

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE  
NUMBER: 06-3D-0505 -X**

**SUBSYSTEM NAME:** ATCS - RADIATORS AND FLOW CONTROL  
**REVISION:** 0 12/02/97

**PART DATA**

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|     | <b>PART NAME</b>             | <b>PART NUMBER</b>          |
|-----|------------------------------|-----------------------------|
|     | <b>VENDOR NAME</b>           | <b>VENDOR NUMBER</b>        |
| LRU | : VALVE,CHECK<br>CIRCLE SEAL | MC284-0472-0034<br>P200-180 |

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
FREON LOOP, RADIATOR ISOLATION, VALVE, CHECK.

**REFERENCE DESIGNATORS:**

**QUANTITY OF LIKE ITEMS:** 2  
ONE PER LOOP

**FUNCTION:**  
PREVENTS BACKFLOW OF FREON INTO THE RADIATORS WHEN ISOLATION VALVE IS IN RADIATOR BYPASS POSITION.

**FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE**

NUMBER: 06-3D-0505- 03

REVISION#: 0 12/05/97

SUBSYSTEM NAME: ATCS - RADIATORS AND FLOW CONTROL

LRU: CHECK VALVE

**CRITICALITY OF THIS  
FAILURE MODE: 1R3**

ITEM NAME: VALVE, CHECK

FAILURE MODE:  
FAILS CLOSEDMISSION 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)  
COOLANT LOOPS ARE FLOW CHECKED AT EACH VEHICLE TURNAROUND.B)  
COOLANT FLOW IS DETECTABLE IN ORBIT.

C)

**- FAILURE EFFECTS -**(A) SUBSYSTEM:  
FIRST FAILURE WILL CAUSE LOSS OF RADIATOR COOLING CAPABILITY IN EFFECTED  
COOLANT LOOP.(B) INTERFACING SUBSYSTEM(S):  
POSSIBLE SHUTDOWN OF SOME EFFECTED SYSTEMS DUE TO REDUCED COOLING  
CAPACITY.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE**  
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**(C) MISSION:**

PROBABLE LOSS OF MISSION AFTER FIRST FAILURE:

- (1) CHECK VALVE FAILS CLOSED.

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

POSSIBLE LOSS OF CREW/VEHICLE AFTER 4 FAILURES:

- (1) CHECK VALVE FAILS CLOSED
- (2) RADIATOR BYPASS VALVE IN RFCA FAILS IN RAD FLOW POSITION
- (3) FAILURE OF RADIATOR ISOLATION VALVE TO SWITCH TO RADIATOR ISOLATION POSITION
- (4) LOSS OF REDUNDANT COOLANT LOOP.

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

POSSIBLE LOSS OF MISSION AFTER FIRST FAILURE:

- (1) CHECK VALVE FAILS CLOSED CAUSING LOSS OF FREON FLOW THROUGH RADIATORS AND SUBSEQUENT LOSS OF RADIATOR COOLING FOR EFFECTED COOLANT LOOP.

POSSIBLE LOSS OF CREW/VEHICLE AFTER FOUR FAILURES:

- (1) CHECK VALVE FAILS CLOSED CAUSING LOSS OF FREON FLOW THROUGH RADIATORS AND SUBSEQUENT LOSS OF RADIATOR COOLING FOR EFFECTED COOLANT LOOP.
- (2) RADIATOR BYPASS VALVE IN RFCA FAILS IN RAD FLOW POSITION
- (3) RADIATOR ISOLATION VALVE FAILS TO SWITCH TO RADIATOR BYPASS POSITION TO DIVERT FLOW OF FREON AROUND RADIATORS (CLOGGED BY CLOSED CHECK VALVE) WILL FORCE ALL FREON TO FLOW THROUGH THE SMALL ANTI HYDRAULIC ORIFICE CAUSING NEARLY A TOTAL LOSS OF COOLANT FLOW IN COOLANT LOOP PROBABLY FORCING SHUTDOWN OF FREON PUMPS FOR EFFECTED LOOP CAUSING LOSS OF COOLANT LOOP.
- (4) LOSS OF REDUNDANT COOLANT LOOP RESULTS IN LOSS OF ALL VEHICLE COOLING.

**- APPROVALS -**

|                     |   |              |
|---------------------|---|--------------|
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| SS & PAE ENGINEER   | : | K.E. RYAN    |
| ECLSS-ATCS          | : | L. T. HARPER |
| BNA SSM             | : | S. N. NGUYEN |
| JSC MOD             | : |              |
| JSC NASA SRQA       | : |              |
| JSC NASA SSM        | : |              |
| JSC/SAM             | : |              |
| JSC/PROJECT MANAGER | : |              |

*USA/orkiter*

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*12-21-98*

*1/4/99*