

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE

		115FM09		
SHEAR PLATE ASSEMBLY ITEM 115 (PIVOTED, PLANAR) ----- SV778540-56 (1)	2/2	Fails to allow 0.9 psig setting.	END ITEM: Failure to disengage 4.3 psi bellows spring and change primary suit regulator pressure setting from 4.3 psi to 0.9 psi when 02 actuator is in IV position.	A. Design - The mode change linkage consists of three main components. The first is a spring loaded translating rod which follows the cam input, the second is a moving lever which is attached to the primary regulator input and the translating rod, the third is a stationary lever which serves as a position adjustable ground. In operation, all three elements experience various system loadings. The maximum linkage loads occur during IV mode operation when the 12 lb mode change regulator spring load is moved to the linkage. The resulting maximum linkage bending stress is 7600 psi and shear stress is 1020 psi. These stresses result in a safety factor of 4.6 in bending and 22.0 in shear. During mode change, the linkage loading tension spring loads change from 14.5 to become 18. The resulting torsion stresses are good for over 10+6 mode change cycles.
OR (ORU) ----- SV824133-8 (1)		Linkage mechanism fractured or deformed; schedule change linkage spring fractures or relaxes.	GFE INTERFACE: Loss of capability to select 0.9 pressure regulation (IV position), during IV prebreathe and suit leak check. Degradation of suit mobility during IVA.	B. Test - Component Acceptance Test - 15 lbs maximum actuator sliding force is allowed per AT-E-115 Para. 10.0. "IV" 0.9 psi operation on the sensor path is verified during Para. 15.0 and 22.0. PDA Test - Proper actuator mechanism operation is verified during SEMU-60-010 at the PLSS level in which the force required to slide the actuator to any of 4 positions must be 15 lbs. maximum. Also, proper 0.9 psi "IV" operation is verified during PLSS SEMU-60-010 testing. Certification Testing - Certified for a useful life of 20 years from the date of manufacture. Successful refurbishment will extend useful life to 30 years max. (ref EMUM1- 0491, EMUM1-0027).
			MISSION: Loss of use of one EMU. Loss of CWS automatic suit leak check test.	After which, proper 0.6 psi "IV" operation was verified.
			CREW/VEHICLE: None.	C. Inspection - Details are 100% inspected per drawing dimensions and surface finish characteristics. Details are manufactured from material with certified physical and chemical properties.
			TIME TO EFFECT /ACTIONS: Immediate.	D. Failure History - J-EMU-115-002 (1-1-83) - 02 actuator binding due to actuation procedure utilized. As corrective action actuation forces are verified during PLSS PDA testing and short EMU testing. This assures that mechanism behavior is normal and within specification without a SOP attached. Crew training procedures were also altered to prevent a recurrence of this condition.
			TIME AVAILABLE: N/A	J-EMU-115-C002 (10-15-80) - Difficulty in moving 02 actuator during a "Manned EMU Vacuum Certification Test". As a corrective action Engineering Change 42803- 311 incorporated an actuator system having reduced operating forces, improved materials and lubricity, and improved glove hand feel.
			TIME REQUIRED: N/A	EMU-115-C002 (4-27-79) - Actuator binding due to interference with wires. As a corrective action EC 42800-024 was processed to relocate an electrical connector to eliminate routing of wire leads near the actuator cam.
			REDUNDANCY	EMU-115-C001 (10-6-78) - Actuator binding due to wear and flaking of Nituff coating from front side of actuator guide plate. As a corrective action an

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		115FM09	SCREENS: A-N/A B-N/A C-N/A	engineering change was processed to eliminate the need for Nituff coating by changing the actuator carriage and guide plate material to stainless steel instead of aluminum. The carriage was also chrome plated. E. Ground Turnaround - Tested for non-EET processing per FEMU-R-001, V1103 Performance Data and Item 113 Regulator Check. FEMU-R-001 Para 8.2 EMU Preflight KSC Checkout for EET processing. F. Operational Use - Crew Response - PreEVA: Trouble shoot problem. If no success, consider use of third EMU if available. Otherwise, continue EVA prep. Do leak checks using OFF position of 02 actuator. Do pre-breathe in PRESS position. Training - Standard training covers this failure mode. Operational Considerations - Flight rules define go/no go criteria related to EMU pressure regulation. EVA checklist procedures verify hardware integrity and systems operational status prior to EVA.

EXTRAVEHICULAR MOBILITY UNIT
SYSTEMS SAFETY REVIEW PANEL REVIEW
FOR THE
I-115 SHEAR PLATE ASSEMBLY
CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

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

Approved by: *RMB*
LSS

M. Smyth
HS - Reliability

V. Barnes
HS - Reliability

Alan Plough for RMA
HS - Engineering Manager

[Signature]
HS - Reliability

James J. Som - ul/mods
HS - Reliability

John Olin
HS - Reliability

[Signature]
HS - Reliability