

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0220 -3 REV:08/26/8
 ASSEMBLY : FREON THERMAL LOOP CRIT. FUNC: 2
 P/N RI : MC250-0001-0270 CRIT. HDW: 2
 P/N VENDOR: SV729792-2 VEHICLE 102 103 104
 QUANTITY : 2 EFFECTIVITY: X X X
 : TWO, ONE PER LOOP PHASE(S): FL LO OO X DO LS
 :

REUNDANCY SCREEN: A- B- C-
 PREPARED BY: DES O. TRAN *O. Tran* APPROVED BY: DES *Richard James Miller* APPROVED BY (NASA):
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ITEM:
 VALVE MODULE, FLOW PROPORTIONAL.

FUNCTION:
 THE VALVE MODULE PROPORTIONS THE FLOW OF FREON TO THE PAYLOAD HEAT EXCHANGER AND THE WATER/FREON INTERCHANGER.

FAILURE MODE:
 FAILS TO OPERATE, FAILS IN INTERCHANGER POSITION.

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

EFFECT(S) ON:
 (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
 (A) LOSS OF FLOW OF ONE FREON COOLANT LOOP TO PAYLOAD HEAT EXCHANGER.
 (B) UNABLE TO PROVIDE SUFFICIENT COOLING TO PAYLOAD.
 (C) POSSIBLE LOSS OF MISSION OBJECTIVE.
 (D) NO EFFECT.

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

(A) DESIGN
 THE VALVE CONSISTS OF A STAINLESS STEEL HOUSING, SPOOL AND TWO POSITION ELECTRIC ACTUATOR. THE CLEARANCE BETWEEN THE SPOOL AND HOUSING IS 0.001 INCH. THE SPOOL IS CONNECTED TO THE ACTUATOR WITH A SPLINED SHAFT TO AVOID ANY PHYSICAL JAMMING/BINDING. THERE ARE 8 DIFFERENT SIZED ORIFICES ON THE SPOOL WALL. THE SMALLEST IS 0.062 INCH. 25 MICRON ABSOLUTE FILTERS AT THE INLET AND OUTLET OF THE VALVE PROTECT AGAINST CONTAMINATION. MATERIALS USED ARE CORROSION RESISTANT AND COMPATIBLE WITH FREON 21. ACTUATOR GEAR TEETH ARE LUBRICATED WITH GREASE PER MIL-G-21164.

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(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 2.0 G²/HZ FOR 84 MIN/AXIS, SHOCK TESTED AT +/- 20 G EACH AXIS. THE VALVE WAS CYCLED 1000 TIMES WITH NO FAILURES OF THIS TYPE.

ACCEPTANCE TEST - ATP VERIFIES PERFORMANCE, CLEANLINESS LEVEL AND PROPE FLOW.

OMRSD - VALVE OPERATION IS VERIFIED PRIOR TO EACH FLIGHT. VEHICLE FREQ IS SERVICED THROUGH A 10 MICRON (ABS) GSE FILTER.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL AND PURCHASED COMPONENTS REQUIREMENTS ARE VERIFIED BY RECEIVING INSPECTION. COATING AND PLATING MATERIALS AND PROCESSES ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

FORMAL CONTAMINATION CONTROL PLAN IS VERIFIED BY INSPECTION. CONTAMINATION CONTROL PROCESSES AND CLEAN AREAS ARE VERIFIED BY INSPECTION. CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION SYSTEM FLUID SAMPLES ARE PERIODICALLY ANALYZED FOR CONTAMINATION AND VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

PARTS PROTECTION, MANUFACTURING PROCESSES, INSTALLATION AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION ON SHOP TRAVELERS. MEASUREMENT STANDARDS AND TEST EQUIPMENT IMPLEMENTATION PER REQUIREMENTS OF MIL SPECIFICATIONS ARE VERIFIED BY INSPECTION. TORQUE CERTIFICATION IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

LEAK TEST IS VERIFIED BY INSPECTION.

TESTING

FUNCTIONAL TEST IS MONITORED BY INSPECTION TO VERIFY FLOWRATE IS WITHIN SPECIFIED LIMITS.

HANDLING/PACKAGING

HANDLING, PACKAGING, AND STORAGE REQUIREMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY.

(E) OPERATIONAL USE

NO IMPACT ON CREW/VEHICLE. POSSIBLE LOSS OF MISSION OBJECTIVES/PAYLOAD WHICH REQUIRES ORBITER COOLING. IF APPLICABLE, A NEW EXPERIMENT TIMELIN WOULD BE MADE TO MINIMIZE COOLING REQUIREMENTS.