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PRINT DATE: 11/78

SHUTTLE CRITICAL ITEMS LIST - ORBITER

NUMBER: 06-182-0518-03

REVISION: 11/07/88

SUBSYSTEM: ARS - COOLING

LRU : PRI COOL PUMP AND ACCUM

ITEM NAME: VALVE, WATER BYPASS CONTROL

CRITICALITY OF THIS

FAILURE MODE: 1R2

FAILURE MODE:  
EXTERNAL LEAKAGE

MISSION PHASE:

LO            LIFT-OFF  
CO            ON-ORBIT  
DO            DE-ORBIT

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

CAUSE:  
MECHANICAL SHOCK, VIBRATION, CORROSION, MATERIAL DEFECT, SEAL MATERIAL  
DEGRADATION

CRITICALITY 1/1 DURING ANY MISSION PHASE OR ABORT? N

REUNDANCY SCREEN A) PASS

B) PASS

C) PASS

A)

B)

C)

- FAILURE EFFECTS -

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**(A) SUBSYSTEM:**

LOSS OF REDUNDANCY - LOSS OF ONE WATER COOLANT LOOP.

**(B) INTERFACING SUBSYSTEM(S):**

LOSS OF COOLING OF AFFECTED WATER COOLANT LOOP. FREE WATER IN CABIN.

**(C) MISSION:**

POSSIBLE EARLY MISSION TERMINATION DUE TO LOSS OF ONE WATER COOLANT LOOP.

**(D) CREW, VEHICLE, AND ELEMENT(S):**

POTENTIAL LOSS OF CREW/VEHICLE UPON SUBSEQUENT LOSS OF REDUNDANT WATER COOLANT LOOP.

**RATIONALE FOR CRITICALITY:**-----  
- DISPOSITION RATIONALE -  
-----**(A) DESIGN:**

ACTUATOR OPERATED TWO-WAY DIVERTER VALVE WITH A CYLINDRICAL VALVE ELEMENT. HAS REDUNDANT DYNAMIC SEALS USED TO PREVENT WATER LEAKAGE TO AMBIENT. VALVE MATERIAL IS CORROSION AND HEAT RESISTANT STEEL SAE 30347 CONDITION A AND SEALS ARE VITON.

**(B) TEST:**

ACCEPTANCE TEST - PROOF PRESSURE TESTED AT 135 PSID. EXTERNAL LEAKAGE TEST - 0.01 CC/HR WATER MAX AT 90 PSIG.

QUALIFICATION TEST - BURST PRESSURE 180 PSID. COLLAPSE PRESSURE 22.5 PSID. PROOF PRESSURE 135 PSID. LEAKAGE - 0.01 CC/HR WATER MAX AT 90 PSIG. VIBRATION, SHOCK AND ACCELERATION DONE WITH THE PUMP PACKAGE: 1168 OPEN/CLOSE CYCLES VS 500 CYCLES FOR MISSION REQUIREMENT. SUBJECTED TO RANDOM VIBRATION SPECTRUM ENVELOPE 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.

IN-VEHICLE TESTING - SYSTEM DECAY TEST IS PERFORMED AT 85 - 95 PSIG, 8 CC/MIN MAX LEAKAGE. PUMP OUT PRESSURE AND ACCUMULATOR QUANTITY ARE CONTINUOUSLY MONITORED WHEN THE VEHICLE IS POWERED UP AND SERVE AS AN

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INDICATION OF EXTERNAL LEAKAGE.

OMRSD - PUMP ACCUMULATOR QUANTITY AND OUTLET PRESSURE ARE CONTINUOUSLY MONITORED WHILE THE VEHICLE IS POWERED UP DURING EACH TURNAROUND, AND SERVE AS AN INDICATION OF EXTERNAL LEAKAGE. WATER IS SAMPLED PER SPEC SE-5-0073 DURING SERVICING.

**(C) INSPECTION:**

**RECEIVING INSPECTION**

INCOMING PARTS ARE VERIFIED FOR MATERIALS AND PROCESS CERTIFICATION. RECEIVING LOG IS MAINTAINED FOR VERIFICATION.

**CONTAMINATION CONTROL**

CLEANLINESS REQUIREMENTS VERIFIED BY INSPECTION. CORROSION PROTECTION IS VERIFIED BY INSPECTION. CORROSION PROTECTION PROVISIONS ARE CHECKED.

**ASSEMBLY/INSTALLATION**

ORIENTATION OF CONNECTOR MASTER KEYWAY IS DETERMINED AND VERIFIED BY INSPECTION. TORQUE APPLIED TO MOUNTING SCREWS IS CHECKED PER DRAWING REQUIREMENT. BOTH COMPONENTS AND ASSEMBLY ARE INSPECTED VISUALLY. SUPER KOROPOW TREATED SURFACE OVERCOATED WITH POLYURETHANE IS VERIFIED BY INSPECTION.

**NONDESTRUCTIVE EVALUATION**

LEAK TEST IS VERIFIED BY INSPECTION.

**CRITICAL PROCESSES**

WELD OF THE FILTER HOUSING TO PUMP INLET FLANGES IS VERIFIED. TUBE WELD IS CHECKED TO VERIFY ITS INTEGRITY DURING ASSEMBLY. COMPONENT HEAT TREATMENT IS VERIFIED BY INSPECTION.

**TESTING**

ATP IS VERIFIED BY INSPECTION.

**HANDLING/PACKAGING**

PACKAGING FOR SHIPMENT IS VERIFIED BY INSPECTION.

**(D) FAILURE HISTORY:**

NO FAILURE HISTORY APPLICABLE TO EXTERNAL LEAKAGE FAILURE MODE. THE CONTROL VALVE HAS SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH THE DURATION OF THE SHUTTLE PROGRAM.

**(E) OPERATIONAL USE:**

TBS.

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- APPROVALS -  
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NUMBER: 06-1B2-0536-03

RELIABILITY ENGINEERING: N. L. STEISSLINGER: <sup>783</sup>

DESIGN ENGINEERING : N. K. DUONG <sup>W/S</sup>

QUALITY ENGINEERING : D. R. STOICA <sup>W/S</sup>

NASA RELIABILITY :

NASA DESIGN :

NASA QUALITY ASSURANCE :

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