

CIL
EMU CRITICAL ITEMS LIST

Page: 1
Date: 11/09/94

12/26/94 SUPERSEDES 12/24/92

ANALYST:

NAME P/N QTY	CRIF	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE															
CHECK VALVE/VENT FLOW SENSOR, ITEM 121 ----- SV771836-29 (1)	2/2	<p>121FM02: Falls out of tolerance, higher sensor trip point (reads low).</p> <p>CAUSE: Contamination (corrosion) causes increase in friction in the switch roller assembly or flapper bearings; loss of input due to electrical open in switch or connecting leads.</p>	<p>END ITEM: False failure indication of a loss in ventilation flow.</p> <p>GFE INTERFACE: False "NO VENT FLOW" message displayed on DCH.</p> <p>MISSION: Terminate EVA. EVA will issue a "NO VENT FLOW" failure message.</p> <p>CREW/VEHICLE: None.</p>	<p>A. Design - Vent flow air is filtered by the DCC. The moving force balance mechanism is located in an isolated compartment to further minimize particulate contamination. The materials of construction are selected to prevent corrosion. The selected switch is a standard hermetic aerospace miniature switch. Leads are soldered per MHB 5300 (3A).</p> <p>B. Test - Component Acceptance Testing per AT-E-121 - A flow signal performance test ensures that the sensor switch trips open and closed per the following:</p> <table border="1"> <thead> <tr> <th>Inlet Pressure</th> <th>N2 Flow to Open Switch</th> <th>N2 Flow to Close Switch</th> </tr> </thead> <tbody> <tr> <td>3.25-3.65 psia</td> <td>3.95 ACFM min.</td> <td>6.09 ACFM max.</td> </tr> <tr> <td>4.20-4.40 psia</td> <td>3.95 ACFM min.</td> <td>3.77 ACFM max.</td> </tr> <tr> <td>14.6-14.8 psia</td> <td>3.95 ACFM min.</td> <td>3.65 ACFM max.</td> </tr> <tr> <td>19.0-19.2 psia</td> <td>3.95 ACFM min.</td> <td>3.65 ACFM max.</td> </tr> </tbody> </table> <p>FOA Testing Per SEMU-6-010 - With the item installed in the PLSB, it is performance tested at an inlet pressure of 4.0-6.6 psig. The flapper is verified to open and close in the flow ranges of 3.7 - 5.1 ACFM N2 through an electrical signal.</p> <p>Certification Test - The item completed 3,651 flow and 1,893 check cycles which fulfilled the 15 year life requirement during 3/85. No engineering changes have been incorporated since this time.</p> <p>C. Inspection - Switch roller and flapper bearings are vendor supplied lubricated ball bearings monitored by H.S. source inspection. Cleanliness level of switch roller and flapper bearings are maintained to MS 155D C12 to minimize particulate contamination, all other details are maintained to MS 3150 gW150.</p> <p>Spring rates - Spring is 100% visually and dimensionally inspected. A force and displacement test is performed to insure proper load and spring rate is obtainable prior to assembly. Further verification is provided by inprocess</p>	Inlet Pressure	N2 Flow to Open Switch	N2 Flow to Close Switch	3.25-3.65 psia	3.95 ACFM min.	6.09 ACFM max.	4.20-4.40 psia	3.95 ACFM min.	3.77 ACFM max.	14.6-14.8 psia	3.95 ACFM min.	3.65 ACFM max.	19.0-19.2 psia	3.95 ACFM min.	3.65 ACFM max.
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2/2

121FH02:

testing (non-inspected) to insure proper performance before final spring and adjustment bonding. Electrical short in switch or connecting leads - switches (by sampling) are tested by the vendor per MIL-8-8805 to verify that there will be no short circuiting (welding or sticking of contacts); breakage, loosening or rotation of terminals or damage to the switch which will interfere with the electrical or mechanical performance of the switch. 100% inspected assembly of electrical wires between microswitch and frame connector.

D. Failure History -

J-EMU-121-A003 (4-26-85) The "NO VENT FLOW" signal was displayed below the specified minimum air flow of 3.7 ACFM, caused by corrosion of internal surfaces due to the process of water, and incomplete Teflon touchup procedure. Coating specs have reworked areas.

H-EMU-121-D003 (6-14-86) - The vent flow sensor switch closed at a flow rate greater than the specification requirement. The bellows adjusting screw had moved while applying epoxy to it. The in-process test (IPT) was revised to verify the ambient pressure set points after applying the epoxy bond prior to the acceptance test (AT).

H-EMU-121-A003 (9-15-86) - The vent flow sensor switch opened at a flow of 3.103 acfm versus a specification requirement of 3.7 acfm. corrosion deposits were found throughout the internal details due to excess water in the valve. The wobbleframe fractured and the bellows cracked causing the sensor to activate below the specification requirement. No corrective action was taken because the source of the water is unknown.

E. Ground Turnaround -

Ground tested per FEMU-R-001, SEMI Reduced Preinstallation Acceptance Testing, Para. 7.3.3.2.1.2, Water Servicing, Leakage, and Gas Removal.

F. Operational Use -

Crew Response -

Pre EVA: Trouble-shoot problem, if failure can be determined to be sensor, continue. Otherwise terminate EVA.

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Page: 3
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	2/2	121FR02-		EVA: If failure can be determined to be sensor, continue. Otherwise terminate EVA. Training - Standard EMU training covers this failure mode. Operational Considerations - Flight rules define EMU as go for loss of Vent flow sensor. EVA checklist and FDF procedures verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.