

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ATMOSPHERIC REVIT. FMEA NO 06-1B -0427 -1 REV: 08/12/85

ASSEMBLY : IMU COOLING CRIT. FUNC: 1R
P/N RI : MC621-0008-0016 CRIT. HDW: 2
P/N VENDOR: SV766402

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

QUANTITY : 3
: ONE PER FLOW PATH

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REDUNDANCY SCREEN: A-PASS B-N/A C-PASS

APPROVED BY: *[Signature]*
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ITEM: -
CHECK VALVE, IMU AIR FLOW

FUNCTION:
PROVIDES AN OPEN FLOW PATH THROUGH AN OPERATING IMU FAN AND BLOCKS BACK FLOW THROUGH NON-OPERATING FAN(S). THERE ARE THREE FLOW PATHS WITH ONE CHECK VALVE PER PATH.

FAILURE MODE:
OPEN

CAUSE(S):
MECHANICAL SHOCK, VIBRATION, CORROSION, CONTAMINATION, PHYSICAL BINDING/JAMMING

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

(A) BACK FLOW CANNOT BE PREVENTED BY THIS CHECK VALVE. FLOW OF OTHER FANS IS REDUCED TO APPROXIMATELY 90 LBS/HR BECAUSE OF "SHORT-CIRCUITED" AIR FLOW.

(B) ELEVATED IMU TEMPERATURE UNTIL NORMAL AIR FLOW IS RESTORED.

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

(D) POTENTIAL LOSS OF CREW/VEHICLE DUE TO LOSS OF IMU'S IF ADEQUATE IMU COOLING CANNOT BE MAINTAINED. SECOND ASSOCIATED FAILURE, LOSS OF ONE OF THE TWO REMAINING FAN FLOW PATHS, WILL CAUSE SIGNIFICANT DECREASE OF IMU COOLING RESULTING IN POSSIBLE LOSS OF CREW/VEHICLE. SCREEN B IS N/A BECAUSE REDUNDANT FANS/CHECK VALVES ARE IN STANDBY UNTIL REQUIRED.

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

(A) DESIGN
THE CHECK VALVE CONSISTS OF A HOUSING WITH TWO SPRING LOADED FLAPPER VALVES EFFECTIVELY MASS BALANCED AROUND A PIVOT. THE FLAPPER SPRING IS

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REDUNDANT SO THAT THE CHECK VALVE FUNCTIONS WITH THE FAILURE OF ANY SINGLE SPRING ELEMENT.

(B) TEST

ACCEPTANCE TEST - THERE IS NO SPECIFIC ATP FOR THE CHECK VALVE. ATP OF THE IMU FAN PACKAGE INCLUDES CHECK VALVE PERFORMANCE.

QUALIFICATION TEST - THE CHECK VALVE WAS QUALIFIED TOGETHER WITH THE IMU FAN PACKAGE:

RANDOM VIBRATION SPECTRUM OF 20 TO 150 HZ INCREASING AT 6 DB/OCTAVE TO 0.03 G**2/HZ, CONSTANT AT 0.03 G**2/HZ FROM 150 TO 1000 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 VERIFY LEAKAGE AFTER SHOCK AND VIBRATION TESTING.

IN-VEHICLE TESTING - IMU FAN DELTA-P IS MONITORED WHILE THE IMU'S ARE POWERED UP.

OMRSD - VALVES ARE CYCLED FOR PROPER OPERATION WHEN IMU'S ARE TURNED ON AND OFF IN SUPPORT OF IMU TESTING EVERY TURNAROUND. IMU FAN DELTA-P IS MONITORED AND SERVES AS AN INDICATION OF VALVE FAILURE.

(C) INSPECTION

RECEIVING INSPECTION

INCOMING MATERIALS ARE VERIFIED FOR MATERIAL AND PROCESS CERTIFICATION.

CONTAMINATION CONTROL

CLEANLINESS IS MAINTAINED AND VERIFIED PER REQUIREMENTS.

ASSEMBLY/INSTALLATION

DIMENSIONS AND SURFACE FINISHES ARE VERIFIED BY INSPECTION PER DRAWING SPEC. MACHINED PARTS ARE VISUALLY INSPECTED UNDER 20X MAGNIFICATION. MANDATORY INSPECTION POINTS ARE INCLUDED IN ASSEMBLY PROCESS.

NONDESTRUCTIVE EVALUATION

LEAK TEST IS VERIFIED BY INSPECTION.

CRITICAL PROCESSES

ALODINE PROCESS IS VERIFIED BY INSPECTION.

TESTING

ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PACKAGING PROCEDURES AND REQUIREMENTS FOR SHIPMENT IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

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

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(E) OPERATIONAL USE
TBS.