NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		103FM10		
DUAL SEAL ARM BEARING, ITEM 103 (1) LEFT (1) RIGHT ---------- 10209-04 (2)	2/2	Physical binding or jamming. Contamination or FOD in race, corrosion, dislodged environmental seal. Defective Material: Inner/outer race or ball bearings. Defective vespel spacer balls or lip seals.	END ITEM: Binding or jamming of bearing. Bearing torque increased. GFE INTERFACE: Hampered mobility in arm movement. MISSION: Terminate EVA. CREW/VEHICLE: None. TIME TO EFFECT /ACTIONS: Minutes. TIME AVAILABLE: Hours. TIME REQUIRED: Minutes. REDUNDANCY SCREENS: A-N/A B-N/A C-N/A	A. Design - Contamination is precluded from entering the arm bearing assembly by dual environmental seals, one on each side of the bearing assembly. These seals fit into mating grooves in the inner and outer races and form a seal to preclude introduction of contamination into the pressure seal and ball raceway areas. The fit also precludes seal dislodging which could lead to binding/jamming of the bearing assembly. Binding/jamming is also prevented by lightly lubricating the bearing races and separator seal with Braycote oil. B. Test - Acceptance: The arm bearing is subjected to testing per ATP 10209 for P/N 10209 at Airlock with ILC source verification. The assembly is pressurized in the test fixture to 8.0 (+0.2 - 0.0) psig for a 5 minute duration and leakage tested to 4.3 + 0.1 psig. The assembly is rotated a minimum of twenty complete turns. The torque, while in the test fixture, is verified to be a maximum of 15 in-lbs. PDA: The arm bearing is torque tested at the arm assembly level in accordance with ILC Document 0111-710112. Certification: The Arm Bearing Assembly was successfully tested (manned) during SSA certification to duplicate 458 hours of operational life (Ref. ILC Report 0111-711330). The following usage, reflecting requirements of significance to the dual seal arm, was documented during certification: Requirement / S/AD / Actual Shoulder Rotation: 29348 / 30000* Don/Doff Cycles: 98 / 400 Pressure Hours: 458 / 916 * The "Actuals" reflect the stainless steel arm beriang rotations applicable to this failure mode (Ref. ILC Report 0111-711529). The baseline arm bearing assembly has successfully passed shock vibration and acceleration testing (Ref. HSD Test Reports TER 3067, TER 3048 and TER 3076). The enhanced arm assembly has been certified by similarity to the baseline arm. 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 hardware 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 MIP's are performed during the arm assembly manufacturing process to assure that the failure causes are precluded from the fabricated item: 1. Inspect environmental seals for proper installation. 2. Verification/inspection of ball bearings for proper size. 3. Visual inspection of races for corrosion, foreign matter or contamination. 4. Verification of cleanliness to VC level.

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		103FM10		5. Visual inspection after proof and leakage testing for deformation, defects or damage. During PDA, the following inspection points are performed at the Arm Assembly level in accordance with ILC Document 0111-710112: 1. Inspection for VC level cleanliness. 2. Inspection for damage, wear or material degradation. 3. Verification of arm bearing torque (in arm assembly) which is not to exceed 30 in-lbs. at 4.3 + 0.1 psig. D. Failure History - None. E. Ground Turnaround - Tested for non-EET processing per FEMU-R-001, Pre-Flight Inspections and Final Structural and Leakage, Bearing Torque. None for EET processing. Every 4 years or 229 hours of manned pressurized time, the bearing is: disassembled, cleaned, inspected, lubricated and reassembled. Following reinstallation of the bearings the arm is subjected to structural and leakage tests and quantitative torque measurement. F. Operational Use - Crew Response - Pre EVA: Trouble shoot problem. If no success, consider use of third EMU if available. Otherwise, continue EVA prep. EMU is go for SCU. EVA: Assess problem. If no longer able to move safely and/or effectively, terminate EVA. Training - No training specifically covers this failure mode. Operational Considerations - EVA checklist procedures verify hardware integrity and systems operational status prior to EVA.

EXTRAVEHICULAR MOBILITY UNIT

SYSTEMS SAFETY REVIEW PANEL REVIEW

FOR THE

I-103 ARM ASSEMBLY

CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

Prepared by: _____ 5/27/02
HS - Project Engineering

Approved by: _____
NASA - SSA/SSM

_____
HS - Reliability

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NASA - EMU/SSM

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HS - Engineering Manager

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NASA - S&MA

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NASA - MOD

_____ 6/04/02
NASA - Crew

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NASA - Program Manager