

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3D -0508 -1 REV: 03/05/85

ASSEMBLY : RADIATOR & FLOW CONTROL CRIT. FUNC: 1R
P/N RI : MC203-0002-0050 CRIT. HDW: 3
P/N VENDOR: 224-00050 VEHICLE 102 103 104
QUANTITY : 4 EFFECTIVITY: X X X
PHASE(S): PL LO OO X DO X LS
: TWO PER LOOP
: ONE PER CONTROLLER

REDUNDANCY SCREEN: A-PASS B-FAIL C-PAS
PREPARED BY: DES O. TRAN DES APPROVED BY: APPROVED BY (NASA):
REL D. RISINGER REL SSM
QE W. SMITH QE

ITEM:
TEMPERATURE SENSOR, RADIATOR BYPASS

FUNCTION:
SENSES THE MIXED FREON COOLANT TEMPERATURE IMMEDIATELY DOWNSTREAM OF THE RADIATOR SUBSYSTEM. IT PROVIDES A SIGNAL TO THE RADIATOR BYPASS VALVE CONTROL CIRCUIT WHICH POSITIONS THE VALVE TO PREVENT UNDER TEMPERATURE CONDITION OF THE FREON COOLANT LOOPS TO PRECLUDE FREEZING OF THE CABIN WATER COOLANT LOOPS.

FAILURE MODE:
SHORTED, HOT TEMPERATURE INDICATION.

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

EFFECT(S) ON:
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
(A, B) LOSS OF ONE REDUNDANT AUTO UNDER TEMPERATURE PROTECTION FOR ONE LOOP.
(C, D) NO EFFECT.
(E) FUNCTIONAL CRITICALITY EFFECT - LOSS OF ALL RADIATOR UNDER TEMPERATURE CONTROL/PROTECTION (REDUNDANT TEMPERATURE SENSOR AND CONTROLLER, FLOW CONTROL VALVE, AND MANUAL CONTROL OF THE BYPASS 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 THE SENSOR CAN NOT BE MONITORED BY CREW OR GROUND.

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

(A) DESIGN
THE THERMISTOR PROBE ASSEMBLY IS AN ENVIRONMENTALLY SEALED ASSEMBLY AND CONTAINS TWO INDEPENDENT SENSING ELEMENTS (DUAL BEADS). THE THERMISTOR

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PROBE CASE IS MADE OF STAINLESS STEEL WHICH IS COMPATIBLE WITH FREON 22. THE PROBE ASSEMBLY IS INSTALLED WITHIN A THERMOWELL IN THE FLOW CONTROL ASSEMBLY.

(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 0.07 G²/HZ FOR 48 MIN/AXIS AND SHOCK TESTED AT +/- 20 G/AXIS.

OMRSD - RADIATOR FLOW CONTROL FAULT DETECTION CIRCUITRY CHECKOUT DURING TURNAROUND.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL CERTIFICATIONS ARE VERIFIED BY INSPECTION. PARTS PROTECTION VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

CONTAMINATION CONTROL PROCESSES AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION. CLEANLINESS TO LEVEL 300 IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

MANUFACTURING, INSTALLATION AND ASSEMBLY OPERATIONS ARE VERIFIED BY SMC TRAVELER MIPS. MATERIAL AND EQUIPMENT CONFORMANCE TO CONTRACT REQUIREMENTS ARE VERIFIED BY INSPECTION. PROCESSING EQUIPMENT CONTROLS ARE VERIFIED BY INSPECTION. CRITICAL DIMENSIONS ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

X-RAY AND PENETRANT INSPECTIONS OF WELDS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

WELDING IS VERIFIED BY INSPECTION.

TESTING

ACCEPTANCE TEST PROCEDURE IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

PROPERLY MONITORED HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO APPLICABLE FAILURE HISTORY.

(E) OPERATIONAL USE

FIRST FAILURE IS NOT DETECTABLE, REDUNDANT ELECTRICAL CIRCUIT WILL CONTROL THE BYPASS VALVE FOR NORMAL OPERATION. NO CREW ACTION REQUIRED.