SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3C -0212 -3 REV: 03/09/88

ASSEMBLY :FREON THERMAL LOOP
P/N RI :MC276-0020-1233
P/N VENDOR:
QUANTITY :1
:TWO,ONE PER LOOP
:

CRIT. FUNC: 1R
CRIT. HDW: 3

VEHICLE EFFECTIVITY:	102 X	103 X	104 X
PHASE(S): PL	LO X	OO X	DO X LS

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

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
DES	O. TRAN	DES	SSM
REL	D. RISING	REL	REL
QE	W. SMITH	QE	QE

ITEM:
QUICK DISCONNECT/CAP, FREON SERVICING.

FUNCTION:
PROVIDES QUICK SELF SEALING CONNECTION FOR GROUND SERVICING AND SAMPLING A PRESSURE CAP IS INSTALLED AFTER SERVICING.

FAILURE MODE:
FAILS OPEN, INTERNAL LEAKAGE OF POPPET/CAP.

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

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

(A) LOSS OF ONE REDUNDANT SEAL.

(B,C,D) NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECT - SECOND ASSOCIATED FAILURE (LOSS OF REDUNDANT SEAL) CAN CAUSE LOSS OF ONE FREON COOLANT LOOP. THIRD FAILURE (LOSS OF REDUNDANT FREON COOLANT LOOP) WILL CAUSE LOSS OF ALL VEHICLE COOLING AND CREW/VEHICLE. REDUNDANCY SCREEN 'B' FAILS BECAUSE QD/POPPET INTERNAL LEAK IS UNDETECTABLE IN FLIGHT - PRESSURE CAP PROVIDES REDUNDANT SEAL. REDUNDANCY SCREEN 'A' FAILS BECAUSE PRESSURE CAP CAN NOT BE LEAK CHECKED AFTER INSTALLATION.

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

(A) DESIGN
ALL STAINLESS STEEL CONSTRUCTION WITH AN ETHYLENE PROPYLENE (EPR) O-RING SEAL AND A TEFLON BACKUP RING SEAL. CAP IS STAINLESS STEEL WITH EPR O-RING SEAL. POPPET IS SPRING LOADED CLOSED. CAP IS INSTALLED PREFLIGHT WHICH PROVIDES A BACKUP SEAL FOR POPPET. MATERIALS ARE COMPATIBLE WITH FREON 21.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3C -0212 -3 REV: 03/09/8

(B) TEST
QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 0.3 G^2/HZ FOR 52 MIN/AXIS, SHOCK TEST AT +/- 20 G EACH AXIS. DESIGN PROOF IS 480 PSIG AND UNIT DID NOT RUPTURE UNTIL 1280 PSI

ACCEPTANCE TEST - SPECIAL TOOLING IS USED IN ATP TO LEAK TEST PRESSURE CAP WHEN CONNECTED TO MAXIMUM AND MINIMUM CONNECTORS TO ASSURE PROPER F TO ALL QD'S. QD IS ACCEPTANCE LEAK TESTED WITH HELIUM.

OMRSD - LEAK CHECK OF QD AFTER GSE DEMATING AND PRIOR TO CAP INSTALLATION. VISUAL INSPECTION OF CAP, INCLUDING O-RING SEAL, PRIOR TO INSTALLATION. EXTERNAL HELIUM LEAK CHECK, PRESSURE DECAY TESTS, BUBBLE LEAK CHECK, QD/TP COUPLING AND CAP INSPECTION AND CHECKOUT. FREON CHEMICAL ANALYSIS PER SE-S-0073 DURING SERVICING.

(C) INSPECTION

RECEIVING INSPECTION
MATERIAL AND EQUIPMENT CONFORMANCE TO SPECIFICATION IS VERIFIED BY INSPECTION. RAW MATERIALS ARE SENT TO A TEST LAB FOR MATERIAL/CHEMICAL ANALYSIS/CERTIFICATION. SHOP TRAVELER INSPECTION IS PERFORMED FOR CORRECT RAW MATERIAL PRIOR TO MACHINING. IN-PROCESS INSPECTION IS REQUIRED FOR CRITICAL DIMENSIONS CERTIFICATIONS. PARTS PROTECTION VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
SYSTEM FLUID SAMPLE ANALYSIS FOR CONTAMINATION IS VERIFIED BY INSPECTION. CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION CONTAMINATION CONTROL IS VERIFIED BY INSPECTION ON SHOP TRAVELERS.

ASSEMBLY/INSTALLATION
MANUFACTURING, INSTALLATION, AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION. CRITICAL DIMENSIONS AND FINISH OF SEALING SURFACES ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES
HEAT TREATMENT IS VERIFIED BY INSPECTION. PASSIVATION IS VERIFIED BY INSPECTION.

TESTING
PROOF PRESSURE AND HELIUM LEAK TESTS ARE VERIFIED BY INSPECTION.

HANDLING/PACKAGING
PROPER HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY
(CAR AC2552, AB2840) TWO INSTANCES WHERE DEMATED QD'S LEAKED DUE TO SCRATCH ON POPPET; PERSONNEL ARE INSTRUCTED TO USE ONLY APPROVED TOOLS DURING QD INSTALLATION.

(CAR AB5643, AB5921) TWO INSTANCES OF A METAL SLIVER LODGED BETWEEN POPPET AND SEAL; IMPROVED ASSEMBLY PROCEDURES (CLEANING, WORKMANSHIP).

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3C -0212 -3 REV: 03/09/88

(E) OPERATIONAL USE
FIRST FAILURE IS NOT DETECTABLE IN FLIGHT. ON-BOARD ACCUMULATOR QUANTIT WILL PROVIDE INDICATION OF SECOND ASSOCIATED FAILURE. THE PUMP OF A LEAKING FREON LOOP WILL BE TURNED OFF PRIOR TO CAVITATION. PERFORM DEORBIT AT NEXT PRIMARY LANDING SITE FOR AN EXCESSIVE LEAK RATE OR LOSS OF ONE FREON COOLANT LOOP.