NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		106FM10Z		
DUAL SEAL WRIST BEARING, GLOVE SIDE, ITEM 106 (1) LEFT (1) RIGHT ---------- 10088-02 (2)	2/1R	Wrist bearing seal gas leakage. Contamination, wear or deterioration of the pressure seal. Inadequate seal squeeze.	END ITEM: Suit gas leakage past primary lip seal to bearing ball/race cavity. GFE INTERFACE: Suit gas leakage into bearing ball/race cavity. Suit pressure maintained by redundant lip seal, test port O-seal and ball port O-seal. MISSION: None for single failure. For dual seal failure depletion of primary O2 supply and SOP. Rapid depressurizatio n of SSA beyond SOP makeup capability. CREW/VEHICLE: None for single failure. Loss of crewperson with loss of both primary and secondary pressure seals. TIME TO EFFECT /ACTIONS: Seconds.	A. Design - Contamination is precluded from entering the wrist bearing assembly by two teflon 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 barrier to preclude introduction of contamination into the pressure seals and ball raceway areas. The pressure seals are made form polyester polyurethane and are lightly lubricated with Brayco 814Z oil to preclude wear. Vespel balls act as a ball separator/spacers. Each seal cross section provides minimum of .012 and maximum of .018 of seal squeeze to maintain positive operational pressure. When pressurized, the seals expand to seal firmly against the bearing races to ensure a maximum bearing leak of 4 sccm and a torque that will not exceed 4 in-lbs. B. Test - Component Acceptance Test: The wrist bearing is subjected to tsting per Airlock ATP 10088 at Airlock with ILC source verification. The primary and secondary seals are proof pressure tested with the bearing in the test fixture. The fixture is pressurized to 8.0 (+0.2 - 0.0) psig and held for 5 minutes. Following proof pressure testing, the bearing is pressurized to 4.3 +/- 0.1 psig, testing the primary and secondary seals verified to be less than 4 scc/min. With both seals pressurized separately and together in the operating condition, bearing torque is measured with the bearing pressurized between plates and verified to be less than 4 in-lbs. PDA: The following tests are conducted at the Glove Assembly level in accordance with ILC Document 0111-70028 (4000 glove) or 0111-710112 (Phase VI glove): 1. Initial leak test at 4.3 +/- 0.1 psig to verify leakage less than 8.0 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 8.0 scc/min. 4. Final leak test at 4.3 +/- 0.1 psig to verify leakage less than 8.0 scc/min. Certification: The wrist disconnect (10088) was successfully tested during SSA certification to duplicate operational life. The following usage reflecting requirements of significance for the wrist disconnect was documented during certification (Ref. ILC Report 0111-711330): Requirement S/AD Actual ---------- ---- ------ Rotation 40224 82000 Engage/Disengage 300 1080 Don/Doff 98 400 Pressure Hours 458 916 C. Inspection -

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		106FM10Z		
			TIME AVAILABLE: Minutes. TIME REQUIRED: Immediate. REDUNDANCY SCREENS: A-PASS B-N/A C-PASS	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 has been received which provides traceability information. The following MIP's are performed during the wrist bearing assembly manufacturing process to assure the failure cause is precluded from the fabricated item: 1. Visual inspection of pressure seals and environmental seals for gouges, nicks, tears and mold imperfections. 2. Verification of cleanliness to VC level. During PDA, the following inspection points are performed at the Glove Assembly level in accordance with ILC Document 0111-70028 (4000 glove) or 0111-710112 (Phase VI glove): 1. Inspection for cleanliness to VC level. 2. Visual inspection for damage after proof-pressure test. D. Failure History - None. E. Ground Turnaround - Tested per FEMU-R-001, Pre-Flight leakage test. However every 4 years of 229 hours of manned pressurized time, the wrist bearing assembly is disassembled, cleaned, inspected, lubricated and reassembled. Both seals are individually (at Glove level) subjeted to quantitative leakage tests. F. Operational Use - Crew Response - PreEVA: No response. Single failure not detectable. EVA: No response. Single failure not detectable. Training - No training covers this failure mode. Operational Considerations - Flight rule A15.1.2-2 of "Space Shuttle Operational Flight Rules", NSTS-12820 defines go/no go criteria related to EMU pressure integrity and regulation. Generic EVA Checklist, JSC-48023, procedures Section 3 (EMU Checkout) and 4 (EVA prep) verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.

EXTRAVEHICULAR MOBILITY UNIT

SYSTEMS SAFETY REVIEW PANEL REVIEW

FOR THE

I-106 GLOVE 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

_____
NASA – S&MA

_____
NASA – MOD

_____
NASA – Crew

_____
NASA – Program Manager