FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 06-1B-0331-X

SUBSYSTEM NAME: ARS - COOLING

REVISION : 3 08/10/90

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	CABIN FAN AND DEBRIS TRAP HAMILTON STANDARD	MC621-0008-0311 SV755508
LRU	:	COVER, ACCESS	SV766406-1

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

QUANTITY OF LIKE ITEMS: 1

FUNCTION:
ACCESS COVER, CABIN FAN DEBRIS TRAP

ALLOW ACCESS TO THE CABIN FAN INLET DEBRIS TRAP FOR IN-FLIGHT CLEANING.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 06-1B-0331-01

REVISION# 3 08/10/90 R

SUBSYSTEM: ARS - COOLING
LRU :CABIN FAN AND DEBRIS TRAP
ITEM NAME: COVER, ACCESS

CRITICALITY OF THIS FAILURE MODE:2/2

FAILURE MODE:
INABILITY TO OPEN

MISSION PHASE:
OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 103 DISCOVERY
: 104 ATLANTIS
: 105 ENDEAVOUR

CAUSE:
PHYSICAL BINDING/JAMMING, MALFUNCTION OF FASTENERS, VIBRATION, MECHANICAL SHOCK

■ 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:
LOSS OF ACCESS TO THE CABIN FAN DEBRIS TRAP FOR CLEANING.

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT.

(C) MISSION:
POSSIBLE EARLY MISSION TERMINATION IF BLOCKAGE OF DEBRIS TRAP INCREASES THE SYSTEM DELTA P BEYOND THE SYSTEM ALLOWABLE LIMIT.

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1609

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECTS:

- DISPOSITION RATIONALE -

(A) DESIGN:
THE ACCESS DOOR IS 6061-T6 ALUMINUM HINGE MOUNTED AND HELD CLOSED BY TWO SILVER PLATED INTERNALLY THREADED A286 STAINLESS STEEL STUDS MATING WITH TWO 302 STAINLESS STEEL BOLTS. THE SILVER PLATING PROVIDES PROTECTION AGAINST GALLING AND BINDING OF THE THREADS. FLIGHT HISTORY INDICATES THAT THE FILTER DID NOT NEED TO BE CLEANED DURING FLIGHT.

(B) TEST:
QUALIFICATION TEST - THE ACCESS DOOR WAS CERTIFIED BY SIMILARITY TO THE QUALIFICATION UNIT WHICH USED A DIFFERENT RETAINING SCREW DESIGN. THE DOOR ASSEMBLY WAS TESTED TOGETHER WITH THE CABIN FAN PACKAGE FOR SHOCK AND VIBRATION:
FAN PACKAGE ASSEMBLY SUBJECTED TO RANDOM VIBRATION SPECTRUM ENVELOPE OF 20 TO 150 HZ INCREASING AT 6 DB/OCTAVE TO 0.09 G**2/HZ AT 150 HZ, CONSTANT AT 0.09 G**2/HZ FROM 150 TO 900 HZ, DECREASING AT 9 DB/OCTAVE FROM 900-2000 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. SALT SPRAY TEST WITH SOLUTION OF FIVE PARTS OF SALT BY WEIGHT AND 80% RH FOR 120 HOURS, CYCLED BETWEEN 60 AND 120F.

OMRSD - DEBRIS SCREENS ARE CLEANED EACH TURNAROUND. OBTAINING ACCESS TO THE CABIN FAN DEBRIS TRAP VERIFIES DOOR FUNCTION.

(C) INSPECTION:
RECEIVING INSPECTION
INCOMING MATERIALS ARE VERIFIED FOR MATERIAL AND PROPERTY CERTIFICATION. HEAT TREATMENT OF RAW MATERIAL IS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
PART CLEANLINESS IS MAINTAINED AND VERIFIED TO MS 1550. PARTS ARE CHECKED TO ENSURE THEY ARE FREE FROM DEBRIS AND CONTAMINATION.

ASSEMBLY/INSTALLATION
SURFACE ROUGHNESS FINISH IS VERIFIED BY INSPECTION. PARTS ARE DIMENSIONALLY INSPECTED IN ACCORDANCE WITH DRAWING SPECIFICATION. MANDATORY INSPECTION POINTS ARE INCLUDED IN MANUFACTURING PROCESS.

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NUMBER: 06-1B-0331-01

TORQUE APPLICATION ON ACCESS COVER IS VERIFIED PER DRAWING SPEC.

CRITICAL PROCESSES
SILVER PLATING IS VERIFIED BY INSPECTION.

TESTING
ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING
PACKAGING FOR STORAGE AND SHIPMENT IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:
NO FAILURE-HISTORY APPLICABLE TO INABILITY TO OPEN FAILURE MODE. THE ACCESS COVER HAS SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH THE DURATION OF THE SHUTTLE PROGRAM.

(E) OPERATIONAL USE:
NONE.

- APPROVALS -

RELIABILITY ENGINEERING	D. R. RISING	R.T	
DESIGN ENGINEERING	N. K. DUONG		
QUALITY ENGINEERING	D. R. STOICA	DRS	
NASA RELIABILITY		GRB	10/22/90
NASA SUBSYSTEM MANAGER			10-22-90
NASA QUALITY ASSURANCE			