

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE																																
BRIEF ASSEMBLY, ITEM 104 ----- 0104-811071-04 (1)	2/1R	104FM24 Loss of primary axial restraint webbing. Defective Material: Worn thread or webbing.	END ITEM: Loss of primary axial restraint. GFE INTERFACE: Axial load will be transferred to secondary restraint. MISSION: None. CREW/VEHICLE: None with single failure. Loss of crewman with loss of secondary restraint webbing. TIME TO EFFECT /ACTIONS: Minutes.	<p>A. Design - The Brief Assembly axial restraints are fabricated from 3/4" wide Spectra 1000 webbing. Size "F" and "FF" polyester thread conforming to V-T-285D type II, class I is used to fabricate the primary axial restraints with type 301 lock stitching conforming to FED-STD-751A. Seams are terminated by backtack and searing of thread ends. Worn thread is precluded by design as a function of the abrasion protection afforded the axial restraints by the TMG.</p> <p>The Brief Restraints were pulled to destruction during design verification testing. Ultimate strength values and safety factors against limit loads are as shown below:</p> <table border="1"> <thead> <tr> <th></th> <th>Brief Restraint Webbing</th> <th>S/AD Pressure Load (lbs)</th> <th>Ultimate Strength (lbs)</th> <th>Ultimate Safety Factor</th> <th>S/AD Safety Factor Req't</th> </tr> </thead> <tbody> <tr> <td>Fore/Aft</td> <td></td> <td>4.4/677 5.5/758 8.8/761</td> <td>1616</td> <td>2.4 2.1 2.1</td> <td>2.0 1.5 1.5</td> </tr> <tr> <td>Thigh Side</td> <td></td> <td>4.4/593 5.5/560 8.8/483</td> <td>1574</td> <td>2.7 2.8 3.3</td> <td>2.0 1.5 1.5</td> </tr> <tr> <td>Thigh Inboard</td> <td></td> <td>4.4/483 5.5/485 8.8/393</td> <td>2115</td> <td>4.4 4.4 5.4</td> <td>2.0 1.5 1.5</td> </tr> </tbody> </table> <p>B. Test - Acceptance: The primary and secondary axial restraints are subjected to the S/AD limit load, as referenced in the design section, during fabrication of each LTA restraint.</p> <p>PDA: The following test is conducted at the LTA level in accordance with ILC Document 0111-710112: Proof pressure test at 8.0 + 0.2 - 0.0 psig for a minimum of 5 minutes conducted with the TMG removed.</p> <p>Certification: The Brief axial restraints were successfully tested (manned) during SSA certification to duplicate 458 hours operational life (Ref. ILC Report 0111-711330). The following usage, reflecting requirements of significance to the brief restraints, was documented during certification:</p> <table border="1"> <thead> <tr> <th>Primary Axial Restraint Requirement</th> <th>S/AD ----</th> <th>Actual -----</th> </tr> </thead> <tbody> <tr> <td>Hip Abd/Add</td> <td>458</td> <td>1200</td> </tr> </tbody> </table>				Brief Restraint Webbing	S/AD Pressure Load (lbs)	Ultimate Strength (lbs)	Ultimate Safety Factor	S/AD Safety Factor Req't	Fore/Aft		4.4/677 5.5/758 8.8/761	1616	2.4 2.1 2.1	2.0 1.5 1.5	Thigh Side		4.4/593 5.5/560 8.8/483	1574	2.7 2.8 3.3	2.0 1.5 1.5	Thigh Inboard		4.4/483 5.5/485 8.8/393	2115	4.4 4.4 5.4	2.0 1.5 1.5	Primary Axial Restraint Requirement	S/AD ----	Actual -----	Hip Abd/Add	458	1200
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		104FM24			
				Hip Flex/Ext.	1524 3200
				Waist Flex/Ext	1234 2800
				Waist Rotations	2466 6000
				Don/Doff Cycles	98 400
				Pressure Hours	458 916
				Walking Steps	4320 77760
				Secondary Axial Restraint	
				Requirement	S/AD Actual
				-----	-----
				Hip Abd/Add	229 600
				Hip Flex/Ext.	762 1600
				Waist Flex/Ext.	617 1400

The restraints were successfully subjected to an ultimate pressure of 13.2 psid during SSA certification testing (Ref. ILC Report 0111-711330). This is 1.5 times maximum BTA operating pressure based on 8.8 psid.

C. Inspection -

Components and material manufactured to ILC requirements at an approved supplier are documented from procurement through shipping by the supplier. ILC incoming receiving inspection verifies that the materials received are as identified in the procurement documents, that no damage has occurred during shipment and that supplier certifications have been received which provide traceability information.

The following MIPs are performed during the brief assembly manufacturing process to assure that the failure causes are precluded from the fabricated item:

1. Visual inspection upon completion of the restraint webbing pull test for signs of defective threads and material.

During PDA, the following inspection points are performed at the brief assembly level in accordance with ILC Document 0111-710112:

1. Visual inspection for material degradation.
2. Visual inspection for structural damage following proof pressure test.

D. Failure History -

Non-Enhanced:

B-EMU-104-T013 (10/26/99) - During 40-hour reverification of the enhanced LTA, broken threads noted on the brief restraint assembly. Cause is contact against the brief restraint bracket. Procedure for installation of an abrasion patch provided to USA for repair of Class IIIW units.

B-EMU-104-A065 (12/10/99) - Snag and broken thread on right inside secondary F.A.R. restraint line. Most probable cause is incidental tool tip to webbing contact when inner FAR mounting screws were backed out. ECO #991-0090-1 changes Maint. Manual to add more steps to remove or install brief thigh restraint webbings and pins.

E. Ground Turnaround -

None, for every component within its limited life requirement.

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Every 4 years or 229 hours of manned pressurized time the lower torso restraint and bladder assembly is removed from the LTA and subjected to complete visual inspection for material degradation or damage.

F. Operational Use -
Crew Response -
Pre/post-EVA : If not detected, no response. If detected audibly or tactily, troubleshoot problem. If no success, use spare LTA if available or terminate EVA prep.
EVA : Single failure not detectable, no response.
Special Training -
No training specifically covers this failure mode.
Operational Considerations -
Not applicable.

EXTRAVEHICULAR MOBILITY UNIT
SYSTEMS SAFETY REVIEW PANEL REVIEW
FOR THE
I-104 LOWER TORSO ASSEMBLY (LTA)
CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

Prepared by: *[Signature]* 3/27/02
HS - Project Engineering

Approved by: *[Signature]* 12/26/02
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