

12/24/93 SUPERSEDES 12/24/91

ANALYST:

NAME P/N QTY	CRIT	FAILURE MODE & CAUSE	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
LOWER ARM RESTRAINT & BLADDER ASSEMBLY ITEM 103 ----- 0103-02351-16 ----- 0103-09752-01 ----- (1) LEFT, (1) RIGHT ----- 2	2/1N	103PM14: Loss of primary axial restraint "E" bracket. CAUSE: Defective Material, Missing or loose keeper screw.	END ITEM: Loss of primary axial restraint. GPE 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.	A. Design - The primary restraint "E" bracket is fabricated from 17-4 stainless steel casting or bar stock. The brackets are machined or cast/machined, ultrasonic cleaned, passivated and either electropolished or dry hone finished. The "E" bracket keeper screw is fabricated from stainless steel and procured to the MAS specification. The loss of the "E" bracket keeper screw is precluded in design by adherence to standard engineering torque requirements for screw installation. Also, the end threads are coated with Hysol epoxy to prevent abrasion of the restraint webbing and to prevent loss of the keeper screw. B. Test - Acceptance: The lower arm axial restraint "E" bracket is subjected to S/AD limit load of 290 pounds during fabrication of each lower arm restraint. PDA: The following test is conducted at Arm Assembly level in accordance with ILC Document 0111-70029J. A proof-pressure test at 8.0 + 0.2 - 0.0 psig for a minimum of 5 minutes conducted with the IM3 removed. Certification: The lower arm axial restraints were successfully tested (named) during SSR certification to duplicate six years operational usage (Ref. Cert Test Report for the SSA, ILC Document 0111-70027). The following usage, reflecting requirements of significance to the lower arm restraints, was documented during certification: Primary Axial Restraint Requirement S/AD Actual Equip Life (yrs) ----- Shoulder Cycles 10,142 15,260 9.0 Shoulder Rotations 10,142 15,260 9.0 Elbow Cycles 43,334 65,613 9.1 Pressure Cycles 432 436 6.0 Don/off Cycles 144 364 15.2 Pressure Hours 461 615 8.0

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2/1R 103FM14:

Per EN # 93-1131:
Secondary Axial Restraint Requirement

	S/AD	Actual
Shoulder Cycles	2002	2160
Shoulder Rotations	2002	2160
Elbow Cycles	8554	8640
Pressure Cycles	32	74

The lower arm axial restraints were successfully subjected to an ultimate pressure of 10.6 psig during SSA certification testing (Ref. Document 0111-70027). This is two times maximum operating pressure based on 5.3 psi. Recertification to 5.5 psi was by test and analysis (Ref. ILC EN 04-1108).

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 provides traceability information.

The following NIP's are performed during the arm assembly manufacturing process to assure that the failure causes are precluded from the fabricated items:
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 bar stock are magnetic particles inspected to detect the presence of flaws.

During PMA, the following inspection points are performed at the arm assembly level in accordance with ILC Document 0111-70028J:
Verify, by visual inspection, no structural damage following proof pressure test.

D. Failure History -
None.

CIL
 EPU CRITICAL ITEMS LIST

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	2/1R	103PH14:		

E. Ground Turnaround -

During ground turnaround in accordance with FEMU-R-001 the arm assembly is inspected (with TNGs removed) pressurized and unpressurized for material damage, structural integrity and loose or missing screws. Screw torque is verified at the SEMU and gas structural and leakage tests are also performed at the SEMU and EPU level.

F. Operational Use -

Crew Response -

Pre EVA: No response. Single failure is not likely to be detected. If problem detected tactually or audibly, trouble shoot. If no success, consider 3rd EMD if available. EPU is go for ECU.

EVA: No response. Single failure not detectable.

Training -

No training specifically covers this failure mode.

Operational Considerations -

Not applicable.