

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ATMOSPHERIC REVIT. PMAA NO 06-1B -0304 -1 REV: 08/11/85

ASSEMBLY : FAN & DEBRIS TRAP CRIT. FUNC: LR  
P/N RI : MC621-0008-0311 CRIT. HDW: 2  
P/N VENDOR: SV755546 HAM STL VEHICLE 102 103 104  
QUANTITY : 2 EFFECTIVITY: X X X  
: ONE IN EACH OF TWO FAN PHASE(S): PL LO X OO X DO X LS  
: FLOW PATHS

PREPARED BY: DES N. K. DUONG APPROVED BY: [Signature] REDUNDANCY SCREEN: A-PASS B-N/A C-PASS  
REL N. L. STEISSLINGER [Signature] APPROVED BY (NASA): [Signature]  
QE D. STOICA [Signature] SSN [Signature]  
[Signature] REL [Signature]  
[Signature] QE [Signature]

ITEM:  
CHECK VALVE - FAN OUTLET

FUNCTION:  
TWO VALVES, ONE EACH IN THE FLOW PATH OF EACH CABIN AIR CIRCULATION FAN TO PERMIT FLOW THROUGH AN OPERATING FAN AND PREVENT BACK-FLOW THROUGH NON-OPERATING FAN.

FAILURE MODE:  
CLOSED

CAUSE(S):  
PHYSICAL BINDING/JAMMING, CONTAMINATION

EFFECT(S) ON:  
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE  
(A) LOSS OF REDUNDANCY - AIR FLOW IS BLOCKED THROUGH ONE OF TWO CABIN FAN FLOW PATHS.  
(B) NO EFFECT.  
(C) POSSIBLE EARLY MISSION TERMINATION FOR FIRST FAILURE.  
(D) NO EFFECT.  
(E) FUNCTIONAL CRITICALITY EFFECT - FAILURE IN THE ACTIVE FLOW PATH WILL CAUSE LOSS OF ALL AIR FLOW. POTENTIAL LOSS OF CREW/VEHICLE DUE TO LOSS OF FLIGHT DECK AVIONICS COOLING. SCREEN B IS N/A BECAUSE CHECK VALVE IS IN STANDBY UNTIL ACTIVATION OF REDONDANT FLOW PATH.

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

(A) DESIGN  
VALVE HOUSING IS CONSTRUCTED OF ALUMINUM WITH STAINLESS STEEL BIFILER SPRING AND FIBERGLASS FLAPPERS. THE CHECK VALVE IS NORMALLY CLOSED UNCE NO FLOW CONDITIONS IN ANY ATTITUDE. MULTIVANE FLAPPER, DUAL STAINLESS STEEL SPRING LOADED CLOSED, UPSTREAM 40/70 MICROM FILTER, FLAPPER HINGES AND MOUNTS DRILLED AT ASSEMBLY, FLAPPER MATERIAL - GLASS REINFORCED

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SUBSYSTEM :ATMOSPHERIC REVIT. FMEA NO 06-1B -0104 -1 REV:08/12/

POLYMER, METALLIC PARTS - SCREW. DESIGN OPERATING LIFE OF THE CHECK VALVE IS A MINIMUM OF 10,000 CYCLES. DESIGN INTERNAL LEAKAGE IN THE REVERSE FLOW DIRECTION IS 0.01 LB/MIN MAX AT 70 DEG F AND 12 INCHES OF WATER DELTA PRESSURE.

(B) DESIGN

ACCEPTANCE TEST - EXAMINATION OF PRODUCT, CHECK VALVE LEAKAGE TESTED AT 10 INH<sub>2</sub>O GN<sub>2</sub> PRESSURE, TOTAL LEAKAGE 0.1 LB/MIN MAX.

QUALIFICATION TEST - CHECK VALVES ARE SUBJECTED TO THE FOLLOWING AS PART OF THE CABIN FAN ASSEMBLY - VIBRATION SPECTRUM OF 20 TO 150 HZ INCREASES AT 6 DB/OCTAVE TO 0.09 G\*\*2/HZ, CONSTANT AT 0.09 G\*\*2/HZ FROM 150 TO 500 HZ, DECREASING AT 9 DB/OCTAVE FROM 500 TO 2000 HZ FOR 48 MIN/AXIS IN 3 ORTHOGONAL AXES. SHOCK - THREE TERMINAL SAWTOOTH PULSES OF 20G PEAK AMPLITUDE AND 11 MS DURATION APPLIED IN BOTH DIRECTIONS ALONG EACH OF THREE ORTHOGONAL AXES. TEMPERATURE/HUMIDITY TESTS AT 100% HUMIDITY AND TEMPERATURE CYCLED BETWEEN 60 AND 120F FOR 120 HOURS.

IN-VEHICLE TESTING - CABIN FAN DELTA-P WOULD INDICATE A BLOCKAGE IN THE FLOW PATH WHEN THE FAN WITH THE FAILED CLOSED CHECK VALVE IS TURNED ON.

OMRSD - VALVES ARE CYCLED EACH TIME THE CABIN FANS ARE TURNED ON AND OFF IN SUPPORT OF VEHICLE COOLING. PERFORMANCE OF THE CABIN FANS IS VERIFIED DURING EACH TURNAROUND. CABIN FAN DELTA-P IS CONTINUOUSLY MONITORED AND SERVES AS AN INDICATION OF VALVE FAILURE. ALSO VERIFIED AS A CONTINGENCY UPON LRU REPLACEMENT.

(C) INSPECTION

RECEIVING INSPECTION

INCOMING PARTS ARE VISUALLY INSPECTED FOR MATERIAL AND PROCESS CERTIFICATION.

CONTAMINATION CONTROL

PART CLEANLINESS IS MAINTAINED AND VERIFIED TO H.S. REQUIREMENTS.

ASSEMBLY/INSTALLATION

TORQUE APPLICATION IS VERIFIED BY INSPECTION PER H.S. PROCEDURES. EPOXY IS APPLIED TO SHAFT POSTS PROVIDING A REDUNDANT LOCKING INSURANCE ON ALIGNMENT OF CENTER LINE OF SHAFT HOLES IN POST IS CHECKED. PROOF PRESSURE TEST OF THE OUTLET HEADER AND CHECK VALVES ARE VERIFIED BY INSPECTION. INSPECTION VERIFIES LEAK TEST PER REQUIREMENT.

CRITICAL PROCESSES

ANODIZING IS VERIFIED BY INSPECTION.

TESTING

ATP TEST IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PACKAGING PROCEDURES AND REQUIREMENT FOR SHIPMENT IS VERIFIED BY INSPECTION.

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(D) FAILURE HISTORY

NO FAILURE HISTORY APPLICABLE TO CLOSED FAILURE MODE. THE FAN CHECK VALVE HAS SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH THE DURATION OF THE SHUTTLE PROGRAM.

(E) OPERATIONAL USE  
TBS.