

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
UPPER ARM ASSEMBLY, ITEM 103 ----- 0103-212113-05/08 ()	3/1RA	103FM09Y External gas leakage (ball port or test port). Contamination wear or deterioration of ball port plug or test port plug o-seal. Defective material; ball port or test port plug o-seal.	END ITEM: Gas leakage through test port or ball port seal. GFE INTERFACE: Opening of leakage path between ball race area and ambient. MISSION: No effect with single failure (loss of test port or ball port seal). With second failure (loss of primary seal) high O2 use. Loss of EVA. CREW/VEHICLE: No effect with single failure (test port or ball port seal) or secondary failure (primary seal). Loss of crewman with third failure (loss of SOP). TIME TO EFFECT /ACTIONS: Seconds. TIME AVAILABLE: Minutes. TIME REQUIRED: Minutes. REDUNDANCY SCREENS:	A. Design - The fluorosilicone "O"-rings mounted in the test port or ball plug are in a static condition. Proper lead-in chamfers and radii on mating hardware components preclude damage to the O-rings during installation. The screws are fabricated from a AMS 5737 (A286) stainless steel and procured to A.N. specifications. Loss of the screws is precluded in design by adherence to standard engineering torque requirements for screw installation. B. Test - Component Acceptance Test: The arm bearing is subjected to testing per Airlock ATP 10209 at Airlock with ILC source verification. During acceptance testing, a test fixture with the same size O-ring is utilized for pressure testing. No specific pressure test is conducted on the test port plug assembly. PDA: The following tests are conducted at the Arm Bearing level in accordance with ILC Document 0111-710112: 1. Initial leak test at 4.3 +/- 0.1 psig to verify leakage less than 4.0 scc/min. 2. Proof pressure test at 8.0 + 0.2 - 0.0 psig to verify no structural damage. 3. Post-proof pressure leak test at 4.3 +/- 0.1 psig to verify leakage less than 4.0 scc/min. 4. Final leak test at 4.3 +/- 0.1 psig to verify leakage less than 4.0 scc/min. Certification: The dual seal arm bearing successfully passed SSA certification testing (manned) to duplicate 458 hours operational usage (Ref. ILC Report 0111-711330). 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 certification have been received which provides traceability information. The following MIPs are performed during the arm bearing assembly manufacturing process to assure the failure cause is precluded from the fabricated item: 1. Verification of presence of ball port plug, test port plug and retainer screw. 2. Visual inspection of ball port and test port plug "O" ring for gouges, nicks, tears and mold imperfections. During PDA, the following inspection points are performed at the arm assembly level in accordance with ILC Document 0111-710112: 1. Inspection for cleanliness to VC level. 2. Visual inspection for damage after proof-pressure test. D. Failure History - None.

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		103FM09Y	A-FAIL B-N/A C-PASS	<p>E. Ground Turnaround - None for every component which is within its limited life requirements. The ball port and test port and o-rings are visually inspected for nicks, burrs, damage, etc. as part of maintenance. The ball port is functionally checked during each maintenance cycle to verify no leakage exists. Both ball port and test port are verified to be installed and torqued as part of maintenance.</p> <p>F. Operational Use - Crew Response - Pre EVA: No response, single failure not detectable. EVA: No response, single failure not detectable.</p> <p>Special Training - No training covers this failure mode.</p> <p>Operational Considerations - EVA checklist procedures verify hardware integrity and systems operational status prior to EVA. Flight rules define go/no go criteria related to EMU pressure integrity.</p>

EXTRAVEHICULAR MOBILITY UNIT
SYSTEMS SAFETY REVIEW PANEL REVIEW
FOR THE
I-103 ARM ASSEMBLY
CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

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