SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-3D-0502-X

SUBSYSTEM NAME: ATCS - RADIATORS AND FLOW CONTROL
REVISION : 10/19/88

CLASSIFICATION		NAME	PART NUMBER
LRU	:	FLOW CONTROL ASSY, RADIATOR	224-00050
LRU	:	FLOW CONTROL ASSY, RADIATOR	MC203-0002-0050

QUANTITY OF LIKE ITEMS: 2
TWO, ONE PER LOOP

DESCRIPTION/FUNCTION:
VALVE, RADIATOR FLOW CONTROL.

CONTROLS FREON COOLANT TEMPERATURE FROM THE RADIATOR PANEL ASSEMBLY. CONTROL IS ACCOMPLISHED BY MIXING HOT FREON WITH COLD RADIATOR FREON.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3D -0502 -2 REV:08/29/

ASSEMBLY :RADIATOR & FLOW CONTROL
P/N RI :MC203-0002-0050
P/N VENDOR:224-00050
QUANTITY :2
:TWO
:ONE PER LOOP

CRIT. FUNC: 1R
CRIT. HDW: 2

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X

PHASE(S): PL LO OO X DO X LS

REDUNDANCY SCREEN: A-PASS B-PASS 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:
VALVE, RADIATOR FLOW CONTROL.

FUNCTION:
CONTROLS FREON COOLANT TEMPERATURE FROM THE RADIATOR PANEL ASSEMBLY. CONTROL IS ACCOMPLISHED BY MIXING HOT FREON WITH COLD RADIATOR FREON.

FAILURE MODE:
FAILS IN FULL COLD POSITION, MECHANICAL JAMMING.

CAUSE(S):
MECHANICAL SHOCK, CONTAMINATION, VIBRATION, CORROSION, PHYSICAL BINDING/JAMMING.

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

(A) UNABLE TO PROVIDE TEMPERATURE CONTROL OF FREON FLOW THROUGH RADIATOR PANEL ASSEMBLY FOR ONE FREON COOLANT LOOP.

(B) LOSS OF RADIATOR HEAT REJECTION OF ONE FREON LOOP FOR VEHICLE COOLING.

(C) POSSIBLE LOSS OF MISSION DUE TO LOSS OF RADIATOR COOLING TO SUPPORT PAYLOAD OPERATIONS.

(D) SECOND ASSOCIATED FAILURE (LOSS OF RADIATOR BYPASS VALVE) CAN FREEZE THE WATER/FREON INTERCHANGER AND RESULT IN RUPTURE OF WATER AND FREON WATER COOLANT LOOPS. LOSS OF COOLING LOOPS CAN CAUSE LOSS OF ALL VEHICLE COOLING AND RESULT IN LOSS OF CREW/VEHICLE.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3D -0502 -2 REV:08/29/8

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

(A) DESIGN
THE RADIATOR FLOW CONTROL VALVE DESIGN CONSISTS OF A DOUBLE POPPET TYPE VALVE HEAD, EACH HEAD HAVING A TEFLON SEALING RING WHICH SEALS AGAINST A CHAMFER SEAT WITHIN THE VALVE BODY. THE VALVE SHAFT, WHICH IS CONNECTED TO THE MOTOR BY A BALL SCREW, RIDES ON TEFLON BUSHINGS AT EACH END TO MINIMIZE FRICTION FORCES. THE BALL SCREW IS LUBRICATED WITH VACUUM COMPATIBLE MOLYBDENUM DISULFIDE LUBRICANT TO PRECLUDE BINDING/JAMMING. ALL MATERIALS ARE STAINLESS STEEL, WHICH IS COMPATIBLE WITH FREON 21 AND CORROSION RESISTANT. THE FLOW CONTROL ASSEMBLY IS MOUNTED ON VIBRATION ISOLATORS. THERE IS A 65 MICRON FILTER IN THE FLOW CONTROL ASSEMBLY.

(B) TEST
QUALIFICATION TEST - FLOW CONTROL ASSEMBLY IS QUALIFIED FOR A 100 MISSION LIFE. VIBRATION TESTED AR 0.1 G^2/HZ FOR 48 MIN/AXIS AND SHOCK TESTED AT +/- 20 G/AXIS.

ACCEPTANCE TEST - VALVE FUNCTIONAL TEST IS PERFORMED DURING ATP. AVT IS DONE AT COMPONENT LEVEL AND AT A HIGHER ASSEMBLY LEVEL (FLOW CONTROL ASSEMBLY).

OMRSD - RADIATOR FLOW CONTROLLER CHECKOUT (MANUAL AND AUTO) EVERY FIVE FLIGHTS. RADIATOR FLOW CONTROL VALVE OPERATION VERIFIED PRIOR TO EACH FLIGHT. FREON CHEMICAL ANALYSIS PER SE-S-0073 DURING SERVICING. FREON IS SERVICED THROUGH A FINAL FILTER OF 25 MICRON SIZE.

(C) INSPECTION

RECEIVING INSPECTION
RAW MATERIAL CERTIFICATIONS ARE VERIFIED BY INSPECTION. PART PROTECTION IS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
CONTAMINATION CONTROL PROCESSES, CONTAMINATION CONTROL PLAN AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION. FLUID SYSTEM IS VERIFIED BY INSPECTION TO BE FREE OF CONTAMINATION.

ASSEMBLY/INSTALLATION
MANUFACTURING, INSTALLATION AND ASSEMBLY ARE VERIFIED BY INSPECTION FOR CRITICAL DIMENSIONS.

CRITICAL PROCESSES
WELDING IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
X-RAY EXAMINATION OF FUSION WELDS IS VERIFIED BY INSPECTION.

TESTING
VIBRATION, FLOW RATE AND PRESSURE DROP REQUIREMENTS ARE VERIFIED BY INSPECTION DURING ATP. INSPECTION VERIFIES TORQUE TEST ON VALVE WHILE UNIT UNDER PRESSURE.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3D -0502 -2 REV:08/29/

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

(D) FAILURE HISTORY
NO FAILURE HISTORY.

(E) OPERATIONAL USE
HARDWARE FAILURE WILL ALLOW FOR AN UNDERTEMPERATURE CONDITION TO OCCUR. AUTOMATIC RADIATOR FAULT DETECTION WILL BYPASS RADIATOR. ON-BOARD ALAR EVAPORATOR OUT TEMPERATURE, WILL INDICATE HARDWARE FAILURE. FAILURE WI CAUSE AN EARLY END OF MISSION. FREON PUMP WILL BE TURNED OFF AND A POWERDOWN PERFORMED. FREON PUMP WILL BE REACTIVATED FOR ENTRY.