NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		103FM02		
DUAL SEAL SCYE BEARING ASSEMBLY ITEM 103 (1) LEFT (1) RIGHT --- A/L 10085-03/04 (2) OR --- A/L 10134-01/02 (2) OR --- A/L 10135-01/02 (2)	2/1R	Loss of primary axial restraint bracket swivel. Defective Material: Bracket, swivel or swivel pin, restraint pin, pin retainer screws. Broken swivel pin.	END ITEM: Loss of primary axial load restraining capability. GFE INTERFACE: Axial load will be transferred to secondary restraint. MISSION: None with loss of primary restraint. Loss of EVA with loss of secondary restraint. CREW/VEHICLE: None with loss of primary restraint. Loss of crewman with loss of secondary restraint. TIME TO EFFECT /ACTIONS: Minutes. TIME AVAILABLE: Days. TIME REQUIRED: Days. REDUNDANCY SCREENS: A-PASS B-N/A C-PASS	A. Design - The scye bearing primary restraint bracket and swivel are fabricated from 17-4 stainless steel bar stock. The bracket and swivel are heat treated to condition H-1050, ultrasonically cleaned, passivated and either electropolished or dry hone finished. Two threaded 17-4 stainless steel pins are utlized to retain a 17-4 stainless steel restraint pin which has a 16 finish to preclude restraint webbing abrasion. A keyed clevis nut retains the swivel by utilization of a NAS1101E04-4 screw. The clevis nut is coated with Nedox on the surface on which the swivel rotates. Analysis of the primary restraint bracket swivel has shown a minimum ultimate strength of 822 lbs. and a yield strength of 632 lbs. At 4.4 psid (normal operating pressure) the S/AD limit load is 288 lbs., giving the bracket swivel a safety factor of 2.9 for ultimate and 2.2 for yield. At 5.5 psid (max failure pressure) and 8.8 psid (max BTA operating presure), the bracket swivel provides safety factors for ultimate of 2.8 and 2.8 against limit loads of 290 lbs. and 295 lbs. respectively. The S/AD minimum safety factor for hardware at 4.4 paid is 2.0 for ultimate and 1.5 for yield. At both 5.5 psid and 8.8 psid, and S/AD minimum safety factor for hardware is 1.5 for ultimate. B. Test - Acceptance Test - Component - See Inspection. PDA - The following test is conducted at the scye bearing level in accordance with ILC Document 0111-710112: Proof pressure test at 8 + 0.2 - 0.0 psig for a minimum of 5 minutes. Certification - The scye bearing primary brackets were successfully tested (manned) during SSA certification to duplicate 458 hours operational usage (Ref. ILC Report 0111-711330). The following usage, reflecting requirements of significance to the scye bearing primary brackets, was documented during certification: Requirement / S/AD / Actual Add/Abd: 8484 / 18000 Lateral/Medial: 4092 / 10000 Flex/Extension: 7430 / 16000 Don/Doff Cycles: 98 / 400 Pressure Hours: 458 / 916 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 is 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 brackets that are machined from bar stock are magnetic particle inspected to detect the presence of flaws.

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
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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. Verification of Nedox application.
2. The brackets are visually inspected upon completion of the primary restraint webbing pull test for signs of defective materials.

During PDA, the following inspection points are performed at the arm assembly level in accordance with ILC Document 0111-710112:
1. Inspection for material degradation.
2. Verify by visual inspection, no structural damage following proof pressure test.

D. Failure History -
None.

E. Ground Turnaround -
Tested per FEMU-R-001, Pre-flight Inspections and Final Structural and Leakage, Bearing Torque. Every 4 years or 229 hours of manned pressurized time the bearing is disassembled, cleaned, inspected, lubricated and reassembled. Following reinstallation to the arm, the bearing is subjected to structural and leakage tests and quantitative torque measurements.

F. Operational Use -
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 EMU if available. Otherwise terminate EVA.
EVA: No response. Single failure not detectable.
Training -
No EMU training specifically covers this failure mode.
Operational Considerations -
Not applicable.

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: _____
HS - Project Engineering

_____
HS - Reliability

_____
HS - Engineering Manager

Approved by: _____
NASA - SSA/SSM

_____
NASA - EMU/SSM

_____ 6/24/02
NASA - S&MA

_____ 6/27/02
NASA - MOD

_____ 7/1/02
NASA - Crew

_____ 7-1-02
NASA - Program Manager