

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
BRIEF/WAIST ASSEMBLY, ITEM 104 ----- 0104-210605- 07/08/09/10/11/12 (1)	2/1R	104FM16 Loss of primary axial restraint bracket, front. Defective Material: Bracket, helicoil or thread lock adhesive. Missing screw.	END ITEM: Loss of primary axial restraint. GFE INTERFACE: Axial load will be transferred to secondary bracket. MISSION: None. CREW/VEHICLE: None with single failure. Loss of crewman with loss of secondary restraint bracket. TIME TO EFFECT /ACTIONS: Minutes. TIME AVAILABLE: Days. TIME REQUIRED: Hours. REDUNDANCY SCREENS: A-PASS B-N/A C-PASS	A. Design - The waist bearing front primary bracket is fabricated from 17-4 stainless steel. The brackets are machined or cast/machined, ultrasonic cleaned, passivated and either electropolished or dry hone finished. During tensile testing of the aluminum waist bearing, the front primary axial restraint bracket exhibited a minimum strength of 3900 lbs. demonstrating a minimum safety factor of 5.8 against a S/AD limit load of 677 lbs. The required S/AD minimum safety factor for waist hardware is 2.0. The bracket attachment screws are fabricated from A-286 stainless steel and are procured to MS or NAS specifications. Analysis showed that the primary screws have a factor of safety of 7.6 for ultimate tensile failure. Loss of the waist bearing front bracket screw is precluded in design by adherence to standard engineering torque requirements for screw installation and the use of thread lock adhesive. Design requirements for proper installation of helicoils are specified in the assembly procedures when the helicoils are installed in the waist bearing. B. Test - Acceptance: Component - See Inspection. PDA: The following tests are conducted at the Brief/Waist assembly 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. Certification: The waist bearing primary restraint brackets were successfully tested (manned) during SSA certification to duplicate operational life (Ref. ILC Engineering Memorandum EM-83-1083). The following usage, reflecting requirements of significance to the waist restraints was documented during certification. Requirement S/AD Actual ----- Waist Cycles 1234 22176 Waist Rotations 2466 12236 Pressure Cycles 300 2045 Don/Doff Cycles 98 445 Pressure Hours 458 1646 Walking Steps 4320 77760 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

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the procurement documents, that no damage has occurred during shipment and that supplier certifications have been received which provide traceability information.

The bracket castings are radiographically inspected to detect the presence of flaws prior to machining and magnetic particle inspected after machining. The brackets that are machined from plate stock are magnetic particle inspected to detect the presence of flaws.

The following MIP's are performed during the brief/Waist assembly manufacturing process to assure the failure cause is precluded from the fabricated item:

1. Verification of loctite application.
2. Verification of presence of screws during torquing operations.
3. Helicoil installation is verified during source inspection at the supplier.
4. Visual inspection for defective material upon completion of webbing pull test.

During PDA, the following inspection points are performed at the LTA 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 -
None.

E. Ground Turnaround -
None, for every component within its limited life requirements.

Every four years or 229 hours of manned pressurized time, during waist bearing maintenance the primary and secondary axial restraint brackets are removed and reinstalled during which time screw torque and loctite application are verified.

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

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