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


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FMEA NUMBER: EC-PORT3-03	ORIGINATOR: ISC	PROJECT:EDFT-03
PART NAME:CABLES&FLUID LINES	LRU/ORU PART NUMBER:SED39126409-301	QUANTITY: 1EA.
PART NUMBER: 1F70287, 1F70278	LRU/ORU PART NAME:RIG UMB ASSY	SYSTEM:OFE
LSC CONTROL NO: N/A	DRAWING/REF DESIGNATOR:SEE P/N	SUBSYSTEM:EVA
ZONE/LOCATION:PORT 3, 4	EFFECTIVITY/AFFECT STAGE: STS-72	

CRITICALITY:

CRITICAL ITEM: Yes  
 CRITICALITY CATEGORY: 1R/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: Pass
4. DETECTION GROUND CREW: N/A
- C/5. LOSS OF REDUNDANCY FROM SINGLE CAUSE: Pass

FUNCTION: The cables and fluid lines (3 electrical and 2 fluid lines) on the RU will be connected to dead face connectors (SURF panel) in STBD bay 4. Each line is restrained to the RU by two fixed line clamps on one end. The midpoint of each line goes through a gang clamp (2 clamps, one on each side of the RU) that will be released during the EVA. The line end that is to be manipulated during the EVA incorporates connectors that are attached to deadface connectors on each side of the RU. Velcro straps are also used to minimize line movement on a unsupport section of the lines. The SURF panel that the dead face connectors are attached to is bolted to the transition plate with 4 EVA removable bolts.

FAILURE MODE CODE: N/A for NSTS

FAILURE MODE: Unable to remove connectors

CAUSE: Contamination, galling.

REMAINING PATHS: 2  
 EVA bolts, cable cutter (electrical lines only)

EFFECT/ MISSION PHASE: EVA

CORRECTIVE ACTION: Cut electrical cables or remove SURF utilizing EVA releasable bolts and jettison RU/SURF.

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-FAILURE EFFECTS-


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END ITEM/LRU/ORU/ASSEMBLY: Unable to return RU to stowage location

SUBSYSTEM/NEXT ASSEMBLY/INTERFACE: N/A

SYSTEM/END ITEM/MISSION: Partial loss of DTO if RU operations are stopped

CREW/VEHICLE: Unable to safely land vehicle with a deployed RU. If contingency methods to remove RU also fail, vehicle would be damaged by loose equipment in PLB at landing.

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<b>PART NAME:</b> CABLES&FLUID LINES	<b>LRU/ORU PART NUMBER:</b> SED39126409-301	<b>QUANTITY:</b> 1EA.
<b>PART NUMBER:</b> 1F70287, 1F70278	<b>LRU/ORU PART NAME:</b> RIG UMB ASSY	<b>SYSTEM:</b> CPE
<b>LSC CONTROL NO:</b> N/A	<b>DRAWING/REF DESIGNATOR:</b> SEE P/N	<b>SUBSYSTEM:</b> EVA
<b>ZONE/LOCATION:</b> PORT 3, 4	<b>EFFECTIVITY/AFFECT STAGE:</b> STS-72	

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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: Hours

TIME TO DETECT: Seconds

TIME TO CORRECT: Minutes

FAILURE DETECTION/FLIGHT: Visual

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**REMARKS:**


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**-RATIONALE FOR ACCEPTABILITY-**


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(A) DESIGN: The RU utilizes zero g connectors. Connectors employ a overcenter type latching mechanism. The fluid connector incorporates a additional lock feature( similiar to a quick disconnect)

**(B) TEST:**

Acceptance: Functional (performed at predelivery acceptance, preinstallation acceptance, pre/post environmental test, and demonstrated during the Thermal Vacuum test).

- 1) Force required to install and release electrical connectors size 3 or 4 is between 1 and 20 lb.
- 2) Force required to install and release electrical connectors size 5 is between 5 and 25 lb.
- 3) Force required to install and release fluid connectors is between 3 and 10 lb.

Acceptance vibration test performed on the flight RU was performed to the following levels for a duration of 1 minute per axis:

**X,Y,Z AXIS**

20 Hz	.01g <sup>2</sup> /Hz
20 - 80Hz	+3 db/oct
80 - 350 Hz	.040g <sup>2</sup> /Hz
350 - 2000 Hz	-3db/oct
2000 Hz	.007g <sup>2</sup> /Hz
6.1 grms	

Acceptance Thermal/Vacuum test performed at a temperature of -100°F and pressure of 1x10<sup>-5</sup> torr at Human thermal/vacuum test.

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PART NUMBER: 1F70287, 1F70278	LRU/ORU PART NAME:RIG UMB ASSY	SYSTEM:GFE
LSC CONTROL NO: N/A	DRAWING/REF DESIGNATOR:SEE P/N	SUBSYSTEM:EVA
ZONE/LOCATION:PORT 3, 4	EFFECTIVITY/AFFECT STAGE: STS-72	

**Qualification:**

Qualification for Acceptance Vibration was performed to the following levels for a duration of 2 minutes per axis:

20 Hz	.017g <sup>2</sup> /Hz
20 - 80Hz	+3 db/oct
80 - 350 Hz	.0670g <sup>2</sup> /Hz
350 - 2000 Hz	-3db/oct
2000 Hz	.012g <sup>2</sup> /Hz
7.87 grms	

Qualification Vibration : A vibration test was performed to the following levels for a duration of 1 minute in each axis: Each redundant path was verified on the track angle assy. latch during x-axis vibration test (x axis was the only axis where anomalies from an earlier test occurred on earlier design of the latch.)

X AXIS		Y AXIS		Z AXIS	
20 - 32 Hz	.003g <sup>2</sup> /Hz	20 - 45 Hz	+10 db/oct	20 - 45Hz	.009g <sup>2</sup> /Hz
20 - 32 Hz	+3 db/oct	45 - 600 Hz	.060g <sup>2</sup> /Hz	45 -70 Hz	+12 db/oct
80 - 350 Hz	.040g <sup>2</sup> /Hz	600 - 2000	-10db/oct	70 - 600 Hz	.050 g <sup>2</sup> /Hz
350 - 2000 Hz	-3db/oct			600 - 2000Hz	-6 db/oct
6.1 grms		7.7 grms		7.0 grms	

**(C) INSPECTION:**

Fabrication - All connectors components are verified to generally clean individually. The RU and RU FSE 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 noncompliances.

(D) FAILURE HISTORY: None.

**(E) OPERATIONAL USE:**

- 1) Operational Effect - Unable to release a line from the SURF.
- 2) Crew Action - Surf must be unbolted from the transition plate and removed. RU and SURF must be jettison.
- 3) Crew Training - Crew trained in proper operation of electrical connectors.
- 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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