NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		410FM08A		
Common Multiple Connector, Item 410 --- SV778872-24 (1)	2/2	Fails latch open, umbilical "T" handle. Failure, binding of locking mechanism, jamming of one or more couplings.	END ITEM: Unable to mate umbilical to DCM. GFE INTERFACE: Unable to recharge EMU. MISSION: Terminate mission. Unable to use one EMU during airlock activity. CREW/VEHICLE: None. TIME TO EFFECT /ACTIONS: Hours. TIME AVAILABLE: N/A TIME REQUIRED: N/A REDUNDANCY SCREENS: A-N/A B-N/A C-N/A	A. Design - Positive camming action by the umbilical lever ensures the axial engagement of the connector halves. The electrical connector, although rectangular, has a sufficiently flexible and floating part at the DCM half to allow easy connect/disconnect. Moment balance around the DCM latch shaft at the start of closing aids smooth mating. B. Test - Component Acceptance: IEU: Airlock ATP 9902-03 requires that 950 + 30 psig (N2) oxygen ports, 28.1 + .5 psig (H2O), 17.0 + .5 psig (H2O) Potable Water Port, the maximum allowable connect/disconnect force is 10 lbs. The required handle detent force is 0.5 to 3 lbs. SCU: Airlock ATP 9902-03 requires that 1005 + 30 psig (N2) oxygen ports, 22.5 + 0.5 psig (H2O), 22.5 + 0.5 psig (H2O) Potable Water Port, the maximum allowable connect/disconnect force is 10 lbs. The required handle detent force is 0.5 to 3 lbs. IPT: An in-process test is performed at HS to check that the "T" handle is operative under a minimum force while the assembly is pressurized at working conditions. PDA: An Umbilical "T" handle latch test is performed per EMU1-21-022(IEU) / SEMU-60-005 (SCU). The force required to actuate the handle latch must be 2-6 lbs. Certification: Certified for a useful life of 15 years. C. Inspection - Binding, failure of locking mechanism, jamming of one or more of the couplings. An in-process test is performed at HSWL to cycle the engagement and pressurizing of the item 10 times. An in-process test is also performed to check that the item engages properly under a maximum force of 10 lbs. While it is pressurized at working conditions. HS source inspection visually inspects umbilical connector, in addition to Air-lock final inspection. D. Failure History - IEU: None. SCU: J-EMU-410-001 (4/10/81) - Damaged electrical connector caused by connector misalignment. EC 42806-425 incorporates redesign to improve piloting features of connectors and float the DCM electrical connector. J-EMU-400-003 (1/24/83) - Failure to latch closed, caused by tolerance stack-up. EC 42806-13 revises dimensions. F-EMU-410-5A01 (11/13/84) - Difficulty with latch closure caused by loosening of setscrews which attach the cam handle to the camshaft. EC 42806-691 increases pre-load torque and adds use of Loctite for setscrew installation. J-EMU-400-005 (03/08/99) - Loose screw on SCU multiple connector I-410 latch plate due to inadequate engagement of screw into single hexagonal locking thread

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		410FM08A		of helical insert. All SCU/ESCU multiple connectors will have existing 0.25-inch length latch plate screw replaced with a 0.375-inch screw. Screw material to be changed from 300 series stainless steel to A286 for greater tensile strength. MS35233-13 screw replaced with NAS1101E04-6 screw. Ref. EC 182135-229 (SCU), 182135-246 (ESCU), 182135-250, 182135-252. CCBDs H6910, H6933, H6937, and SI-EMU1-422. E. Ground Turnaround - IEU: Tested per FEMU-G-527, engagement force test, latch test, out of detent force test. SCU: Tested per FEMU-R-001, EMU checkout in Orbiter, V1103.02, SCU/DCM interface verification. F. Operational Use - Pre/Post-EVA: Troubleshoot problem. If no success, discontinue use of umbilical and EMU. Special Training - Standard EMU training covers this failure mode. Operational Considerations - 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-410 SCU COMMON MULTIPLE CONNECTOR

CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

Prepared by: _____
HS - Project Engineering

_____
HS - Reliability

_____ 4/24/02
HS - Engineering Manager

Approved by: _____ 5/21/02
NASA – SSA/SSM
LSS

_____ 5/21/02
NASA – EMU/SSM

_____ 5/29/02
NASA - S & MA

_____ 5-30-02
NASA - MOD

_____ 6/04/02
NASA - Crew

_____ 6/3/02
NASA - Program Manager