCE OF GROSS EXTERNAL LEAKAGE RESULTING IN L
OF AVIONICS COOLING CAPABILITY IS CONSIDERED REMOTE.

(B) TEST

ACCEPTANCE TEST - LEAK TEST VERIFIES EXTERNAL LEAKAGE OF LESS THAN 0.2
LB/MIN GN2 WITH DELTA-P OF 5.0 INH2O, AND INTERNAL LEAKAGE OF BYPASS
VALVE OF 0.12 LB/MIN MAX AT 0.8 IN H2O. PROOF PRESSURE TESTED AT 7.5
8.90 INH2O WITH NO PERMANENT DEFORMATION.

QUALIFICATION TEST - RANDOM VIBRATION SPECTRUM OF 20 TO 150 HZ INCREAS
AT 6 DB/OCTAVE TO 0.03 G**2/HZ, CONSTANT AT 0.03 G**2/HZ FROM 150 TO
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. ATP PERFORMED TO VERI
LEAKAGE AFTER SHOCK AND VIBRATION TESTING.

IN-VEHICLE TESTING - CABIN FAN DELTA-P IS MONITORED CONTINUOUSLY WHEN
VEHICLE IS POWERED UP.

OMRSD - CABIN FAN DELTA-P IS MONITORED CONTINUOUSLY WHEN THE VEHICLE
POWERED UP AND SERVES AS AN INDICATION OF EXTERNAL LEAKAGE. CABIN
PERFORMANCE IS VERIFIED IN FLIGHT AND EVERY TURNAROUND.

(C) INSPECTION

RECEIVING INSPECTION
INCOMING PARTS ARE VERIFIED FOR MATERIAL AND PROCESS CERTIFICATION.

CONTAMINATION CONTROL
PRODUCT CLEANLINESS IS MAINTAINED TO LEVEL 300 PER REQUIREMENT. EXTER
AND INTERNAL SURFACE CLEANLINESS IS VERIFIED PER M.S. REQUIREMENTS.

ASSEMBLY/INSTALLATION
PRODUCTS ARE VISUALLY EXAMINED BEFORE ACCEPTANCE TEST. TORQUE APPLIED
TIGHTEN NUTS IS VERIFIED. SLOTTED WASHERS BONDED WITH WET EPOXY IS
VERIFIED BY INSPECTION. ALIGNMENT BETWEEN HOLES IN THE ARM AND LINK A
CHECKED TO PROPERLY INSTALL QUICK RELEASE PINS. LEAK TEST IS VERIFIED
PER M.S. REQUIREMENT.

CRITICAL PROCESSES
ADHESIVE BONDING OF PARTS IS VERIFIED BY INSPECTION. WELDING IS VERIF
BY INSPECTION.

TESTING
ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING
PACKAGING FOR SHIPMENT IS VERIFIED BY INSPECTION.

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(D) FAILURE HISTORY
NO FAILURE HISTORY APPLICABLE TO EXTERNAL LEAKAGE FAILURE MODE. THE CO ABSORBER ASSEMBLY HAS SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH TH DURATION OF THE SHUTTLE PROGRAM.

(E) OPERATIONAL USE
1. CREW ACTION
FAN PERFORMANCE DEGRADATION TROUBLESHOOTING WITH MALFUNCTION PROCEDURES AND APPLICABLE POWERDOWN.
2. TRAINING
CURRENT ECLSS TRAINING COVERS THE EFFECT OF THIS FAILURE INCLUDING HIGH CONCENTRATION OF CO2 AND THE POWERDOWN FOR LOSS OF AIR FLOW TO THE FLIGHT DECK AVIONICS.

3. OPERATIONAL CONSIDERATIONS
NONE.