

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTIVE THERMAL CONTROL FMEA NO 06-3C -0230 -2 REV:08/29/8

ASSEMBLY : FREON THERMAL LOOP CRIT. FUNC: 1R
 P/N RI : V070-615124-0005 CRIT. HDW: 2
 P/N RI : V070-63510X VEHICLE 102 103 104
 P/N VENDOR: EFFECTIVITY: X X X
 QUANTITY : 17 PHASE(S): PL LO X OO X DO X LS
 : SEVENTEEN/VEHICLE

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

ITEM:
 COLDPLATES, RGA AND APT.

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

RGA	V070-615124 (4 REQUIRED)
DBLA, RJDA, ASA, DSC	V070-635101 (1 REQUIRED)
MDM, MEC, NDM	V070-635102 (2 REQUIRED)
APG, ATVC, MEA, RTU	V070-635103 (3 REQUIRED)
LCA, PCA, PCA	V070-635104 (3 REQUIRED)
UP, DSC, ASA, PTS, DBLA	V070-635105 (1 REQUIRED)
UP, ASA, DSC, MDM	V070-635106 (1 REQUIRED)
MDM, ATVC, NDM	V070-635107 (1 REQUIRED)
RJDA, ASA, NDM	V070-635108 (1 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) THE TWO FREON COOLANT LOOPS BECOME INTERCONNECTED RESULTING IN 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) CAN CAUSE LOSS OF ALL VEHICLE COOLING AND MAY RESULT IN LOSS OF CREW/VEHICLE.

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DISPOSITION & RATIONALE:

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

(A) DESIGN

DESIGN SAFETY FACTOR - PROOF PRESSURE OF 1.5 AND BURST PRESSURE OF 2.0 TIMES MAXIMUM OPERATING PRESSURE. STANDARD PIN-FIN DESIGN CONFIGURATION. 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 APT COLDPLATES. SHOCK TESTED AT +/- 20G IN EACH AXIS. QUALIFIED BY SIMILARITY TO COLDPLATES IN APOLLO. DESIGN BURST PRESSURE IS 1280 PSIG. SIMILAR APOLLO COLDPLATES TESTED FAILED AT 1500, 1700, 1440, AND 2190 PSIG.

ACCEPTANCE TEST - COLDPLATE IS LEAK TESTED IN ATP. COLDPLATE FLUSH AND SAMPLE FOR CLEANLINESS AFTER ASSEMBLY.

OMRSD - FCL'S ARE LEAK CHECKED PRIOR TO EACH FLIGHT. FLUID USE CONTROLLED TO SZ-S-0073.

(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 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.