

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE

NUMBER: 06-3D-0507 -X

SUBSYSTEM NAME: ATCS - RADIATORS AND FLOW CONTROL

REVISION: 0

12/05/97

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: TRICKLE FLOW ORIFICE	V070-613185-007
	BOEING	V070-613185-007

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
TRICKLE FLOW ORIFICE (ORIFICE#2)

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 2
ONE PER EACH COOLING LOOP

FUNCTION:
PROVIDES SUFFICIENT PRESSURE DROP TO CRACK THE CHECK VALVE THUS
ALLOWING TRICKLE FLOW.

FAILURE MODES EFFECTS ANALYSIS FMEA - NON-CIL FAILURE MODE

NUMBER: 06-3D-0507-02

REVISION#: 0 12/05/97

SUBSYSTEM NAME: ATCS - RADIATORS AND FLOW CONTROL

LRU: TRICKLE FLOW ORIFICE

CRITICALITY OF THIS
FAILURE MODE: 1R3

ITEM NAME: TRICKLE FLOW ORIFICE

FAILURE MODE:
CLOGSMISSION PHASE: OO ON-ORBIT
DO DE-ORBITVEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
103 DISCOVERY
104 ATLANTIS
105 ENDEAVOURCAUSE:
VIBRATION, MECHANICAL SHOCK, CORROSION, CONTAMINATION.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:

A)
DURING NORMAL GROUND TURNAROUND, HARDWARE FAILURE CAN BE DETECTED AS A
RESULT OF FLOW REDUCTION SENSED BY FLOW SENSORS.B)
DURING FLIGHT, HARDWARE FAILURE CAN BE DETECTED AS A RESULT OF FLOW
REDUCTION SENSED BY FLOW SENSORS.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF ABILITY TO CONTROL RADIATOR OUTLET TEMPERATURE AFTER FIRST
FAILURE(B) INTERFACING SUBSYSTEM(S):
FIRST FAILURE WILL EFFECT COOLING CAPACITY TO CREW CABIN, VEHICLE AVIONICS,
AND FES WATER CONSUMPTION.

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(C) MISSION:

FIRST FAILURE WILL RESULT IN LOSS OF RADIATOR COOLING FROM THAT LOOP, AND POSSIBLE EARLY MISSION TERMINATION.

(D) CREW, VEHICLE, AND ELEMENT(S):

FIRST FAILURE WILL RESULT IN LOSS OF RADIATOR COOLING FROM ASSOCIATED COOLANT LOOP AND REDUCED COOLING TO THE VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

POSSIBLE LOSS OF MISSION AFTER FIRST FAILURE: CLOGGED TRICKLE FLOW ORIFICE.

POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE FAILURES:

(1) TRICKLE FLOW CLOGS.

(2) ISOLATION VALVE FAILS TO SWITCH TO RADIATOR BYPASS.

(3) BYPASS VALVE IN RADIATOR FLOW CONTROL ASSEMBLY FAILS TO DIVERT THE FLOW OF COLD FREON FROM THE HEAT EXCHANGER RESULTING IN HEAT EXCHANGER WATER LINES FREEZING AND RUPTURING THUS CAUSING LOSS OF ALL VEHICLE COOLING AND POSSIBLE LOSS OF CREW/VEHICLE.

-DISPOSITION RATIONALE-

(A) DESIGN:

THE ORIFICE IS SIZED TO 0.455" TO OVERCOME ISOLATION VALVE CRACKING PRESSURE AND COMBINED PRESSURE DROPS OF CHECK AND ISOLATION VALVES. THE ORIFICE DELTA PRESSURE IS NOT ADDITIVE TO VALVE'S DELTA PRESSURE. THE PROBABILITY OF THE ORIFICE CLOGGING SHOULD BE VERY LOW AS IT IS FILTERED.

(B) TEST:

NONE.

(C) INSPECTION:

NONE.

(D) FAILURE HISTORY:

NO APPLICABLE FAILURE HISTORY.

(E) OPERATIONAL USE:

ON-BOARD ALARMS, FREON TEMPERATURE AND FLOW RATE WILL PROVIDE INDICATION OF HARDWARE FAILURE. ISOLATION VALVE WILL BE SWITCHED TO BYPASS AND IF THIS

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FAILS FREON PUMP WILL BE TURNED OFF AND LOSS OF LOSS OF ONE FREON LOOP
POWERDOWN WILL BE PERFORMED. ENTRY AT NEXT PRIMARY LANDING SITE.

- APPROVALS -

SS & PAE MANAGER	: D.F. MIKULA	: <i>D.F. Mikula</i>
SS & PAE ENGINEER	: K.E. RYAN	: <i>K.E. Ryan</i>
ECLSS-ATCS	: L. T. HARPER	: <i>L.T. Harper</i>
BNA SSM	: S. N. NGUYEN	: <i>S.N. Nguyen</i>
JSC MOD	: P. HASERDOLK	: <i>P. Haserdolk</i>
JSC NASA SRQA	:	: <i>[Signature] 3/3/99</i>
JSC NASA SSM	:	: <i>[Signature] 3/3/99</i>
JSC/SAM	: J. STONE	: <i>[Signature] 3/4/99</i>
JSC/PROJECT MANAGER	:	: <i>[Signature] 3/5/99</i>
USA/Orbiter	:	: <i>N/A</i>
		: <i>Suzanne Rade 3/4/99</i>