

CRITICAL ITEMS LIST

REFERENCE DESIGNATOR: HPA-3
 NAME / QUANTITY: PFR Extender
 DRAWING REFERENCE: 4177902

PROJECT: HST
 LRU NAME / QUANTITY: HST PFR/APC Assembly
 LRU PART NUMBER: SED 3010295-001503

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 SUBSYSTEM: N/A
 EFFECTIVITY: ALL ORBITERS

FAILURE MODE NUMBER HST-HPA-3-1	CRITICALITY 1F/2	FAILURE EFFECT	RETENTION RATIONALE
FUNCTION PFR extender is used to change the location of a PFR socket required for attaching a HST or STS PFR.		END ITEM PFR extender is free in the payload bay.	I. Design Feature to Minimize the Chance of the Failure Mode A. Design The PFR Extender was designed to an ultimate structural safety factor of 1.4. B. Tolerances Sufficient tolerances were used in the PFR Extender design to prevent jamming by expansion and contraction of material due to temperature extremes or on-orbit use. C. Materials - Major Components Probe - 15-5PH, Condition H1025. Pip pin - Modified MS stainless steel pin (P/N 4173211) II. Testing and Analysis A. Acceptance Testing 1. PIA A full pre-installation acceptance (PIA) test was performed on the Jettison Handle assembly before it was delivered to KSC to support flight. The PIA verified that the Jettison Handle is functioning within tolerances and that the assembly is clean (ref. 189320299). 2. Pip Pin Acceptance The Pip pin was used in the STS-31 manned thermal vacuum test to demonstrate its operation under thermal conditions. The operation was successful at -90°F.
FAILURE MODE AND CAUSE MODE PFR extender comes loose during Launch or landing. CAUSE(S) 1) Pip Pin Failure. 2) Vibration.		MISSION None.	
REDUNDANCY SCREENS A - Pass B - Pass C - Pass	REMAINING PATHS 1) Hitch Pin.	CREW / VEHICLE Loss of crew and vehicle due to damaged created from loose PFR Extender in the payload bay.	
MISSION PHASE Launch/Landing		INTERFACE EVA-Plate PFR socket.	
		CORRECTIVE ACTION TIMES	
		TIME TO EFFECT	TIME TO CORRECT
		Minutes	Seconds

PREPARED BY: J. F. PARK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 10/1/83

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CRITICAL ITEMS LIST

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SUBSYSTEM: N/A
EFFECTIVITY: ALL ORBITERS

REFERENCE DESIGNATOR: HPA-3
NAME / QUANTITY: PFR Extender
DRAWING REFERENCE: 417702

PROJECT: HST
LRU NAME / QUANTITY: HST PFR/APC Assembly
LRU PART NUMBER: SED 30110205-001000

FAILURE MODE NUMBER HST-HPA-3-1	CRITICALITY 1R/2	FAILURE EFFECT	RETENTION RATIONALE		
FUNCTION PFR extender is used to change the location of a PFR socket required for attaching a HST or STS PFR.		END ITEM PFR extender is free in the payload bay. MISSION None. CREW / VEHICLE Loss of crew and vehicle due to damaged created from loose PFR Extender in the payload bay. INTERFACE EVA-Plate PFR socket.	B. Certification Testing 1. Thermal Vacuum The PFR Extender was exposed to a cold temperature (-132°F) vacuum (1x10 ⁻⁵ toms) environment. This test was used to check the tolerances of the hex probe to the PFR socket and the operation of the pip pin. The operational requirement was -90°F (Ref. JSC-23650) 2. Functionals The PFR Extender pip pin was functionally operated prior to and immediately after all acceptance/certification tests to verify that the test environment did not degrade the hardware performance.		
FAILURE MODE AND CAUSE MODE PFR extender comes loose during Launch or landing. CAUSES: 1) Pip Pin Failure. 2) Vibration.					
REUNDANCY SCREENS A - Pass B - Pass C - Pass	REMAINING PATHS 1) Hitch Pin.				
MISSION PHASE Launch/Landing	CORRECTIVE ACTION TIMES <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">TIME TO EFFECT</th> <th style="width: 50%;">TIME TO CORRECT</th> </tr> <tr> <td style="text-align: center;">Minutes</td> <td style="text-align: center;">Seconds</td> </tr> </table>			TIME TO EFFECT	TIME TO CORRECT
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Minutes	Seconds				

PREPARED BY: J.F. PARK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 10/20/83

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CRITICAL ITEMS LIST

REFERENCE DESIGNATOR: HPA-3
 NAME / QUANTITY: PFR Extender
 DRAWING REFERENCE: 417708

PROJECT: HST
 LRU NAME / QUANTITY: HST PFR/APC Assembly
 LRU PART NUMBER: CED 3011026-01/50

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 SUBSYSTEM: M/A
 EFFECTIVITY: ALL ORBITERS

FAILURE MODE NUMBER HST-HPA-3-1	CRITICALITY 1R/2	FAILURE EFFECT	RETENTION RATIONALE																																																
FUNCTION PFR extender is used to change the location of a PFR socket required for attaching a HST or STS PFR.		END ITEM PFR extender is free in the payload bay.	<p>C. Certification Analysis All PFR Extender components were be analyzed to the following induced environments to verify that the assembly can withstand the environment levels.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">1. Requirements</td> <td style="width: 30%;">Source</td> <td style="width: 40%;">Data</td> </tr> <tr> <td colspan="3">A. Structures</td> </tr> <tr> <td>- Fracture</td> <td>JSC-25838</td> <td>OK per Mail-93-079</td> </tr> <tr> <td>- Ul. (fs = 2.0)</td> <td>Interim Loads from ESA</td> <td>See Below</td> </tr> <tr> <td style="text-align: center;"><u>X</u></td> <td style="text-align: center;"><u>Y</u></td> <td style="text-align: center;"><u>Z</u></td> </tr> <tr> <td style="text-align: center;">75</td> <td style="text-align: center;">19</td> <td style="text-align: center;">70</td> </tr> <tr> <td style="text-align: center;">19</td> <td style="text-align: center;">75</td> <td style="text-align: center;">70</td> </tr> <tr> <td style="text-align: center;">19</td> <td style="text-align: center;">19</td> <td style="text-align: center;">280</td> </tr> <tr> <td style="text-align: center;">19</td> <td style="text-align: center;">19</td> <td style="text-align: center;">70</td> </tr> <tr> <td style="text-align: center;">Mx</td> <td style="text-align: center;">My</td> <td style="text-align: center;">Mz</td> </tr> <tr> <td style="text-align: center;">1215</td> <td style="text-align: center;">4800</td> <td style="text-align: center;">450</td> </tr> <tr> <td style="text-align: center;">4800</td> <td style="text-align: center;">1215</td> <td style="text-align: center;">450</td> </tr> <tr> <td style="text-align: center;">1215</td> <td style="text-align: center;">1215</td> <td style="text-align: center;">450</td> </tr> <tr> <td style="text-align: center;">1215</td> <td style="text-align: center;">1215</td> <td style="text-align: center;">1800</td> </tr> </table> <p>B. Temperature</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">- Hot</td> <td style="width: 30%;">LESC-30943</td> <td style="width: 40%;">+250°F</td> </tr> <tr> <td>- Cold</td> <td>JSC-23550</td> <td>-90°F</td> </tr> </table>	1. Requirements	Source	Data	A. Structures			- Fracture	JSC-25838	OK per Mail-93-079	- Ul. (fs = 2.0)	Interim Loads from ESA	See Below	<u>X</u>	<u>Y</u>	<u>Z</u>	75	19	70	19	75	70	19	19	280	19	19	70	Mx	My	Mz	1215	4800	450	4800	1215	450	1215	1215	450	1215	1215	1800	- Hot	LESC-30943	+250°F	- Cold	JSC-23550	-90°F
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FAILURE MODE AND CAUSE MODE PFR extender comes loose during launch or landing.		MISSION None.																																																	
CAUSE(S) 1) Pin Failure. 2) Vibration.		CREW / VEHICLE Loss of crew and vehicle due to damaged created from base PFR Extender in the payload bay.																																																	
REDUNDANCY SCREENS A - Pass B - Pass C - Pass	REMAINING PATHS 1) Hitch Pin.	INTERFACE EVA-Plate PFR socket.																																																	
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CRITICAL ITEMS LIST

REFERENCE DESIGNATOR: HPA-3
 NAME / QUANTITY: PFR Extender
 DRAWING REFERENCE: 417892

PROJECT: HST
 LRU NAME / QUANTITY: HST PFR/APC Assembly
 LRU PART NUMBER: SED3911926-001/508

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 SUBSYSTEM: N/A
 EFFECTIVITY: ALL ORBITERS

FAILURE MODE NUMBER HST-HPA-3-1	CRITICALITY 1R/2	FAILURE EFFECT	RETENTION RATIONALE		
FUNCTION PFR extender is used to change the location of a PFR socket required for attaching a HST or STS PFR.		END ITEM PFR extender is free in the payload bay. MISSION None. CREW / VEHICLE Loss of crew and vehicle due to damaged created from loose PFR Extender in the payload bay. INTERFACE EVA-Plate PFR socket.	III. Inspection A. <u>Manufacturing</u> 1. The PFR Extender components were inspected prior to build-up for conformance to their applicable drawings. B. <u>Assembly</u> 1. PFR Extender and pip pin are cleaned and inspected to the levels described in JSC 5322B. Once cleaned, the PFR Extender was bagged to prevent anything from contaminating the unit. C. <u>Testing</u> 1. The hardware was fully inspected for any signs of galling as a part of the pre/post functional tests performed prior to and immediately after all certification and acceptance tests.		
FAILURE MODE AND CAUSE MODE PFR extender comes loose during Launch or landing. CAUSE(S) 1) Pip Pin Failure. 2) Vibration.					
REDUNDANCY SCREENS A - Pass B - Pass C - Pass	REMAINING PATHS 1) Hrch Pin.				
MISSION PHASE Launch/Landing	CORRECTIVE ACTION TIMES <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">TIME TO EFFECT</th> <th style="width: 50%;">TIME TO CORRECT</th> </tr> <tr> <td>Minutes</td> <td>Seconds</td> </tr> </table>			TIME TO EFFECT	TIME TO CORRECT
TIME TO EFFECT	TIME TO CORRECT				
Minutes	Seconds				

PREPARED BY: J. F. PARK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 102093

HST-HPA - 24

CRITICAL ITEMS LIST

REFERENCE DESIGNATOR: HPA-3
 NAME / QUANTITY: PFR Extender
 DRAWING REFERENCE: 417508

PROJECT: HST
 LRU NAME / QUANTITY: HST PFR/APC Assembly
 LRU PART NUMBER: SED 96119296-501/503

PAGE 3 OF 5
 SUBSYSTEM: N/A
 EFFECTIVITY: ALL ORBITERS

FAILURE MODE NUMBER	CRITICALITY	FAILURE EFFECT	RETENTION RATIONALE
HST-HPA-3-1	1R/2		
FUNCTION PFR extender is used to change the location of a PFR socket required for attaching a HST or STS PFR.		END ITEM PFR extender is free in the payload bay.	IV. Failure History A. None, HST PFR/APC flew on STS-31, but was not used. V. Operations A. <u>Effects of Failure</u> PFR Extender loses connection to the APC and is free to move within the payload bay. B. <u>Crew Actions</u> None. C. <u>Training</u> None. D. <u>Mission Constraints</u> Possible damage to cargo within payload bay if the PFR Extender does come loose. E. <u>In Flight Check-Outs</u> None
FAILURE MODE AND CAUSE MODE PFR extender comes loose during Launch or landing.		MISSION None.	
CAUSE(S) 1) Pip Pin Failure. 2) Vibration.		CREW / VEHICLE Loss of crew and vehicle due to damaged created from loose PFR Extender in the payload bay.	
REDUNDANCY SCREENS A - Pass B - Pass C - Pass	REMAINING PATHS 1) Hitch Pin.	INTERFACE EVA-Plate PFR socket.	
MISSION PHASE	CORRECTIVE ACTION TIMES		
	TIME TO EFFECT	TIME TO CORRECT	
Launch/Landing	Minutes	Seconds	

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