NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		132BFM02A		
PRESSURE TRANSDUCER FEEDWATER SUPPLY, ITEM 132B ---------- SV767793-7 (1) ---------- SV767793-8 (1)	2/2	Drifts low. 1.Pressure increase in the sensor reference cavity due to leakage through the case or sensing element. 2. Failure of the potentiometer linkage due to increased friction. 3. Mechanical shock loading of linkage causing misalignment of the element relative to the wiper. 4. Failure of the coil due to an open on the high side of the coil.	END ITEM: False indication of low water pressure. GFE INTERFACE: False CWS warning and indication that the reserve water supply is on-line. 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 - -5 Conrac and -7 Gulton: The sensing element is made of an all welded solution hardening Inconel diaphragm to maximize strength and reduce any shift due to over stressing it. All linkage/resistive element attaching screws are potted in place to prevent shifting. The assembly is vacuum outgassed and temperature cycled until stable. The sensor design minimizes sensor output shifting, increase in friction and excesive resistive element/wiper wear. The vacuum reference cavity is hermetically sealed in all metal/glass, welded/brazed case. The final seal to trap a vacuum within the case is accomplished by resistance welding a steel ball into the evacuation hole. B. Test - Testing - Component Acceptance Test - Conrac: The feedwater supply presure sensor is subjected to acceptance testing per Conrac procedure ATP (451329-64) prior to shipment by the assembly vendor. This testing includes the following tests to insure the sensor is stable. 1. The sensor is subjected to random vibration (6.1 grms) testing to insure there are no workmanship or material problems that would cause the voltage to shift low. 2. The sensor is subjected to calibration testing at high and low temperature (30 to 120 degrees F) to insure there are no defect that thermal expansion/contraction would uncover. 3. The sensor is calibration checked during acceptance testing to insure sensor is stable. 4. Proof pressure tested for one minute at 60 psia to insure pressure stability. Gulton: The feedwater supply pressure sensor is subjected to acceptance testing per Gulton procedure ATP 3031-15202 prior to shipment by the assembly vendor. This testing includes the following tests to insure the sensor is stable. 1. The sensor is subjected to ramdom vibration (6.1 grms) testing to insure there are no workmanship or material problems that would cause the voltage to shift low. 2. The sensor is subjected to calibration testing at high and low temperature (30 to 120 degrees F) to insure there are no defects that thermal expansion/contraction would uncover. 3. The sensor calibration is checked during acceptance testing to insure sensor is stable. 4. Proof pressure tested for one minute at 60 psia to insure pressure stability. PDA Test - The sensor calibration is checked at 0 and 16.5 psig as assembled on the PLSS to insure the output voltage is within specified limits. Certification Testing - Certified for a useful life of 20 years (ref. EMUM1-0084). C. Inspection - Conrac: 1) The sensor is visually inspected prior to case assembly to insure the unit has been assembled per print and that there are no workmanship problems which could cause the output voltage to shift low. 2. The sensor is calibration checked in the assembly process to insure the unit has been assembled per print and that the sensor output is within specified

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
		132BFM02A		limits. Gulton: 1) The sensor is visually inspected prior to case assembly to insure there are no workmanship problems which could cause the output voltage to shift low. 2. The sensor is calibration checked in the assembly process to insure the sensor output is within specified limits. 3. The sensor is pressure cycled for at least 350 cycles during assembly to insure the sensor is stabilized. 4. The sensor is temperature cycled between -65 degrees F and +200 degrees F to insure it is stable. D. Failure History - RDR EMU-132-C003, C004 (1-29-80) Test specification required sensor output of 15+/-0.2 psi but sensor specification accuracy is 15+/-0.8 psi. The test procedure was changed to agree with the sensor specification accuracy of 15+/-0.8 psi. RDR J-EMU-132-001 (10-18-80) Electrical connector seal leakage. Connector redesigned to have individual glass seals around each pin (EC 42802-924). There was no cert impact (connector used in other places in the EMU). RDR H-EMU-132-C001 (6-6-80) Leak in vacuum ball seal weld area (that seals the vacuum reference cavity). Ball weld technique is qualified procedure, weld methods and tooling were reviewed and found to be correct. Failure as considered to be a random occurance. RDR B-EMU-132-A001 (1/15/92) - The item 132B pressure sensor exhibited a continuous low output reading due to loss of reference vacuum and shorting of the potentiometer winding. The coil wires were worn and smeared causing adjacent wires to short together by the sliding contact of the wiper across them. This is the first data point of wear-out of the coil wire/slider of the sensors at 10.3 years of the sensor's fifteen year useful life. No corrective action taken. E. Ground Turnaround - Tested for non-EET processing per FEMU-R-001, Transducer and DCM Gage Calibration Check. FEMU-R-001 Para 8.2 EMU Preflight KSC Checkout for EET processing. F. Operational Use - Crew Response - EVA: When CWS data confirms activation of reserve water tank, terminate EVA. Training - Standard EMU training covers this failure mode. Operational Considerations - Flight rules require termination of EVA when minimum primary consumables remain. EVA checklist procedures 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-132 FEEDWATER SUPPLY PRESSURE SENSOR

CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

Prepared by: _____ 3/27/02
HS - Project Engineering

_____
HS - Reliability

_____
HS - Engineering Manager

Approved by: _____ 9/30/02
NASA - SSA/SSM
ES5

_____
NASA - [redacted]

_____
NASA - S&MA

_____
NASA - MOD

_____
NASA - Crew

_____
NASA - Program Manager