

CRITICAL ITEMS LIST

REFERENCE DESIGNATION: **PBAS-1**
 NAME / QUANTITY: **Pip Pin**
 DRAWING REFERENCE: **SED38124002**

PROJECT: **Push Button Articulating Socket (PBAS)**
 LRU NAME / QUANTITY: **PBAS1**
 LRU PART NUMBER: **SED38124000-301001**

PAGE 1 OF 5
 SUBSYSTEM: **N/A**
 EFFECTIVITY: **ALL ORBITERS**

FAILURE MODE NUMBER PBAS-2-1	CRITICALITY 1R/2	FAILURE EFFECT	RETENTION RATIONALE
FUNCTION The Push Button Articulating Socket is used as a crew restraint. It increases the height of the PFR platform from the PFR Socket and gives the user an additional joint to manipulate.		END ITEM Cannot slow the Articulating Socket for landing. MISSION None CREW / VEHICLE Possible damage to orbiter if Articulating Socket comes loose in payload bay during landing. INTERFACE PFR Socket	I. Design Feature to Minimize the Chance of the Failure Mode A. Design The PBAS was designed to an ultimate structural safety factor of 1.4 by test and 2.0 by analysis. B. Tolerances Sufficient tolerances were used in the PBAS design to prevent jamming by expansion and contraction of material due to temperature extremes or on-orbit use. C. Materials - Major Components 1) Pip pin MS 17990CB21; Stainless Steel Shank and Balls. II. Testing and Analysis A. Acceptance Testing 1. PIA A full pre-installation acceptance (PIA) test will be performed on the PBAS before it is delivered to KSC to support any STS flight. The PIA will verify that the PBAS is functioning within tolerances and that the assembly is clean. 2. Vibration The PBAS was exposed to acceptance level vibration loads during its initial development in support of STS-51. The test verified that the PBAS was free of manufacturing defects and tolerance problems.
FAILURE MODE AND CAUSE MODE Articulating Socket pip pin jams in a PFR socket and cannot be removed. CAUSE(S) 1) Binding 2) Contamination			
REUNDANCY SCREENS A - Pass B - Pass C - Pass	REMAINING PATHS 1) Hitch pin on Pip Pin		
MISSION PHASE EVA	CORRECTIVE ACTION TIMES TIME TO EFFECT: Minutes TIME TO CORRECT: Seconds		

PREPARED BY: J. F. PARK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 01/03/92

PBAS - 1

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CRITICAL ITEMS LIST

PAGE 2 OF 5
SUBSYSTEM: N/A
EFFECTIVITY: ALL ORBITERS

REFERENCE DESIGNATOR: PBAS-2
NAME / QUANTITY: PIP pins/1
DRAWING REFERENCE: SED04130002

PROJECT: Push Button Articulating Socket (PBAS)
LRU NAME / QUANTITY: PBAS/1
LRU PART NUMBER: RED00024500-20/202

FAILURE MODE NUMBER	CRITICALITY	FAILURE EFFECT	RETENTION RATIONALE																
PBAS-2-1	1FV2																		
FUNCTION		END ITEM	<p>A. <u>Acceptance Testing (continued)</u></p> <p>The following vibration levels are per :</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Frequency (Hz)</th> <th style="text-align: center;">Slope (dB/oct.)</th> <th style="text-align: center;">Constant Level G²/Hz</th> <th style="text-align: center;">Overall Gms</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20-80</td> <td style="text-align: center;">+3.0</td> <td style="text-align: center;">.040</td> <td style="text-align: center;">6.1</td> </tr> <tr> <td style="text-align: center;">80-350</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">350-2000</td> <td style="text-align: center;">-3.0</td> <td></td> <td></td> </tr> </tbody> </table> <p>3. <u>Pip Pin Program</u></p> <p>All Pip Pins used in the HST hardware will be exposed to a separate dedicated acceptance test program to assure the project that the pip pins are at acceptable conditions which will help prevent a failure on-orbit.</p> <p>a. <u>Cleaning</u> All pip pins will be cleaned with freon to remove any lubricant from the pin which could be the cause of binding in the internal pin mechanism due to cold temperature.</p> <p>b. <u>Thermal</u> An ambient pressure cold cycle temperature test will be performed to verify that the actuation of the pip pin is possible at the missions cold temperature.</p> <p>c. <u>Vibration</u> All pip pins will be vibration tested to standard acceptance level vibration loads to screen for any workmanship defects.</p>	Frequency (Hz)	Slope (dB/oct.)	Constant Level G ² /Hz	Overall Gms	20-80	+3.0	.040	6.1	80-350				350-2000	-3.0		
Frequency (Hz)	Slope (dB/oct.)	Constant Level G ² /Hz		Overall Gms															
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350-2000	-3.0																		
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FAILURE MODE AND CAUSE MODE		MISSION																	
<p>Articulating Socket pip pin jams in a PFR socket and cannot be removed.</p> <p>CAUSE(S)</p> <p>1) Binding 2) Contamination</p>		<p>None</p>																	
REUNDANCY SCREENS		CREW / VEHICLE																	
<p>A - Pass B - Pass C - Pass</p>		<p>Possible damage to orbiter if Articulating Socket comes loose in payload bay during landing</p>																	
REMAINING PATHS		INTERFACE																	
<p>1) Hitch pin on Pip Pin</p>		<p>PFR Socket</p>																	
MISSION PHASE		CORRECTIVE ACTION TIMES																	
		TIME TO EFFECT	TIME TO CORRECT																
EVA		Minutes	Seconds																

PREPARED BY: J. F. PAIK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 6/1/93

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1.A0

CRITICAL ITEMS LIST

REFERENCE DESIGNATOR: PBAS-2
 NAME / QUANTITY: Pip pin/1
 DRAWING REFERENCE: SED09124442

PROJECT: Push Button Articulating Socket (PBAS)
 LRU NAME / QUANTITY: PBAS/1
 LRU PART NUMBER: SED09124442-001/002

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 SUBSYSTEM: NA
 EFFECTIVITY: ALL ORBITERS

FAILURE MODE NUMBER	CRITICALITY	FAILURE EFFECT	RETENTION RATIONALE
PBAS-2-1	1R/2		
FUNCTION The Push Button Articulating Socket is used as a crew restraint. It increases the height of the PFR platform from the PFR Socket and gives the user an additional joint to manipulate.		RHD ITEM Cannot slow the Articulating Socket for landing.	d. Functional All pip pins will be functionally operated and operation loads recorded prior to and immediately after all acceptance level testing to determine if there has been any adverse effects due to the test environment. B. Certification Testing 1. Thermal Vacuum The PBAS was exposed to a cold temperature (-110°F) vacuum (1x10 ⁻⁵ torrs) environment. This test was used to check the functionality of the pip pin with successful results. 2. Functionals The PBAS was functionally operated prior to and immediately after all acceptance and certification tests to verify that the test environment did not degrade the hardware performance. C. Certification Analysis All PBAS components were analyzed to the following induced environments to verify that the assembly can withstand the environment levels: 1. Requirements Source a. Structures • J.R. (Is = 2.0) NSTS-07700 VOL. XIV • Fracture NSTS-07700 VOL. XIV
FAILURE MODE AND CAUSE MODE Articulating Socket pip pin jams in a PFR socket and cannot be removed. CAUSE(S) 1) Binding 2) Contamination		MISSION None	
REUNDANCY SCREENS A - Pass B - Pass C - Pass		CREW / VEHICLE Possible damage to orbiter if Articulating Socket comes loose in payload bay during landing	
REMAINING PATHS 1) Hitch pin on Pip Pin		INTERFACE PFR Socket	
MISSION PHASE		CORRECTIVE ACTION TIMES	
		TIME TO EFFECT	TIME TO CORRECT
EVA		Minutes	Seconds

PREPARED BY: J. F. PARK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 8/10/93

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CRITICAL ITEMS LIST

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SUBSYSTEM: N/A

EFFECTIVITY ALL ORBITERS

REFERENCE DESIGNATOR: PBAS-2
 NAME / QUANTITY: Pip pin 1
 DRAWING REFERENCE: 8E03943492

PROJECT: Push Button Articulating Socket (PBAS)
 LRU NAME / QUANTITY: PBAS1
 LRU PART NUMBER: 8E039124000-301002

FAILURE MODE NUMBER PBAS-2-1	CRITICALITY 1R/2	FAILURE EFFECT	RETENTION RATIONALE				
FUNCTION The Push Button Articulating Socket is used as a crew restraint. It increases the height of the PFR platform from the PFR Socket and gives the user an additional joint to manipulate.		END ITEM Cannot slow the Articulating Socket for landing.	b. <u>Temperature</u> - Hot (+250°F) - Cold (-110°F) NSTS-07700 VOL. XIV, Appendix 7. JSC-37873-A III. <u>Inspection</u> A. <u>Manufacturing</u> 1. The PBAS components were inspected prior to build-up for conformance to their applicable drawings. 2. The pip pin is not fracture critical. 3. The pip pin were inspected upon delivery. B. <u>Assembly</u> 1. PBAS will be cleaned to GC and inspected to the levels described in JSC 53229. Once cleaned, the PBAS will be bagged to prevent any contamination from entering the unit. C. <u>Testing</u> 1. The pip pin was fully inspected for any signs of loose parts as a part of the pre/post functional tests performed prior to and immediately after all certification and acceptance tests. 2. After each flight, the assembly will be fully inspected and a prior to each flight, a PIA will be performed to verify that the hardware especially the pip pin is operating properly.				
FAILURE MODE AND CAUSE MODE Articulating Socket pip pin jams in a PFR socket and cannot be removed. CAUSE(S) 1) Binding 2) Contamination		MISSION None					
REDUNDANCY SCREENS A - Pass B - Pass C - Pass		CREW / VEHICLE Possible damage to orbiter if Articulating Socket comes loose in payload bay during landing.					
REMAINING PATHS 1) Hitch pin on Pip Pin		INTERFACE PFR Socket					
MISSION PHASE EVA		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	Minutes	Seconds
TIME TO EFFECT	TIME TO CORRECT						
Minutes	Seconds						

PREPARED BY: J. F. PARK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 01/093

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CRITICAL ITEMS LIST

REFERENCE DESIGNATOR: PBAS-2
 NAME / QUANTITY: Ptp pin/1
 DRAWING REFERENCE: BSC00124002

PROJECT: Push Button Articulating Socket (PBAS)
 LRU NAME / QUANTITY: PBAS/1
 LRU PART NUMBER: BSC00124005-001002

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 SUBSYSTEM: N/A
 EFFECTIVITY: ALL ORBITERS

FAILURE MODE NUMBER PBAS-2-1	CRITICALITY 1R/2	FAILURE EFFECT	RETENTION RATIONALE
FUNCTION The Push Button Articulating Socket is used as a crew restraint. It increases the height of the PFR platform from the PFR Socket and gives the user an additional joint to manipulate.		END ITEM Cannot stow the Articulating Socket for landing. MISSION None CREW / VEHICLE Possible damage to orbiter if Articulating Socket comes loose in payload bay during landing. INTERFACE PFR Socket	IV. Failure History A. None, the PBAS first flight is STS-51. V. Operations A. <u>Effects of Failure</u> The PBAS is jammed in a PFR socket for landing and may damage the orbiter if it comes loose in the payload bay during landing. B. <u>Crew Actions</u> Insert the hitch pin into the pip pin to secure the PBAS in place. C. <u>Training</u> Crew must be trained in the procedure to attempt removal of the PBAS with crowbar if hitch pin is unable to be installed. D. <u>Mission Constraints</u> None E. <u>In flight Check-Outs</u> None
FAILURE MODE AND CAUSE MODE Articulating Socket pip pin jams in a PFR socket and cannot be removed. CAUSE(S) 1) Binding 2) Contamination			
REDUNDANCY SCREENS A - Pass B - Pass C - Pass	REMAINING PATHS 1) Hitch pin on Pip Pin		
MISSION PHASE	CORRECTIVE ACTION TIMES TIME TO EFFECT TIME TO CORRECT		
EVA	Minutes Seconds		

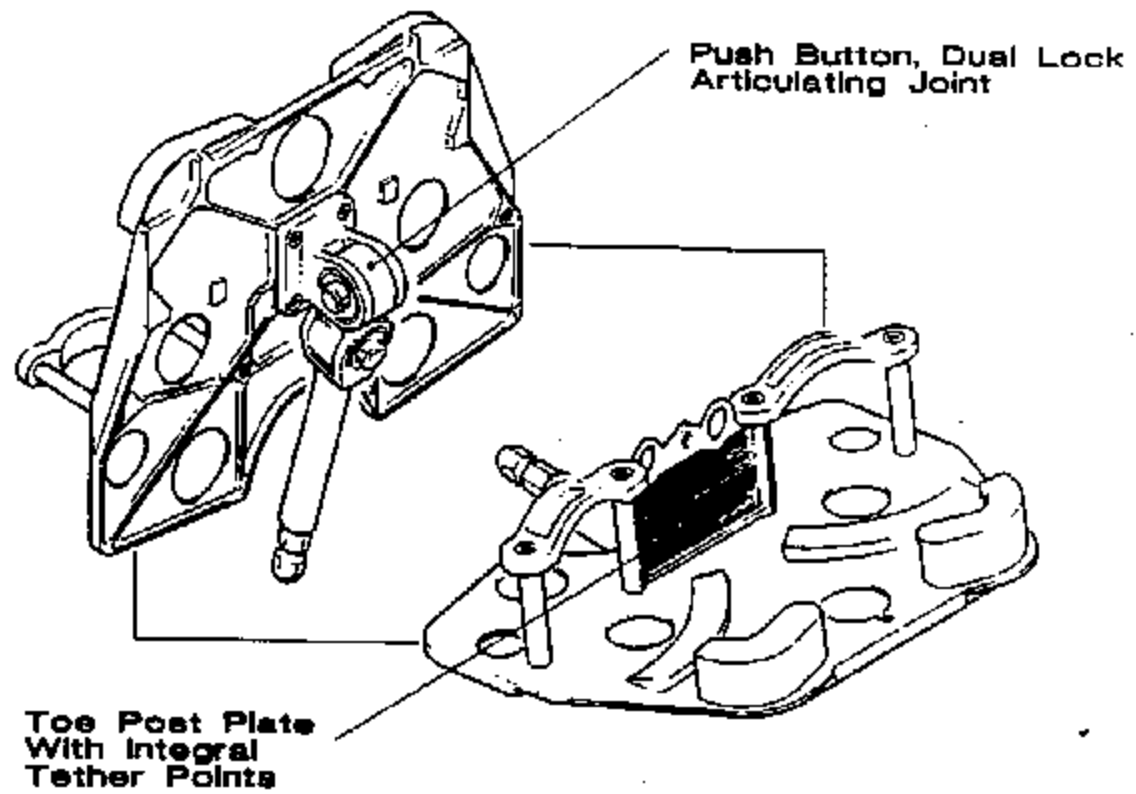
PREPARED BY: J. F. PARK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 8/19/93

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FMEA/CIL for the PB PFR and PBAS, JSC-37837

