

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
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DUAL SEAL SCYE BEARING ASSEMBLY, ITEM 103 (1) LEFT, (1) RIGHT ----- A/L 10085-03/04 (2) OR ----- A/L 10135-01/02 (2) OR ----- A/L 10134-01/02 ( )	2/2	103FM04  Physical binding or jamming.  Contamination or foreign matter in race, corrosion, dislodged environmental seal.  Defective Material: inner/outer race, ball bearings, 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. If EVA return to airlock.  TIME AVAILABLE: N/A  TIME REQUIRED: N/A  REDUNDANCY SCREENS: A-N/A B-N/A C-N/A	A. Design - Contamination is precluded from entering the Scye bearing assembly by dual urethane 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 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 Krytox grease in the A/L 9782. Binding/jamming is also prevented by lightly lubricating the bearing races and pressure seals with Braycote in the A/L 10085.  Bearing races are made from 17-4 PH stainless steel heat treated to a 1050 condition and ball bearings are 440 stainless steel, both of which resist corrosion. Machined surface finish of the bearing is 63 to assure smooth bearing operation. Separator/pressure seals are made from polyester polyurethane.  B. Test - Acceptance: A torque test is performed at airlock per ATP 9782 or ATP 10085 to verify proper operation of the scye bearing. The bearing is rotated a minimum of 20 complete turns and the torque, while in the test fixture, is verified to be less than 22 in-lbs for the A/L 9782 and less than 18 in-lbs for the A/L 10085.  PDA: The scye bearing is torque tested at the arm assembly level in accordance with ILC Document 0111-70028J.  Certification: The Scye Bearing Assembly was successfully tested (manned) during SSA certification for fifteen years. Reference "15 year Certification Report for the Dual Seal Scye Bearing", ILC Document 0111-710464.  Requirement                      S/AD                      Actuals -----                              ----                      ----- Pressure Hours                      458                      1270 Pressure Cycles                      300                      1080 Scye Flex/Ext                      7430                      25355 Scye Rotation                      10142                      25355 Don/Doff Cycles                      98                      360
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 material 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 scye assembly manufacturing process to assure the failure cause is precluded from the fabricated item: 1. Inspect environmental seals for proper installation.				

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		103FM04		<p>2. Verification/inspection of ball bearings for proper size. 3. Visual inspection of races for corrosion, foreign matter or contamination. 4. Visual inspection, after proof and leakage testing for deformation, defects or damage.</p> <p>During PDA, the following inspection points are performed at the Arm Assembly level in accordance with ILC Document 0111-70028J: 1. Inspection for VC level cleanliness. 2. Verify Dual Seal Scye Bearing torque does not exceed 32 in-lbs.</p> <p>D. Failure History - I-EMU-103-C001 (1/14/90). Excessive force required to rotate the dual seal scye bearing due to an interference between the upper arm softgoods which are attached to the inner race, and the scye bearing outer race. ECO 891-0680 increase the axial length of the softgoods cavity in the outer race to enlarge the softgoods volume between inner and outer races.</p> <p>I-EMU-800--001 (4/10/00) During DVT testing of 12V SEMU Power Harness, suit subject unable to lower right arm. Power harness had looped around the scye bearing axial restraint swivel bracket, preventing arm movement. Excess harness length deflected downward and hooked on exposed swivel bracket. ECO 971-0318 corrects planar HUT by re-routing harness to eliminate exposure to swivel bracket. ECO 002-0152 corrects non-planar HUT by adding tunnel.</p> <p>E. Ground Turnaround - Tested per FEMU-R-001, Pre-Flight Inspections an 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 measurement.</p> <p>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.</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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