

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
EVVA, ITEM 108 ----- 0108-10008-21 (1)	2/2	108FM08 Physical jamming of sun visor. Contamination or foreign matter defective lever.	END ITEM: Sun Visor jammed in open or closed position. GFE INTERFACE: Sun Visor will not rotate up or down. MISSION: Terminate EVA. CREW/VEHICLE: None. TIME TO EFFECT /ACTIONS: Seconds. TIME AVAILABLE: N/A TIME REQUIRED: N/A REDUNDANCY SCREENS: A-N/A B-N/A C-N/A	A. Design - Protection against jamming due to contamination or foreign matter is provided by the EVVA shell, tight tolerances, surface finish and lubrication. The visor is completely covered in the "up" position by the EVVA shell. This leaves only the open edge of the visor stack-up exposed to contamination. The tight gap between visors at this edge makes it unlikely that foreign matter could jam the visor. This same gap protects the visor from being jammed in the "down" position. The contour and surface finish of the visor makes it unlikely that contaminants or foreign matter could stick to the visor. Tight clearances in the actuator mechanism greatly reduces the possibility of contaminants entering the working mechanism to cause the jam. Further protection against jamming of the actuator mechanism is provided by the surface finish of the shaft (100), the use of low coefficient of friction teflon washers as spacers, and a dry film lubricant (Dow Corning 321). Lever dimensions were designed to clear the shell through the range of motion used to actuate the visor; precluding jamming by interference. The lever is retained by a special screw that goes through the pivot shaft, ensuring positive location of the lever. Axial play of the lever on the pivot is eliminated by this screw and, as a result, interference is eliminated. Incidence of jamming as a result of defective or loose lever screws is precluded by adherence to torque requirements for screw installation and the use of self-locking screws. The design of the lever visor drag mechanism uses a vespel friction pad against a stainless steel flange with a 63 finish. Correct tolerancing and use of these materials which will not gall or bind makes it unlikely that lever drag mechanism could cause the visor to jam. The visor is designed to control warping. The sun visor shape is controlled by three aluminum stiffeners bonded to the visor and by the two pivot mounting installation. These five stiffening conditions combine to control visor warping. B. Test - Acceptance: The EVVA assembly is subjected to testing at Airlock per ATP 9833 with ILC source verification. Starting torque for the sun visor is verified to be 4.5 to 10 in-lbs. PDA: The sun visor is tested for starting torque (4.5 to 10 in-lbs) per ILC Document 0111-70028J. Certification: The EV visor assembly was successfully tested (manned) during SSA certification to duplicate operational usage (Ref. ILC Engineering Memorandum EM-83-1083 and EM 98-0008). The following usage, reflecting requirement of significance to the EVVA was documented during certification testing:

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		108FM08		<table border="1"> <thead> <tr> <th>Requirement</th> <th>S/AD</th> <th>Actual</th> </tr> <tr> <th>-----</th> <th>----</th> <th>-----</th> </tr> </thead> <tbody> <tr> <td>Visor Actuations</td> <td>266</td> <td>778</td> </tr> </tbody> </table> <p>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 materials received are as identified in the procurement documents, that no damage has occurred during shipment and that supplier certification have been received which provides traceability information.</p> <p>The following MIP's are performed during the EVVA assembly manufacturing process to assure the failure cause is precluded from the EVVA assembly.</p> <ol style="list-style-type: none"> 1. Verification of cleanliness and operational sheet completion. 2. Visual inspection for defects or damage. 3. Verification of sun visor torque of 4.5 - 10 in-lbs. <p>During PDA, the assembly is inspected for defects or damage and starting torque is verified per ILC Document 0111-70028J. Insepction for cleanliness to VC level is also performed.</p> <p>D. Failure History - J-EMU-108-002 (02/14/83). Sun visor would not go full down. Corrected error in assembly. B-EMU-105-A007 (1/20/00) - Retraction/extension of sun visor loose during post-flight processing of a STS-103 helmet assembly (crewman Nicolier). Sun Visor torque below spec. NASA stopped investigation. Explained closed for all flights. Future sun visor torque anomalies to be corrected on DR per NASA.</p> <p>E. Ground Turnaround - Tested for non-EET processing per FEMU-R-001, Pre-Flight Test Requirements, sun visor and eyeshade torque. None for EET processing. Additionally, every 4 years from date of original EVVA and helmet interface the EVVA is removed from the helmet and completely inspected for structural integrity/material damage.</p> <p>F. Operational Use - Crew Response - Pre/post EVA - Troubleshoot problem. If vision not totally obscured, continue EVA operations. If vision totally obscured, terminate EVA operations. EVA - Use eyeshades if appropriate. If vision not totally obscured, continue EVA operations. If vision totally obscured, terminate EVA. Special Training - No training specifically covers this failure mode. Operational Considerations - EVA checklist procedures verify hardware integrity and systems operational status prior to EVA.</p>	Requirement	S/AD	Actual	-----	----	-----	Visor Actuations	266	778
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EXTRAVEHICULAR MOBILITY UNIT
SYSTEMS SAFETY REVIEW PANEL REVIEW
FOR THE
I-108 EXTRAVEHICULAR VISOR ASSEMBLY (EVVA)
CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

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