SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3D -0504 -1 REV: 03/09/83

ASSEMBLY :RADIATOR & FLOW CONTROL
P/N RI :MC203-0002-0050
P/N VENDOR:224-00050
QUANTITY :2
:TWO, ONE PER LOOP
:

CRIT. FUNC: 1R
CRIT. HDW: 2

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

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
DES	O. TRAN	DES	SSM
REL	D. RISING	REL	REL
QE	W. SMITH	QE	QE

ITEM:
VALVE, BYPASS, RADIATOR.

FUNCTION:
PROVIDES COMPLETE BYPASS OF RADIATORS FOR UNDER TEMPERATURE PROTECTION O THE FREON COOLANT LOOPS TO PREVENT THE FREEZING OF THE CABIN WATER COOLANT LOOPS.

FAILURE MODE:
MECHANICALLY JAMMED IN THE RADIATOR FLOW POSITION.

CAUSE(S):
VIBRATION, MECHANICAL SHOCK, CORROSION, CONTAMINATION.

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

(A) LOSS OF RADIATOR BYPASS OPERATION ON ONE LOOP.

(B) LOSS OF UNDER TEMPERATURE PROTECTION FOR ONE LOOP.

(C) LOSS OF PARTIAL RADIATOR COLD SOAK CAN SHORTEN VEHICLE POSTLANDING COOLING CAPABILITY WHICH MAY REQUIRE EARLY VEHICLE POWERDOWN AND RESULT IN POSSIBLE LOSS OF PAYLOAD COOLING.

(D) SECOND ASSOCIATED FAILURE (LOSS OF RADIATOR FLOW CONTROL VALVE) CAN FREEZE THE INTERCHANGER AND RESULT IN RUPTURE OF WATER AND FREON COOLANT LOOPS. LOSS OF ALL VEHICLE COOLING WILL CAUSE LOSS OF CREW/VEHICLE. REDUNDANCY SCREEN 'B' FAILS BECAUSE FAILURE IS NOT DETECTABLE UNTIL VAL IS REQUIRED TO BE CLOSED, WHICH MAY NOT ALLOW SUFFICIENT TIME FOR OTHER CORRECTIVE ACTION.

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

(A) DESIGN
WELDED CONSTRUCTION WITH BELLOWS FOR DYNAMIC SEALS. THE FLOW CONTROL ASSEMBLY IS MOUNTED ON VIBRATION ISOLATORS. VALVE HOUSING AND SEAT ARE MADE OF STAINLESS STEEL, WHICH IS COMPATIBLE WITH FREON 21. FREON IS

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SERVICED THROUGH A FINAL FILTER OF 25 MICRON SIZE AND THERE IS A 65 MICRON FILTER IN THE FLOW CONTROL ASSEMBLY.

(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 0.1 G^2/HZ FOR 48 MIN/AXIS, SHOCK TESTED AT +/- 20 G EACH AXIS, AND 3500 CYCLE VALVE LIFE TEST.

ACCEPTANCE TEST - VALVE FUNCTIONAL TEST IS PERFORMED DURING ATP. AVT I DONE AT COMPONENT LEVEL AND AT A HIGHER ASSEMBLY (FLOW CONTROL ASSEMBLY

OMRSD - FREON COOLANT LOOPS 1 AND 2 RADIATOR FLOW CONTROL CHECKOUT (MANUAL AND AUTO) DURING GROUND TURNAROUND. FREON CHEMICAL ANALYSIS PE SE-S-0073 DURING SERVICING.

(C) INSPECTION

RECEIVING INSPECTION
RAW MATERIAL CERTIFICATIONS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
CONTAMINATION CONTROL PROCESSES, CONTAMINATION CONTROL PLAN AND CORROSI PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION. FLUID SYSTEM IS VERIFIED BY INSPECTION TO BE FREE OF CONTAMINATION.

ASSEMBLY/INSTALLATION
MANUFACTURING, INSTALLATION AND ASSEMBLY ARE VERIFIED BY INSPECTION. CRITICAL DIMENSIONS AND SURFACE FINISHES VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
X-RAY EXAMINATION OF FUSION WELDS IS VERIFIED BY INSPECTION. ULTRASONI INSPECTION OF RAW MATERIAL VERIFIED. DYE PENETRANT EVALUATION OF MACHINED PARTS VERIFIED.

CRITICAL PROCESSES
PASSIVATION, HEAT TREATING, WELDING AND BRAZING ARE VERIFIED BY INSPECTION.

TESTING
VIBRATION, FLOW RATE AND PRESSURE DROP REQUIREMENTS ARE VERIFIED BY INSPECTION DURING ATP. LEAKAGE DURING PROOF PRESSURE AND HELIUM LEAK CHECK TESTS IS VERIFIED BY INSPECTION. INSULATION RESISTANCE AND DIELECTRIC STRENGTH TEST ARE VERIFIED BY INSPECTION DURING ATP.

HANDLING/PACKAGING
HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION. PARTS PROTECTION VERIFIED BY INSPECTION.

(D) FAILURE HISTORY
NO APPLICABLE FAILURE HISTORY.

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(E) OPERATIONAL USE
IF BYPASS VALVE FAILS TO CLOSE FOR RADIATOR UNDER TEMPERATURE CONDITION, THE EVAPORATOR OUTLET TEMPERATURE ALARM WILL INDICATE FAILURE. BOTH WATER COOLANT LOOPS WILL BE ACTIVATED AND AFFECTED FREON PUMP WILL BE TURNED OFF. IF THE RADIATOR FLOW CONTROL PROBLEM CANNOT BE CORRECTED, THEN CLOSE THE AFFECTED RADIATOR DOOR OR ORIENT THE VEHICLE TO WARM THE RADIATORS AND DEORBIT AT THE NEXT PRIMARY LANDING SITE.