

FAILURE MODES AND EFFECTS ANALYSIS /CRITICAL ITEMS REPORT

FMEA NO: CSD-SRS 4-2

ORIGINATOR: JSC - NS

PROJECT:Orbiter

<p>Item Name: PFR Socket/Pln</p> <p>Part Number: 10190-20173/ST28P1583-38</p> <p>Drawing No: 10190-20173/ST28P1583-38</p>	<p>Subsystems: EVAT</p> <p>System: GFE</p> <p>Quantity: 1</p> <p>Location/Zone: N/A</p>	<p>LSC Control No.:N/A</p> <p>LRU/ORU Part Name:SRS</p> <p>LRU/ORU Part No:10159-10093-301</p>
<p style="text-align: center;"><u>CRITICALITY</u></p> <p>Critical Item: Yes</p> <p>Criticality Category: 1R/2</p> <p>End Item Failure Tolerance:N/A</p> <p>Redundancy Screens:</p> <ol style="list-style-type: none"> 1. C/O Prelaunch: P 2. Detection on-orbit: P 3. Detection ground crew: <u>N/A</u> 4. Loss of redundancy from single cause: P 5. On-orbit restorability: <u>N/A</u> 	<p style="text-align: center;"><u>FAILURE EFFECT</u></p> <p>End Item/LRU/ORU Assembly:</p> <p>Unable to remove the PFR from the SRS. SRS/Orbiter interface not certified for landing with PFR in place.</p> <p>Subsystems/End Item Function:</p> <p>Mission objective complete.</p>	
<p>FUNCTION:(End Item and ORU/LRU)</p> <p>Portable foot restraint (PFR) socket is used to support the crewmember while recharging the SAFER.</p>	<p>System/End Item Capability:</p> <p>N/A</p>	
<p>FAILURE MODE:</p> <p>Unable to remove PFR from the SRS socket for re-entry.</p> <p>CAUSE:</p> <ol style="list-style-type: none"> 1. Contamination 2. Defective socket material 3. Pip pin jammed 	<p>Crew/Vehicle:</p> <p>Possible vehicle damage due to loose equipment in PLB if crewmember is unable to activate contingency release and stow PFR.</p>	
<p>REMAINING PARTS:</p> <p>Use contingency release handle to remove PFR socket from the Quad Pod.</p>	<p>MISSION PHASE</p> <p>EVA Landing</p>	
<p>CORRECTIVE ACTION:</p> <p>EVA crewmember activates contingency release mechanism. EVA hex head is integrated in the handle and can be operated with a tool.</p>		

FAILURE MODES AND EFFECTS ANALYSIS /CRITICAL ITEMS REPORT

FMEA NO: CSD-SRS-4-2

ORIGINATOR: JSC - NS

PROJECT: Orbiter

<p>HAZARD INFORMATION:</p> <p>Hazard: N/A</p> <p>Hazard Organization code: N/A</p> <p>Hazard Number: N/A</p>	<p>Time to Effect: Immediate: Hrs.</p> <p>Time to Correct: Min.</p> <p>Time to Detect: Sec</p> <p>Failure Detection/Flight: Visual</p> <p>Remarks:</p>
---	--

RATIONALE FOR ACCEPTABILITY

(A) Design:

- a) Sufficient interface tolerances to ensure proper alignment
- b) The PFR socket is derived from the standard PFR socket flown on shuttle.

(B) Test:

(A) Acceptance:

- (1) The PFR socket is fit checked to a PFR go/no gauge and at flight PFR gimbals at predelivery and preinstallation test; (2) Force required to activate quick release pin shall be less than 10 lb. Verified at predelivery and preinstallation test; (3) Pin pin environmental acceptance vibration per SP-T-023B. (4) SRS acceptance vibration to level specified in ES42-94-13.

Certification -

Thermal - Verification for the thermal environment is based on the SRS similarity to the HST Tool Box which was qualified for: Storage: -140 deg f to 250 deg f operational: -45 deg f to +160 deg f.

Same unit flown on STS-37 with no anomalies. Tested to the following:

- a) Temperature: -110 deg f
- b) Pressure: 1X10⁻⁵ torr
- c) 25 cycles insertion and removal of PFR
- d) Vibration Test:

The PFR socket was subjected to a random vibration test to the following levels in three axis for 1 minute per axis on STS-37. A similar environment exists on STS-64.

<p>X-Axis</p> <p>23-32 Hz .003 g/Hz</p> <p>32-100Hz +6dB/oct</p> <p>100-500 Hz .030 g/Hz</p> <p>(overall 5.5 Grms)</p>	<p>Y-Axis</p> <p>20-43 Hz + 10dB/oct</p> <p>45-600 Hz .060 g/Hz</p> <p>600-2000 HZ -6 dB/oct</p> <p>(overall 7.7 Grms)</p>
---	---

Z-Axis

20-43 HZ .009 g/Hz

45-70 Hz + 12 dB/oct

70-600 Hz .050 g/Hz

600-2000 Hz -6 dB/oct

(overall 7.0 Grms)

FAILURE MODES AND EFFECTS ANALYSIS /CRITICAL ITEMS REPORT

FMEA NO: CSD-SRS 4-2 -

ORIGINATOR: JSC - NS

PROJECT:Orbiter

Environmental Test:

a) As part of the CEFA certification the PFR socket were analyzed for the following natural and induced environmental to ensure that the assembly is not adversely affected.

NATURAL (Per MIF004-14D)	INDUCED	REQ:
1. Fungus	1. Temp High/Low	S AD
2. Pressure	2. Shock	
3. Hail	-Transportation	FED-STD-101
4. Humidity	-Handling	MIL-STD-101
5. Lighting	-Crash	NSTS 07700 Vol XIV
6. Ozone	-Functional	MIL-STD-810D
7. Meteoroids	3. Vibration	
8. Salt Spray	-Transportation	FED-STS-101
9. Sand/Dust	-Acoustic	NSTS-07700 Vol XIV
10. Solar Radiation (Thermal Nuclear)	-Model Survey	JSC 14046
	4. Structures	
	-Ultimate (E/N 2.0)	NSTS-07700 Vol XIV
	-Fracture/Fatigue	NSTS-07700 Vol XIV
	5. Acceleration	MF0004-014D

(C) Inspection:

a. Manufacturing:

- (1) All piece parts were inspected for conformance to their applicable drawings before and after any special process.
- (2) All Fracture Critical Piece Parts were subjected to dye penetrant inspection per MIL0168G, Type II, Method C.

b. Assembly:

- (1) Assembly cleaned per SN-C-0003, Rev C
- (2) Assembly inspected to conformance to the drawing.
- (3) Assembly functionally cycled to ensure proper operation

c. Test:

Verification of all test/inspection results for conformance to requirements.

(D) Failure History:

There have been no failures associated with the SRS PFR socket.

(E) Operations:

a. Effect of failure

SRS/PFR could break off from Orbiter interface.

b. Crew action

Use available tool to remove PFR from Quad Pad.

c. Crew training

None

d. Mission constraint

None

e. Inflight ops

Crew will inspect at time of use

(F) Maintainability:N/A

Prepared By:G. Wright	Engineering:R. G. Schwarz	Waiver Number:
Date:06/14/94	Revision:	Waiver Date: