

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 04-2-BD01 -X

SUBSYSTEM NAME: AUXILIARY POWER (APUS)

REVISION: 1 **09/02/98**

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: BURST DISK HYDRODYNE	ME251-0017-0001 48-5806
	:	

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

THE BURST DISK ASSEMBLY CONSISTS OF A SPRING/DIAPHRAGM SYSTEM AND A SHARP CUTTING DEVICE ENCLOSED IN A PRESSURE-SEALED STEEL BODY. IT IS PROVIDED WITH A TEST PORT DOWNSTREAM OF THE DIAPHRAGM LOCATION FOR LEAK CHECK PURPOSES. IT IS LOCATED IMMEDIATELY DOWNSTREAM OF THE DRAIN SYSTEM CATCH BOTTLE AND UPSTREAM OF THE RELIEF VALVE.

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 3
ONE PER APU

FUNCTION:

THE FUNCTION OF THE BURST DISK IS TO PROVIDE REDUNDANCY TO THE RELIEF VALVE AND TO PREVENT THE LOSS OF PRE-LAUNCH DRAIN SYSTEM PRESSURE THROUGH RELIEF VALVE LEAKAGE. FUEL PUMP LEAKAGE, COMBINED WITH RELIEF VALVE LEAKAGE, MAY REDUCE THE PRESSURE DOWNSTREAM OF THE FUEL TANK ISOLATION VALVE TO A LEVEL UNACCEPTABLE FOR APU PRE-START ACTIVATION OF THE ISOLATION VALVE. FLIGHT RULE A10.1.2-2 DOES NOT ALLOW FUEL TANK ISOLATION VALVE OPENING WHEN THE DOWNSTREAM PRESSURE IS LESS THAN 15 PSIA DUE TO ADIABATIC BUBBLE COMPRESSION DETONATION CONCERNS (CRIT 1/1).

**FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE
NUMBER: 04-2-BD01-03**

REVISION#: 1 09/02/88

SUBSYSTEM NAME: AUXILIARY POWER UNIT (APU)
LRU: BURST DISK
ITEM NAME: BURST DISK

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

FAILURE MODE:
GROSS INTERNAL LEAK OR RUPTURES PREMATURELY.

MISSION PHASE:

PL	PRE-LAUNCH
LO	LIFT-OFF
OO	ON-ORBIT
DO	DE-ORBIT
LS	LANDING/SAFING

VEHICLE/PAYLOAD/KIT EFFECTIVITY:

102	COLUMBIA
103	DISCOVERY
104	ATLANTIS
105	ENDEAVOUR

CAUSE:
CORROSION, IMPROPER TESTING, MATERIAL, HANDLING, CONTAMINATION.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN

A) PASS
B) N/A
C) PASS

PASS/FAIL RATIONALE:

A)
LEAK CHECK MAY BE PERFORMED DURING GROUND TURNAROUND

B)
N/A-NOTE THAT BURST DISK INTERNAL LEAK IS DETECTABLE BY CYCLIC BEHAVIOR OF DRAIN SYSTEM PRESSURE.

C)
A SINGLE CREDIBLE EVENT CANNOT CAUSE LOSS OF ALL APU REDUNDANCY

- FAILURE EFFECTS -

(A) SUBSYSTEM:
NONE FOR THE FIRST FAILURE.

(B) INTERFACING SUBSYSTEM(S):
NONE FOR THE FIRST FAILURE.

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

NONE WITHOUT ADDITIONAL FAILURES.

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

NONE WITHOUT ADDITIONAL FAILURES.

(E) FUNCTIONAL CRITICALITY EFFECTS:

POSSIBLE LOSS OF BOTH MISSION AND CREW/VEHICLE AFTER 5 FAILURES:

- (1) GROSS INTERNAL LEAK THROUGH BURST DISK OR BURST DISK RUPTURES PREMATURELY.
- (2) RELIEF VALVE FAILS OPEN OR HAS INTERNAL LEAK.
- (3) STATIC FUEL PUMP SEAL LEAK CAUSING FUEL PUMP INLET PRESSURE < 15 PSIA.
- (4) ANOTHER APU FAILS OR LANDING/DECEL REDUNDANCY IS LOST, NECESSITATING USE OF APU WITH F/P STATIC LEAK.
- (5) WHEN ISOLATION VALVES ARE OPENED ON AFFECTED APU, ADIABATIC BUBBLE COMPRESSION DETONATION (ABCD) OCCURS.

- APPROVALS -

SS & PAE MANAGER	FR: D. F. MIKULA
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VEHICLE & SYSTEMS DESIGN	: M. A. WEISER
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