

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE**  
**NUMBER: 06-3A-0633 -X**

**SUBSYSTEM NAME:** ACTIVE THERMAL CONTROL

**REVISION:** 0      02/04/88

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**PART DATA**

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	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	: WATER SPRAY BOILER	MC250-0019
SRU	: BLOW-OFF STEAM VENT PLUG	MC250-0019-0030 SV779058-1

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
BLOW-OFF STEAM VENT PLUG

**QUANTITY OF LIKE ITEMS:** 3  
ONE FOR EACH BOILER ASSEMBLY

**FUNCTION:**  
PREVENTS THE INTRODUCTION OF RAIN, SAND, AND DUST, ETC. FROM ENTERING THE STEAM CIRCUIT OF THE WATER SPRAY BOILER PRIOR TO LAUNCH.

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

NUMBER: 06-3A-0633-01

REVISION#: 1 08/25/98

SUBSYSTEM NAME: ATCS - WATER SPRAY BOILER

LRU: WATER SPRAY BOILER

ITEM NAME: BLOW-OFF STEAM VENT PLUG

CRITICALITY OF THIS

FAILURE MODE: 1R2

**FAILURE MODE:**

FAILURE TO RELEASE

**MISSION PHASE:**

LO LIFT-OFF

DO DE-ORBIT

**VEHICLE/PAYLOAD/KIT EFFECTIVITY:**

102 COLUMBIA

103 DISCOVERY

104 ATLANTIS

105 ENDEAVOUR

**CAUSE:**STICTION, TOLERANCE STACKUP, IMPROPER MATERIAL OR MANUFACTURE, IMPROPER  
INSTALLATION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

**REDUNDANCY SCREEN**

A) FAIL

B) PASS

C) PASS

**PASS/FAIL RATIONALE:**

A)

"A" SCREEN FAILS SINCE FAILURE WOULD NOT OCCUR UNTIL AFTER LIFT OFF.

B)

C)

**- FAILURE EFFECTS -****(A) SUBSYSTEM:**LOSS OF FUNCTION - REDUCED HEAT REJECTION CAPABILITY IN ONE APU/HYD SYSTEM  
DUE TO INCREASE IN BACK PRESSURE IN HEAT EXCHANGER/CORE WHICH CAUSES

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INCREASED BOILING TEMPERATURE. POSSIBLE DAMAGE TO STEAM VENT SYSTEM DUE TO OVERPRESSURIZATION. RUPTURE OF STEAM DUCT CAN CAUSE WSB FREEZE UP.

**(B) INTERFACING SUBSYSTEM(S):**

POSSIBLE OVERHEATING OF APU LUBE OIL LEADING TO LOSS OR LIMITED RUN TIME OF ONE APU/HYD SYSTEM. LIMITED RUN TIME MAY NOT ALLOW APU/HYD SYSTEM TO SUPPORT ENTIRE POWERED FLIGHT OR ENTRY PHASE. LOSS OF HYDRAULIC CAPABILITY TO THROTTLE ONE MAIN ENGINE, LOSS OF HYDRAULIC LANDING GEAR DEPLOY AND NOSEWHEEL STEERING IF SYSTEM ONE IS LOST, AND LOSS OF ONE OF THREE ET UMBILICAL RETRACT ACTUATORS FOR EACH UMBILICAL PLATE. LOSS OF REDUNDANT HYDRAULIC POWER SYSTEM FOR FOUR TVC ACTUATORS. LOSS OF ONE OF THREE HYDRAULIC POWER SYSTEMS TO FLIGHT CONTROL SURFACES AND BRAKES.

**(C) MISSION:**

ABORT DECISION - REMAINING TWO SUBSYSTEMS PROVIDE SAFE RETURN.

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

NO EFFECT

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

POSSIBLE LOSS OF CREW/VEHICLE WITH THIS FAILURE PLUS LOSS OF A SECOND APU/HYD SYSTEM.

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**-DISPOSITION RATIONALE-**

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**(A) DESIGN:**

STEAM VENT PLUG IS A MOLDED SILICONE RUBBER DISK SHAPED TO FIT THE ORIFICE ADAPTOR (0.8 IN. DIA) IN THE VENT NOZZLE. THE EXTERNAL LIP IS 0.120 IN. THICK WITH THE CENTRAL DISK THICKNESS OF 0.030 IN. THE RETAINING LIP IS 0.860 IN. DIA. THE STEAM VENT PLUG IS DESIGNED TO BLOW-OFF AT 0.2 TO 2.0 PSID. THE CENTRAL DISK WILL BURST AT APPROXIMATELY 27 PSID IF THE PLUG FAILS TO RELEASE. A PRESSURE OF APPROXIMATELY 10 PSID WILL FORCE THE PLUG THROUGH THE ORIFICE. THIS IS BELOW THE REQUIRED 20 PSIG BURST PRESSURE OF THE STEAM DUCT. THESE CONDITIONS WOULD OCCUR BEFORE APU LUBE OIL REACHES 350 DEG F.

**(B) TEST:**

QUALIFICATION.

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- RELEASE PRESSURE TEST - AT 70 DEG F TO 280 DEG F, RELEASE PRESSURE TESTED AT BUILD UP RATE OF 1 PSIG/SEC. PASS/FAIL CRITERIA: MUST RELEASE BETWEEN 0.2 AND 2.0 PSID.

**ACCEPTANCE:**

- EXAMINATION OF PRODUCT - VERIFICATION OF WORKMANSHIP, FINISH, CONSTRUCTION, CLEANLINESS, IDENTIFICATION, TRACEABILITY LEVEL AND PROCESSES PER DRAWINGS.
- RELEASE PRESSURE MUST BE CLEANLY EJECTED AT A PRESSURE BETWEEN 0.20 AND 2.0 PSID AT AMBIENT TEMPERATURE (LOT SAMPLE).

**GROUND TURNAROUND TEST**

- ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

**(C) INSPECTION:**

**RECEIVING INSPECTION**

RAW MATERIALS ARE SENT TO A TEST LAB FOR MATERIAL AND CHEMICAL ANALYSIS AND CERTIFICATION. SHOP TRAVELER INSPECTION IS PERFORMED FOR CORRECT RAW MATERIAL PRIOR TO MACHINING.

**CONTAMINATION CONTROL**

NO FOREIGN MATERIAL PERMITTED UNDER VISUAL EXAMINATION (1X MAGNIFICATION) CLEANLINESS IS VERIFIED BY INSPECTION.

**ASSEMBLY/INSTALLATION**

MANUFACTURING AND INSTALLATION ARE VERIFIED BY INSPECTION.

**TESTING**

ATP IS VERIFIED BY INSPECTION.

**HANDLING/PACKAGING**

PROPER HANDLING AND PACKAGING ARE VERIFIED BY INSPECTION.

**(D) FAILURE HISTORY:**

CURRENT DATA ON TEST FAILURES, FLIGHT FAILURES, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN THE PRACA DATA BASE.

**(E) OPERATIONAL USE:**

ASCENT: SHUT DOWN AFFECTED APU/HYD SYSTEM AT AN APPROPRIATE TIME BASED ON FLIGHT PHASE AND SYSTEM TEMPERATURES.

ENTRY: SHUT DOWN AFFECTED APU/HYD SYSTEM OR DELAY APU START IF FAILURE KNOWN PRIOR TO DEORBIT.

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**- APPROVALS -**

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TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 95-CIL-009_06-3A