

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0215 -1 REV: 03/09/86

ASSEMBLY : FREON THERMAL LOOP CRIT. FUNC: 1
P/N RI : V070-634101/2/3/4/5 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-FAIL C-PAS
PREPARED BY: APPROVED BY: APPROVED BY (NASA):
DES O. TRAN *cat* DES *[Signature]* SSM *[Signature]* 4/1/87
REL D. RISING *cat* REL *[Signature]*
QE 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) 2
CRYO HEATER MCA AND MJCA V070-634102 (1 REQUIRED)
DBIA, MCA, CRYO HEATER V070-634103 (2 REQUIRED)
MDM, CRYO HEATER MCA V070-634104 (1 REQUIRED)
FLOODLIGHT V070-634105 (2 REQUIRED)

FAILURE MODE:
RESTRICTED FLOW.

CAUSE(S):
CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL DAMAGE.

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

- (A) LOSS OF ONE REDUNDANT PATH FOR COOLING OF ONE SET OF MIDBODY COLDPLATES.
- (B) NO EFFECT. REDUNDANT COOLANT LOOP CAN PROVIDE THE REQUIRED COOLING FOR AVIONICS.
- (C) NO EFFECT.
- (D) SECOND ASSOCIATED FAILURE (LOSS OF REDUNDANT FREON COOLANT LOOP FLOW THROUGH COLDPLATES) WILL CAUSE LOSS OF MIDBODY AVIONICS AND MAY LEAD TO LOSS OF CREW/VEHICLE. REDUNDANCY SCREEN 'B' FAILS BECAUSE RESTRICTED FLOW IN MIDBODY COLDPLATES CAN NOT BE DETECTED DURING FLIGHT BECAUSE IT PARALLEL FLOW PATHS HAVE NO INSTRUMENTATION FOR FLOWRATE.

DISPOSITION & RATIONALE:

- (A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE
- (A) DESIGN
STANDARD PIN-FIN DESIGN CONFIGURATION. FILTRATION PROVISIONS TO MINIMIZE CONTAMINATION - 25 AND 61 MICRON FILTERS ARE LOCATED UPSTREAM OF THE

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COLDPLATES WITH 120 MICRON SIZE FLOW PATHS. THE COLDPLATES ARE MADE OF ALUMINUM, WHICH IS COMPATIBLE WITH FREON 21.

(B) TEST

QUALIFICATION TESTS - QUALIFICATION TESTED FOR 100 MISSION LIFE. QUALIFIED BY SIMILARITY TO COLDPLATES IN APOLLO.

ACCEPTANCE TESTS - COLDPLATE ACCEPTANCE TEST INCLUDES PRESSURE DROP TEST. COLDPLATE FLUSH AND SAMPLE FOR CLEANLINESS AFTER ASSEMBLY.

OMRSD - NO CURRENT TEST REQUIREMENT. A PERIODIC TEST WILL BE ADDED FOR MEASURING THE TEMPERATURE DIFFERENTIAL BETWEEN LOOPS TO DETECT RESTRICTED FLOW. 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

(CAR AB7200) OV-102 COLDPLATES EXPERIENCED SILTING PROBLEMS. THE COLDPLATES SHOWED EVIDENCE OF CONTAMINATION WITH HYDRATED ALUMINUM OXIDE ALL COLDPLATES SINCE OV-102 HAVE BEEN MANUFACTURED AND CONTROLLED TO NEW REQUIREMENTS PER MPP107M310M01(REV E), WHICH INCLUDE CAREFUL CLEANING OF COLDPLATE COMPONENTS WITHIN 24 HOURS BEFORE BRAZING AND THEN BRAZING COLDPLATES IN A VACUUM.

(E) OPERATIONAL USE

FAILURE IS NOT DETECTABLE IN FLIGHT - NO CREW ACTION REQUIRED.