

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0230 -1 REV:08/29/83

ASSEMBLY : FREON THERMAL LOOP CRIT. FUNC: 15
 P/N RI : V070-615124-0005 CRIT. HDW: 1
 P/N RI : V070-63510X VEHICLE 102 103 104
 P/N VENDOR: EFFECTIVITY: X X X
 QUANTITY : 17 PHASE(S): PL LC X OC X DO X LS
 : SEVENTEEN/VEHICLE

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

PREPARED BY: DES O. TRAN *O.T.* APPROVED BY: *[Signature]* APPROVED BY (NASA): *[Signature]*
 REL D. RISING *DR* REL *[Signature]*
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ITEM:
 COLDPLATES, RGA AND AFT.

FUNCTION:
 REMOVES WASTE HEAT FROM THE RATE GYRO ASSEMBLIES (RGA) AND AFT AVIONICS EQUIPMENT. THE COLDPLATES ARE LOCATED IN PARALLEL NETWORK IN THE MIDBODY AND IN THREE AFT AVIONICS BAYS.

RGA	V070-615124 (4 REQUIRED)
DBIA, RJDA, ASA, DSC	V070-635101 (2 REQUIRED)
MDM, MEC, MDM	V070-635102 (2 REQUIRED)
APU, ATVC, MEA, EIU	V070-635103 (3 REQUIRED)
LCA, PCA, PCA	V070-635104 (3 REQUIRED)
UP, DSC, ASA, PTS, DBIA	V070-635105 (1 REQUIRED)
UP, ASA, DSC, MDM	V070-635106 (1 REQUIRED)
MDM, ATVC, MDM	V070-635107 (1 REQUIRED)
RJDA, ASA, MDM	V070-635108 (1 REQUIRED)

FAILURE MODE:
 RESTRICTED FLOW.

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

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

(A) LOSS OF ONE REDUNDANT FREON FLOW PATH IN ONE COLDPLATE AND REDUCED FREON FLOW THROUGH AFT AND RGA COLDPLATE NETWORK.

(B) REDUCED AFT AND RGA AVIONICS COOLING DUE TO REDUCED FREON FLOW IN ONE LOOP.

(C) POSSIBLE LOSS OF MISSION. EARLY MISSION TERMINATION FOR FIRST FAILURE.

(D) SECOND ASSOCIATED FAILURE (LOSS OF REDUNDANT FREON COOLANT LOOP WILL RESULT IN LOSS OF COOLING TO RGA'S AND AFT AVIONICS AND MAY CAUSE LOSS OF CREW/VEHICLE.

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DISPOSITION & RATIONALE

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A) DESIGN

STANDARD PIN-PIN DESIGN WITH MULTIPLE 120 MICRON SIZE FLOW PATHS. FILTRATION PROVISIONS IN SYSTEM TO MINIMIZE CONTAMINATION INCLUDE 25 AND 61 MICRON FILTERS AT THE PUMP INLET. COLDPLATES ARE MADE OF ALUMINUM, WHICH IS CORROSION RESISTANT AND COMPATIBLE WITH FREON 21.

(B) TEST

QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 0.023 G²/HZ FOR 84 MIN/AXIS FOR THE RGA COLDPLATES AND 48 MIN/AXIS FOR THE AFT COLDPLATES. SHOCK TESTED AT +/- 20G IN EACH AXIS. QUALIFIED BY SIMILARITY TO APOLLO PROGRAM COLDPLATES.

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

OMRSD - RGA'S AND AFT COLDPLATE NETWORK FLOWRATES ARE VERIFIED PRIOR TO EACH FLIGHT. FLUID USE CONTROLLED TO SE-5-0073. FREON 21 IS SERVICED THROUGH A 10 MICRON FILTER.

(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.

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(D) FAILURE HIST BY

(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 MEET 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

ON-BOARD ALARM, COLDPLATE FLOW, WILL PROVIDE INDICATION OF HARDWARE FAILURE. LOSS OF COLDPLATE FLOW IS DEFINED AS A LOSS OF FREON COOLANT LOOP. ENTRY AT NEXT PRIMARY LANDING SITE.