PRINT DATE: 02/17/89

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B3-0570-X

SUBSYSTEM NAME: ARS - COOLING

REVISION : 0 02/17/89 W

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	LINES, BULKHEAD PENETRATION	MC271-0085-0022
LRU	:	LINES, BULKHEAD PENETRATION	MC271-0085-0023
LRU	:	LINES, BULKHEAD PENETRATION	MC271-0085-1022
LRU	:	LINES, BULKHEAD PENETRATION	MC271-0085-1023

QUANTITY OF LIKE ITEMS: 4
TWO PER COOLANT LOOP
FOUR PER SUBSYSTEM

DESCRIPTION/FUNCTION:
FLEX LINE ASSEMBLIES

PROVIDE FLEXIBILITY IN THE CREW MODULE/MID FUSELAGE WATER COOLANT LOOP MATING INSTALLATION.

5 PRINT DATE: 02/17/8

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-1B3-0570-02

REVISION: 0 02/17/89 W

SUBSYSTEM: ARS - COOLING
LRU LINES, BULKHEAD PENETRATION CRITICALITY OF THIS
ITEM NAME: LINES, BULKHEAD PENETRATION FAILURE MODE:1R2

FAILURE MODE:
RESTRICTED FLOW

MISSION PHASE:
LO LIFT-OFF
OO ON-ORBIT
DO DE-ORBIT

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

CAUSE:
CONTAMINATION, CORROSION, KINKING, MECHANICAL SHOCK

CRITICALITY 1/1 DURING INTACT ABORT ONLY? N

REDUNDANCY SCREEN A) PASS
B) N/A
C) PASS

PASS/FAIL RATIONALE:
A)

B)
SCREEN B IS N/A BECAUSE REDUNDANT LOOP IS IN STANDBY UNTIL REQUIRED.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
REDUCED OR LOST COOLING CAPABILITY 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 FOR CABIN AND AVIONICS COOLING.

(D) CREW, VEHICLE, AND ELEMENT(S):
POTENTIAL LOSS OF CREW/VEHICLE UPON SUBSEQUENT LOSS OF REDUNDANT WATE

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COOLANT LOOP.

(E) FUNCTIONAL CRITICALITY EFFECTS

- DISPOSITION RATIONALE -

(A) DESIGN:
HOSES HAVE A CONVOLUTED CORROSION RESISTANT STEEL (321 CRES) INNER LINER WITH 5/8 INCH O.D. AND 0.030 INCH WALL THICKNESS. EXTERNAL 321 CRES WIRE BRAID SUPPORTS INNER HOSE. DESIGNED TO WITHSTAND 800 FLEXURE CYCLES.

(B) TEST:
ACCEPTANCE TEST - PROOF PRESSURE TESTED TO 180 PSIG. LEAKAGE, PRESSURE DROP AND LENGTH VARIATION TESTED.

QUALIFICATION TEST/CERTIFICATION - PROOF PRESSURE TEST FOR >180 PSI AND BURST PRESSURE BY SIMILARITY TO OXYGEN FLEXLINES WHICH ARE GOOD FOR 5200 PSIG. RANDOM VIBRATION TEST - 20 TO 150 HZ INCREASING AT 6 DB/OCTAVE TO 0.09 G**2/HZ, CONSTANT AT 0.09 G**2/HZ FROM 150 TO 900 HZ, DECREASING AT 9 DB/OCTAVE FROM 900 TO 2000 HZ FOR 48 MINUTES PER AXIS IN THREE ORTHOGONAL AXES. LIFE FLEXURE TEST FOR 800 CYCLES. HUMIDITY CERTIFIED BY SIMILARITY IN CONSTRUCTION TO THE AFT BULKHEAD PENETRATION LINES FROM 0 TO 100% RELATIVE HUMIDITY. SAND AND DUST CERTIFIED BY TEST PER MIL-STD-810, METHOD 510 FOR A DURATION OF 28 HOURS. SALT FOG CERTIFIED BY TEST PER MIL-STD-810, METHOD 509 PROCEDURE I FOR A DURATION OF 48 HOURS. FLUID COMPATIBILITY - CERTIFIED BY SIMILARITY TO THE APOLLO/SKYLAB BULKHEAD PENETRATION LINES. TEMPERATURE - CERTIFIED TO TEMPERATURES FROM -65 TO 250 F BY TEST. THE LINES ARE NOT SENSITIVE TO PRESSURE CYCLING.

IN-VEHICLE TESTING - PUMP CHECKS ARE PERFORMED AND PUMP OUT PRESSURE IS CONTINUOUSLY MONITORED WHEN THE VEHICLE IS POWERED UP; SERVES AS AN INDICATION OF BLOCKAGE IN THE LOOP.

OMRSD - PUMP OUTLET PRESSURE IS CONTINUOUSLY MONITORED WHEN THE VEHICLE IS POWERED UP DURING EACH TURNAROUND AND SERVES AS AN INDICATION OF BLOCKAGE IN THE LOOP. WATER IS SAMPLED PER SPEC SE-S-0073 DURING SERVICING.

(C) INSPECTION:
RECEIVING INSPECTION
INCOMING PARTS ARE VERIFIED FOR MATERIAL AND PROCESS CERTIFICATION. RECEIVING RECORDS ARE MAINTAINED FOR VERIFICATION.

CONTAMINATION CONTROL
CLEANLINESS IS MAINTAINED AND VERIFIED BY INSPECTION. CORROSION

PROTECTION IS VERIFIED PER DRAWING REQUIREMENT.

ASSEMBLY/INSTALLATION
SURFACE FINISH AND DIMENSIONS ARE VERIFIED BY INSPECTION. PROOF PRESSURE TEST WITH NITROGEN IS VERIFIED. INSPECTION POINTS ARE INCLUDED IN ASSEMBLY PROCEDURE.

NONDESTRUCTIVE EVALUATION
HELIUM LEAK TEST IS VERIFIED BY INSPECTION. DYE PENETRANT AND RADIOGRAPHIC INSPECTION ARE VERIFIED.

CRITICAL PROCESSES
TIG WELD ON ALL JOINTS ARE VERIFIED BY INSPECTION PER REQUIREMENT. PARTS PASSIVATION AND ELECTRO POLISHED EXTERNAL SURFACE ARE VERIFIED. INSPECTION VERIFIES ELECTRO-ETCHED MARKING PER REQUIREMENT. HEAT TREATMENT OF DYNATUBE FITTING IS VERIFIED.

TESTING
ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING
PACKAGING FOR SHIPMENT IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:
NO FAILURE HISTORY APPLICABLE TO RESTRICTED FLOW FAILURE MODE. THE FLEX LINES HAVE SUCCESSFULLY PERFORMED WITHOUT FAILURE THROUGH THE DURATION OF THE SHUTTLE PROGRAM.

(E) OPERATIONAL USE:
TBS.

- APPROVALS -

RELIABILITY ENGINEERING	N. L. STEISSLINGER	
DESIGN ENGINEERING	N. K. DUONG	
QUALITY ENGINEERING	D. R. STOICA	
NASA RELIABILITY		
NASA SUBSYSTEM MANAGER		
NASA QUALITY ASSURANCE		