

**FAILURE MODE EFFECTS ANALYSIS/CRITICAL ITEMS LIST**

FMEA NUMBER: EC-PORT1-1	ORIGINATOR: JSC	PROJECT: EDFT-03
PART NAME: LATCH ASSY	LRU/ORU PART NUMBER: SED39126403-301	QUANTITY: 3
PART NUMBER: SED39126433-301	LRU/ORU PART NAME: PIT/PIT UT BOX	SYSTEM: GFE
LSC CONTROL NO: N/A	DRAWING/REF DESIGNATOR: SEE P/N	SUBSYSTEM: EVA
ZONE/LOCATION: PORT 1	EFFECTIVITY/AFFECT STAGE: STS-72	

CRITICALITY:

CRITICAL ITEM: Yes  
 CRITICALITY CATEGORY: IR/2  
 SUCCESS PATHS: 2  
 SUCCESS PATH REMAINING: 1

END ITEM NAME: N/A  
 END ITEM FUNCTIONAL: N/A  
 END ITEM CAPABILITY: N/A  
 END ITEM FAILURE TOLERANCE: N/A

REDUNDANCY SCREENS:

- A/1. C/O PRELAUNCH: Pass
2. C/O ON ORBIT: N/A for NSTS
- B/3. DETECTION FLIGHT CREW: N/A
4. DETECTION GROUND CREW: N/A
- C/5. LOSS OF REDUNDANCY FROM SINGLE CAUSE: Pass

FUNCTION: Three latches preventing primary utility box door from opening.  
 Door hinge and locking door strut provided support when door is opened.

FAILURE MODE CODE: N/A for NSTS

FAILURE MODE: Latch mechanism inadvertently open.

CAUSE: Spring failure, piece part failure.

REMAINING PATHS: 1	EFFECT/ MISSION PHASE:
Remaining two latches and door hinge.	Launch/Landing

CORRECTIVE ACTION: None

\*FAILURE EFFECTS-

END ITEM/LRU/ORU/ASSEMBLY: One latch opens. Door prevented from releasing into the PLB by the remaining two latches and door hinge.

SUBSYSTEM/NEXT ASSEMBLY/INTERFACE: N/A

SYSTEM/END ITEM/MISSION: None.

CREW/VEHICLE : No effect for a single open latch. If another latch opens remaining latch and door hinge can not sustain loads. Utility box may open and fail structurally at hinge due to loads. Loose equipment in PLB may damage vehicle.

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**HAZARD INFORMATION:**


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HAZARD: N/A

HAZARD ORGANIZATION CODE: N/A

HAZARD NUMBER: N/A

TIME TO EFFECT: Seconds

TIME TO DETECT: N/A

TIME TO CORRECT: Immediately

FAILURE DETECTION/FLIGHT: None

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**REMARKS:**


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**-RATIONALE FOR ACCEPTABILITY-**


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A) DESIGN: Door is designed to be single fault tolerant in preventing release of the door. The three door latches are simple 1/4 turn latch utilizing a spring to hold it in the locked position. Hinge incorporates 2 EVA releasable bolts which will enable the two halves of the hinge to be separated. Door latches have been analyzed and have a minimum margin of safety of 0.09 with a factor of safety of 2.0.

**(B) TEST:**

Acceptance: Functional performed at predelivery acceptance, preinstallation acceptance, pre/post environmental test, and demonstrated during the thermal vacuum test.

1) Latch operation torque is between 20 and 30 in-lb.

**Qualification:**

Protoflight Vibration: A vibration test was performed to the following levels for a duration of 1 minute in each axis:

X AXIS		Y AXIS		Z AXIS	
20 - 30 Hz	+3 db/oct	20 - 45 Hz	+10 db/oct	20 - 45Hz	.009g <sup>2</sup> /Hz
80 - 350 Hz	.040g <sup>2</sup> /Hz	45 - 600 Hz	.060g <sup>2</sup> /Hz	45 - 70 Hz	+12 db/oct
350 - 2000 Hz	-3db/oct	600 - 2000	-10db/oct	70 - 600 Hz	.050 g <sup>2</sup> /Hz
				600 - 2000Hz	-6 db/oct
6.1 grms		7.7 grms		7.0 grms	

Thermal/Vacuum: Hinge operation demonstrated at a temperature of -100°F at a pressure of  $1 \times 10^{-5}$  torr.

**(C) INSPECTION:**

Fabrication - All latch components are verified to generally clean individually. The PIT Segment to PIT Segment Utility Box is verified to be visually clean at predelivery acceptance.

Test - Quality Assurance surveillance is required at all test and inspections. Discrepancy reports are written on all noncompliance's.

**(D) FAILURE HISTORY:** None.**(E) OPERATIONAL USE:**

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1) Operational Effect - Utility Box Door may open during launch if multiple failure occurs. Release of the door is required during EVA if two latches can not be closed. Loose equipment could impact the vehicle.

2) Crew Action - If a double latch failure occurs, release EVA hinge bolts and door stay and jettison door.

3) Crew Training - Crew trained in proper operation of door assy.

4) Mission constraint - None.

5) In Flight Checkout - Proper stowage verified during EVA operations.

(F) MAINTAINABILITY: N/A

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PREPARED BY: G. Wright

REVISION:

DATE: 8/10/95

WAIVER NUMBER:

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