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PRINT DATE: 02/17

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B2-0543-X

SUBSYSTEM NAME: ARS - COOLING

REVISION : 0 02/17/89 W

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	PRI COOL PUMP AND ACCUM HAMILTON STANDARD	MC621-0008-0455 SV755509
LRU :	SEC COOL PUMP AND ACCUM HAMILTON STANDARD	MC621-0008-0456 SV755509
SRU :	ACCUMULATOR	SV755538-5

QUANTITY OF LIKE ITEMS: 2

DESCRIPTION/FUNCTION:

MAINTAINS POSITIVE PRESSURE AT PUMP INLET AND COMPENSATES FOR THERMAL EXPANSION AND CONTRACTION OF WATER BY MEANS OF EXPANSION AND CONTRACTION OF A GN2 LOADED BELLOWS.

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PRINT DATE: 11/07/88

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B2-0543-01

REVISION: 11/07/88

SUBSYSTEM: ARS - COOLING
LRU :PRI COOL PUMP AND ACCUM
ITEM NAME: ACCUMULATOR

CRITICALITY OF THIS
FAILURE MODE:LR2

FAILURE MODE:
EXTERNAL LEAKAGE, GN2 PRECHARGE

MISSION PHASE:

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

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

CAUSE:
MECHANICAL SHOCK, VIBRATION, CORROSION, MATERIAL DEFECT

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

REDUNDANCY SCREEN A) PASS

B) PASS

C) PASS

A)

B)

C)

- FAILURE EFFECTS -

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B2-0543-01

(A) SUBSYSTEM:

REDUCED POSITIVE SUCTION HEAD DOWN TO CABIN PRESSURE. PUMP MAY CAVITATE DUE TO LOW INLET PRESSURE, RESULTING IN LOSS OF ONE WATER COOLANT LOOP.

(B) INTERFACING SUBSYSTEM(S):

NO EFFECT. REDUNDANT LOOP WILL PROVIDE COOLING.

(C) MISSION:

POSSIBLE EARLY MISSION TERMINATION FOR LOSS OF ONE WATER COOLANT LOOP.

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

SECOND ASSOCIATED FAILURE (FAILURE IN REDUNDANT WATER COOLANT LOOP) CAUSES LOSS OF ALL WATER COOLING, AND MAY RESULT IN LOSS OF CREW/VEHICLE.

RATIONALE FOR CRITICALITY:

- DISPOSITION RATIONALE -

(A) DESIGN:

BELLOWS ARE MADE OF INCONEL 718 AND THE HOUSING IS MADE OF 6061-T6 ALUMINUM. THE DESIGN PRECLUDES THE WETTING OF BIMETAL JOINTS, PREVENTING GALVANIC CORROSION. THE BELLOWS IS DESIGNED TO WITHSTAND 65 PSID PROOF PRESSURE LIQUID TO GAS, 33 PSID GAS TO LIQUID. THE TANK IS DESIGNED TO WITHSTAND A BURST PRESSURE OF 180 PSID.

(B) TEST:

ACCEPTANCE TEST - PROOF PRESSURE 135 PSID. MAXIMUM ALLOWABLE LEAKAGE OF 0.28 SCC/HR N2 AT 90 PSID FROM THE GAS CAVITY. LEAKAGE OF 0.01 SCC/HR N2 FROM BELLOWS AT 20 PSID.

QUALIFICATION TEST - PROOF PRESSURE 135 PSID. BURST PRESSURE 180 PSID ON TANK. BURST OF 2 TIMES GAS PRESSURE ON BELLOWS. LEAKAGE OF 0.28 SCC/HR N2 AT 90 PSID FROM THE CAVITY. LEAKAGE OF 0.01 SCC/HR OF N2 ON BELLOWS AT 20 PSID. 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.

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IN-VEHICLE TESTING - WCL PUMP PRESSURES ARE MONITORED CONTINUOUSLY WHEN THE VEHICLE IS POWERED UP.

OMRSD - WCL PUMP PRESSURES ARE MONITORED CONTINUOUSLY WHEN THE VEHICLE IS POWERED UP DURING EACH TURNAROUND AND WILL DETECT FAILURE OF ACCUMULATOR. WATER IS SAMPLED PER SPEC SE-S-0073 DURING SERVICING.

(C) INSPECTION:

RECEIVING INSPECTION

INCOMING PARTS ARE VERIFIED FOR MATERIALS AND PROCESS CERTIFICATION.

CONTAMINATION CONTROL

ASSEMBLY IS VERIFIED TO CLEANLINESS LEVEL 300 PER SPECIFICATION. CORROSION PROTECTION PROVISIONS ARE CHECKED.

ASSEMBLY/INSTALLATION

DIMENSIONS AND SURFACE FINISHES VERIFIED BY INSPECTION. APPLICATION OF SUPER KOROPON AND POLYURETHANE TO ACCUMULATOR AND SENSOR, VERIFIED BY INSPECTION. PROOF PRESSURE TEST IS VERIFIED.

NONDESTRUCTIVE EVALUATION

INTERNAL METAL BELLOWS ARE RADIOGRAPHICALLY INSPECTED TO ENSURE THE PARTS ARE FREE FROM DAMAGE. HELIUM LEAK DETECTION IS VERIFIED PER SPECIFICATION.

CRITICAL PROCESSES

ELECTRICAL BONDING IS VERIFIED BY INSPECTION. WELDS ARE VERIFIED BY INSPECTION.

TESTING

ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:

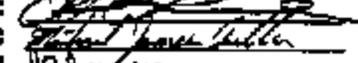
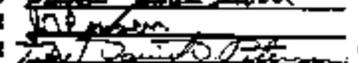
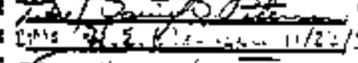
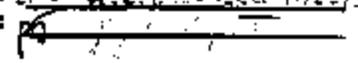
NO FAILURE HISTORY APPLICABLE TO EXTERNAL LEAKAGE, GN2 PRECHARGE FAILURE MODE. THE ACCUMULATOR HAS SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH THE DURATION OF THE SHUTTLE PROGRAM.

(E) OPERATIONAL USE:

TRB.

- APPROVALS -

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B2-0543-01

RELIABILITY ENGINEERING:	N. L. STEISLINGER:	<i>788</i>	
DESIGN ENGINEERING :	N. K. DUONG <i>ky</i> :		
QUALITY ENGINEERING :	D. R. STOICA <i>AS</i> :		
NASA RELIABILITY :	:		
NASA DESIGN :	:		
NASA QUALITY ASSURANCE :	:		

4/17/82