

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
MULTIPLE CONNECTOR (HUT HALF), ITEM 102 ----- A/L 9694-08 (1)	2/1R	External leakage, water from connector when coupled. Defective Material: O- ring, Misalignment of or damage to internal sealing surfaces, defective spring, or contamination.	END ITEM: Water leakage from connector to suit vent loop. GFE INTERFACE: Loss of cooling capability. Loss of water from water reservoir. Possible fogging of helmet. MISSION: Terminate EVA. CREW/VEHICLE: None with first failure. Loss of crewman if SOP fails. TIME TO EFFECT /ACTIONS: Minutes. Activate the Purge Valve. Return to airlock. TIME AVAILABLE: Minutes.	A. Design - The Multiple Water Connector is designed to have zero leakage when coupled. This is accomplished by using smooth machined inner surfaces, tight clearances, polyube coating, Krytox grease, and a series of "O" rings which seal all possible leak paths. The multiple connector and the plug ends are machined from 6061-T6 aluminum. The external sealing surface is machined to a 63 finish and the plug ends to a 16 finish. The compression spring is tempered stainless steel, "O" rings are silicone rubber and the hose clamp is machined from 7075-T73 aluminum. All screws are high strength alloy steel. The multiple connector three hose clamp is designed to minimize the cold flow characteristics of EVA tubing and thereby ensure the longevity of positive sealing. This is accomplished by machined grooves on the clamping surface. Leakage at the multiple connector/EVA tubing interface is precluded by the three hose clamp design and by torquing of clamp attachment screws to 7-9 inch lbs. Teflon penetrated hard coat anodize (polyube) finish provides a self-lubricating, high corrosion-resistance surface with a minimum finish of 63 on which krytox lubricated O-rings seal. A 30 degree x .045 edge break is specified on the leading edge of the HUT plug end to prevent damaging the LCVG o-ring during mating. All sliding surfaces are coated with krytox grease. Introduction of contamination as a cause of leakage is prevented by the wiping action of the HUT side multiple connector "O" ring along the LCVG connector housing sleeve during engagement. A redundant wiping action is provided by the LCVG multiple connector "O" ring to further eliminate the introduction of contamination. Stainless steels are passivated to remove residual corrosive elements. This combination of proper material selection and surface treatment prevents corrosion. B. Test - Acceptance: The MWC is leak and proof tested prior to acceptance by ILC per Airlock ATP 9694-08. PDA: During PDA, the MWC is leak and proof tested at the HUT level per ILC Document 0111-70028J (Pivoted HUT) or 0111-710112 (Planar HUT). Certification: The MWC was successfully tested (manned) during SSA certification to duplicate operational life (Ref. EM 83-1083, ILC Report 0111-70027 and EM 98-0008). The following usage reflecting requirements of significance to the MWC was documented during certification:
		REDUNDANCY SCREENS:		
		A-PASS B-PASS C-PASS		Requirement ----- MWC Actuation Cycles Pressure Hours Pressure Cycles S/AD ----- 300 458 300 Actual ----- 1080 916 600
				C. Inspection -

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		102FM22		<p>The MWC is inspected for defects in material and workmanship at acceptance testing per Airlock ATP 9694-08 and then at PDA per 0111-70028J (Pivoted HUT) or 0111-710112 (Planar HUT).</p> <p>D. Failure History - J-EMU-102--006 (10/02/84) Leak of HUT half of MWC. MWC was improperly assembled. Added quality verification step to procedures to preclude incorrect assembly.</p> <p>E. Ground Turnaround - Tested for non-EET processing per FEMU-R-001, Water Servicing, Leakage and Gas Removal. FEMU-R-001 Para 8.2 EMU Preflight KSC Checkout for EET processing. Every 369 days the MWC is disassembled, inspected, cleaned, lubricated. Following reassembly gas and water (structural and leakage) tests and subjective engagement evaluations are performed at the SEMU or EMU level.</p> <p>F. Operational Use - Crew Response - Pre/PostEVA: Trouble shoot problem, if no success, consider third EMU if available. EMU no go for EVA. EVA: Open helmet purge valve for CO2 control and anti-fog as required. Terminate EVA. Training - No training specifically covers this failure mode. Operational Considerations - EVA checklist procedures verify hardware integrity and system operational status prior to EVA. Flight rules define go/no go criteria related to EMU ventilation flow pressure integrity. Real Time Data System allows ground monitoring of EMU systems.</p>

EXTRAVEHICULAR MOBILITY UNIT
SYSTEMS SAFETY REVIEW PANEL REVIEW
FOR THE
I-102 HARD UPPER TORSO (HUT)
CRITICAL ITEM LIST (CIL)
EMU CONTRACT NO. NAS 9-97150

Prepared by: J. Chumley 3/27/02
HS - Project Engineering

Approved by: [Signature]
NASA - SSFVSSM

M. Snyder
HS - Reliability

[Signature] 5/14/02
[Redacted]

[Signature] for RTR
HS - Engineering Manager

[Signature] 5/23/02
[Redacted]

[Signature] 5/23/02
[Redacted]

[Signature] 6/04/02
[Redacted]

[Signature] 6/14/02
[Redacted]