

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL HARDWARE
NUMBER: 06-3D-0509 -X

SUBSYSTEM NAME: ATCS - RADIATORS AND FLOW CONTROL
REVISION: 0 01/12/98

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: VALVE, ISOLATION CARLETON TECHNOLOGIES	ME284-0603 2632-1001-5

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
 FREON LOOP ISOLATION VALVE CONTROL

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 2
 ONE PER LOOP

FUNCTION:
 PROVIDES MEANS OF ISOLATING FREON FLOW FROM THE RADIATOR ARRAY IN THE
 EVENT OF AN EXTERNAL LEAK IN THAT ARRAY.

FAILURE MODES EFFECTS ANALYSIS FMEA - CIL FAILURE MODE

NUMBER: 06-3D-0509- 02

REVISION#: 0 12/05/97

SUBSYSTEM NAME: ATCS - RADIATORS AND FLOW CONTROL

LRU: VALVE, ISOLATION

ITEM NAME: VALVE, ISOLATION

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:

MECHANICALLY JAMMED IN THE RADIATOR FLOW POSITION

MISSION PHASE: OO ON-ORBIT
DO DE-ORBITVEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
103 DISCOVERY
104 ATLANTIS
105 ENDEAVOUR**CAUSE:**

VIBRATION, MECHANICAL SHOCK, CORROSION, CONTAMINATION.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS
B) FAIL
C) PASS**PASS/FAIL RATIONALE:**

A)

B)

SINCE VALVE IS ALWAYS IN RAD FLOW IT IS NOT POSSIBLE TO SEE IF IT IS JAMMED IN RAD FLOW UNLESS OTHER FAILURE OCCURS (IE. FREON LEAK IN RADIATOR ARRAY).

C)

- FAILURE EFFECTS -**(A) SUBSYSTEM:**

NO EFFECT FIRST FAILURE.

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(B) INTERFACING SUBSYSTEM(S):
NO EFFECT FIRST FAILURE.

(C) MISSION:
POSSIBLE LOSS OF MISSION AFTER TWO FAILURES:
(1) ISOLATION VALVE JAMS IN RAD FLOW POSITION
(2) EXTERNAL LEAK OCCURS IN ASSOCIATED RADIATOR ARRAY

(D) CREW, VEHICLE, AND ELEMENT(S):
POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE FAILURES:
(1) ISOLATION VALVE JAMS IN RADIATOR FLOW POSITION.
(2) EXTERNAL LEAK OCCURS IN ASSOCIATED RADIATOR ARRAY.
(3) FAILURE OF REDUNDANT COOLANT LOOP.

(E) FUNCTIONAL CRITICALITY EFFECTS:
PROBABLE LOSS OF MISSION AFTER TWO FAILURES:
(1) ISOLATION VALVE JAMS IN RAD FLOW POSITION RESULTING IN LOSS OF RADIATOR ISOLATION CAPABILITY
(2) EXTERNAL LEAK OCCURS IN ASSOCIATED RADIATOR ARRAY WITH RESULTANT LOSS OF THAT COOLANT LOOP SINCE RADIATORS CANNOT BE BYPASSED.

POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE FAILURES:
(1) ISOLATION VALVE JAMS IN RAD FLOW POSITION RESULTING IN LOSS OF RADIATOR ISOLATION CAPABILITY
(2) EXTERNAL LEAK OCCURS IN ASSOCIATED RADIATOR ARRAY WITH RESULTANT LOSS OF THAT COOLANT LOOP SINCE RADIATORS CANNOT BE BYPASSED.
(3) FAILURE OF REDUNDANT COOLANT LOOP CAUSES LOSS OF ALL VEHICLE COOLING.

-DISPOSITION RATIONALE-

(A) DESIGN:
WELDED CONSTRUCTION WITH BELLOWS FOR DYNAMIC SEALS. VALVE HOUSING AND SEAT ARE MADE OF STAINLESS STEEL, WHICH IS COMPATIBLE WITH FREON 21. FREON IS SERVICED THROUGH A FINAL FILTER OF 25 MICRON SIZE AND THERE IS A 65 MICRON FILTER IN THE RADIATOR ISOLATION VALVE ASSEMBLY.

(B) TEST:
QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 0.4 G**2/HZ FOR 30 MIN/AXIS, SHOCK TESTED AT +/- 20 G EACH AXIS, AND 10000 CYCLE VALVE LIFE TEST.

ACCEPTANCE TEST - VALVE FUNCTIONAL TEST IS PERFORMED DURING ATP.

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GROUND TURNAROUND TEST

TURNAROUND CHECKOUT TESTING ACCOMPLISHED IN ACCORDANCE WITH OMR5D.

(C) INSPECTION:

RECEIVING INSPECTION

RAW MATERIAL CERTIFICATIONS ARE 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. CRITICAL DIMENSIONS AND SURFACE FINISHES VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

X-RAY EXAMINATION OF FUSION WELDS IS VERIFIED BY INSPECTION. ULTRASONIC INSPECTION OF RAW MATERIAL VERIFIED. DYE PENETRANT EVALUATION OF MACHINED PARTS VERIFIED.

CRITICAL PROCESSES

PASSIVATION, HEAT TREATING, WELDING AND BRAZING ARE VERIFIED BY INSPECTION.

TESTING

VIBRATION, FLOW RATE AND PRESSURE DROP REQUIREMENTS ARE VERIFIED BY INSPECTION DURING ATP. LEAKAGE DURING PROOF PRESSURE AND HELIUM LEAK CHECK TESTS IS VERIFIED BY TESTING. INSULATION RESISTANCE AND DIELECTRIC STRENGTH TEST ARE VERIFIED BY TESTING DURING ATP.

HANDLING/PACKAGING

HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION. PARTS PROTECTION VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:

NO APPLICABLE FAILURE HISTORY.

(E) OPERATIONAL USE:

ON-BOARD ALARMS, FREON INLET PRESSURE AND ACCUMULATOR QUANTITY, WILL PROVIDE INDICATION OF HARDWARE FAILURE. FREON PUMP WILL BE TURNED OFF AND LOSS OF ONE FREON LOOP POWERDOWN WILL BE PERFORMED. ENTRY AT NEXT PRIMARY LANDING SITE.

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- APPROVALS -

SS & PAE MANAGER
SS & PAE ENGINEER
ECLSS-ATCS
BNA SSM
JSC MOD
JSL RDE

Fa. D.F. MIKULA
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: L. T. HARPER
: S. N. NGUYEN

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None of them 11-74-98

USA/Orbiter

Suzanne Little 1-4-99
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