

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0215 -2 REV:08/25/81
ASSEMBLY : FREON THERMAL LOOP CRIT. FUNC: 13
P/N RI : V070-634X0X CRIT. HDW: :
P/N VENDOR: VEHICLE 102 103 104
QUANTITY : 9 EFFECTIVITY: X X X
: NINE PHASE(S): PL LO X OO X DO X LS
:

REDUNDANCY SCREEN: A-PASS B-PASS C-PAS:
PREPARED BY: APPROVED BY: APPROVED BY (NASA):
DES C. TRAN *C. TRAN* DES *[Signature]* SSM *[Signature]*
REL D. RISING *D. RISING* REL *[Signature]* REL *[Signature]*
QE W. SMITH *W. SMITH* QE *[Signature]* QE *[Signature]*

ITEM:
COLDPLATES, MIDBODY.

FUNCTION:
REMOVES WASTE HEAT FROM AVIONICS EQUIPMENT LOCATED ON THE COLDPLATES.
MPD AND PCA V070-634101 (3 REQUIRED)
CRYO HEATER MCA AND MCA V070-634102 (1 REQUIRED)
DBLA, MCA, CRYO HEATER V070-634103 (2 REQUIRED)
MDM, CRYO HEATER MCA V070-634104 (1 REQUIRED)
FLOODLIGHT V070-634105 (2 REQUIRED)

FAILURE MODE:
INTERNAL LEAKAGE, FREON TO FREON.

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

EFFECT(S) ON:
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
(A) TRANSFER OF COOLANT FROM ONE LOOP TO THE OTHER UNTIL PRESSURE IN BOTH LOOPS IS EQUALIZED.
(B) NO EFFECT.
(C) POSSIBLE LOSS OF MISSION. EARLY MISSION TERMINATION FOR FIRST FAILURE.
(D) SECOND ASSOCIATED FAILURE (EXTERNAL LEAKAGE OF EITHER FREON COOLANT LOOP) WILL CAUSE LOSS OF ALL VEHICLE COOLING AND MAY RESULT IN LOSS OF CREW/VEHICLE.

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

(A) DESIGN
STANDARD PIN-PIN DESIGN CONFIGURATION. THE COLDPLATES ARE MADE OF ANODIZED ALUMINUM, WHICH IS CORROSION RESISTANT AND COMPATIBLE WITH FREON 21. PROOF PRESSURE OF 1.5 AND BURST PRESSURE OF 2.0 TIMES MAXIMUM OPERATING PRESSURE.

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(B) TEST

QUALIFICATION TESTS - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 0.023 G²/HZ FOR 84 MIN/AXIS. SHOCK TESTED AT +/- 2 G EACH AXIS. QUALIFIED BY SIMILARITY TO COLDPLATES IN APOLLO. DESIGN BURST PRESSURE IS 1280 PSIG. SIMILAR APOLLO COLDPLATES TESTED FAILED AT 1590, 1700, 1440, AND 2190 PSIG.

ACCEPTANCE TESTS - COLDPLATE ACCEPTANCE TEST FOR LEAKAGE. COLDPLATE FLUSH AND SAMPLE FOR CLEANLINESS AFTER ASSEMBLY.

OMRSD - PCL'S LEAK CHECKED PRIOR TO EACH FLIGHT. FREON CHEMICAL ANALYSIS PER SE-S-0073 DURING SERVICING.

(C) INSPECTION

RECEIVING INSPECTION

COMPONENTS MANUFACTURED TO DRAWING AND APPLICABLE SPECIFICATION ARE VERIFIED BY INSPECTION. RAW MATERIAL AND PROCESS CERTIFICATIONS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

HARDWARE CLEANLINESS PER REQUIREMENTS IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

INSTALLATION AND ASSEMBLY ARE VERIFIED BY INSPECTION. INSPECTION FOR DAMAGE VERIFIED BY INSPECTION.

CRITICAL PROCESSES

BRAZING IS VERIFIED BY INSPECTION. ETCHING IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

PENETRANT INSPECTION OF ANY DINGS OR IMPRESSIONS IS VERIFIED BY INSPECTION

TESTING

PROOF TEST IS VERIFIED BY INSPECTION. LEAK TEST IS VERIFIED BY INSPECTION. FUNCTIONAL TEST MONITORED FOR FLOWRATE. SYSTEM FLUIDS SAMPLED AND ANALYZED FOR CONTAMINATION AND VERIFIED BY INSPECTION.

HANDLING/PACKAGING

HANDLING AND PACKAGING REQUIREMENTS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

NO FAILURE HISTORY.

(E) OPERATIONAL USE

GROUND CONTROLLER WILL IDENTIFY HARDWARE FAILURE. PUMP INLET PRESSURE CONVERGE AND ACCUMULATOR QUANTITIES DIVERGE. BOTH LOOPS WILL OPERATE NORMALLY. A LEAK IN EITHER LOOP WILL CAUSE LOSS OF BOTH LOOPS. THEREFORE IT IS TREATED AS LOSS OF ONE FREON LOOP. ENTRY AT NEXT PRIMARY LANDING SITE.