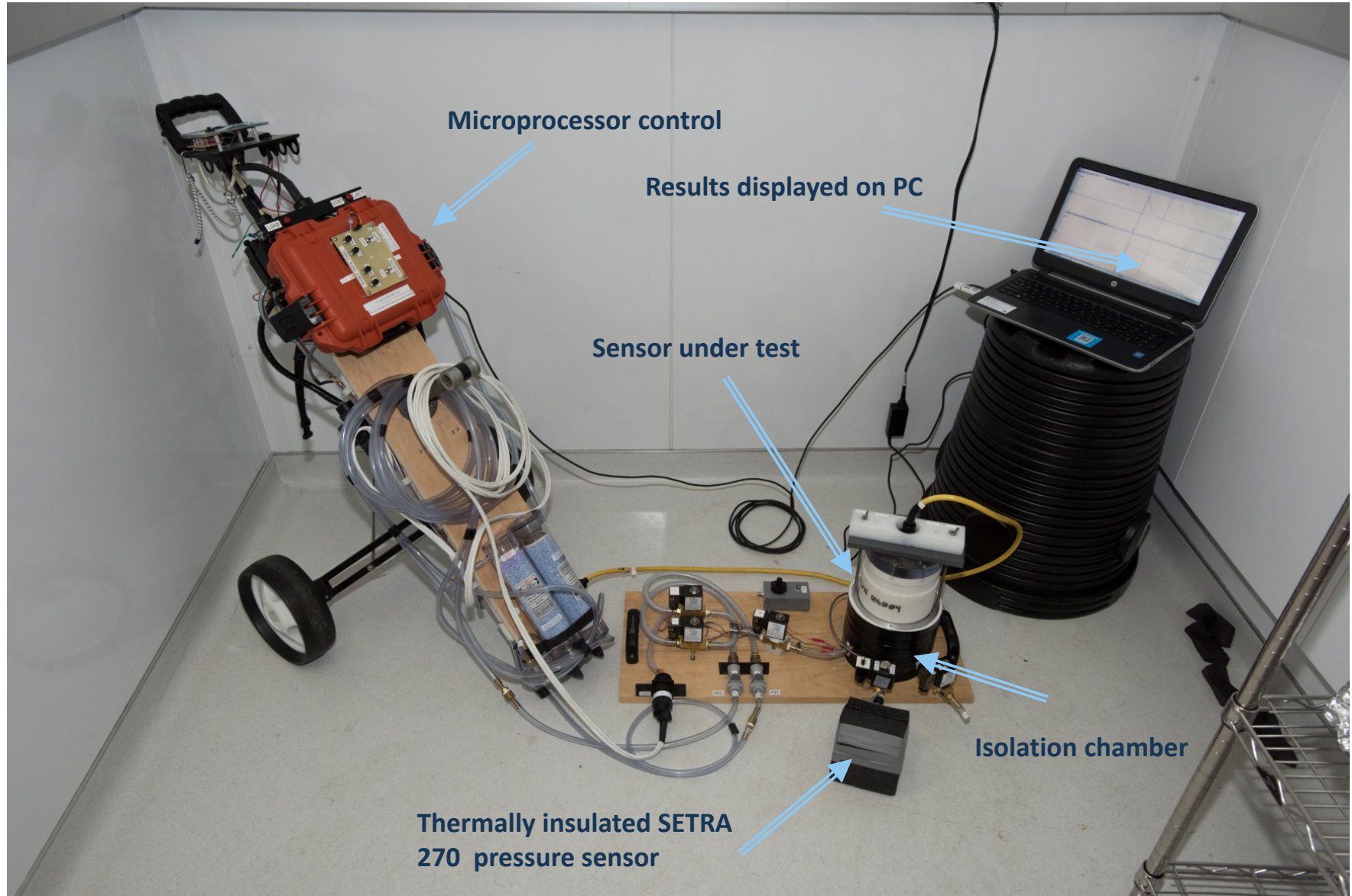




DIFFERENTIAL PRESSURE GAUGE (DPG) TESTER

WHOI Ocean Bottom Seismograph Laboratory

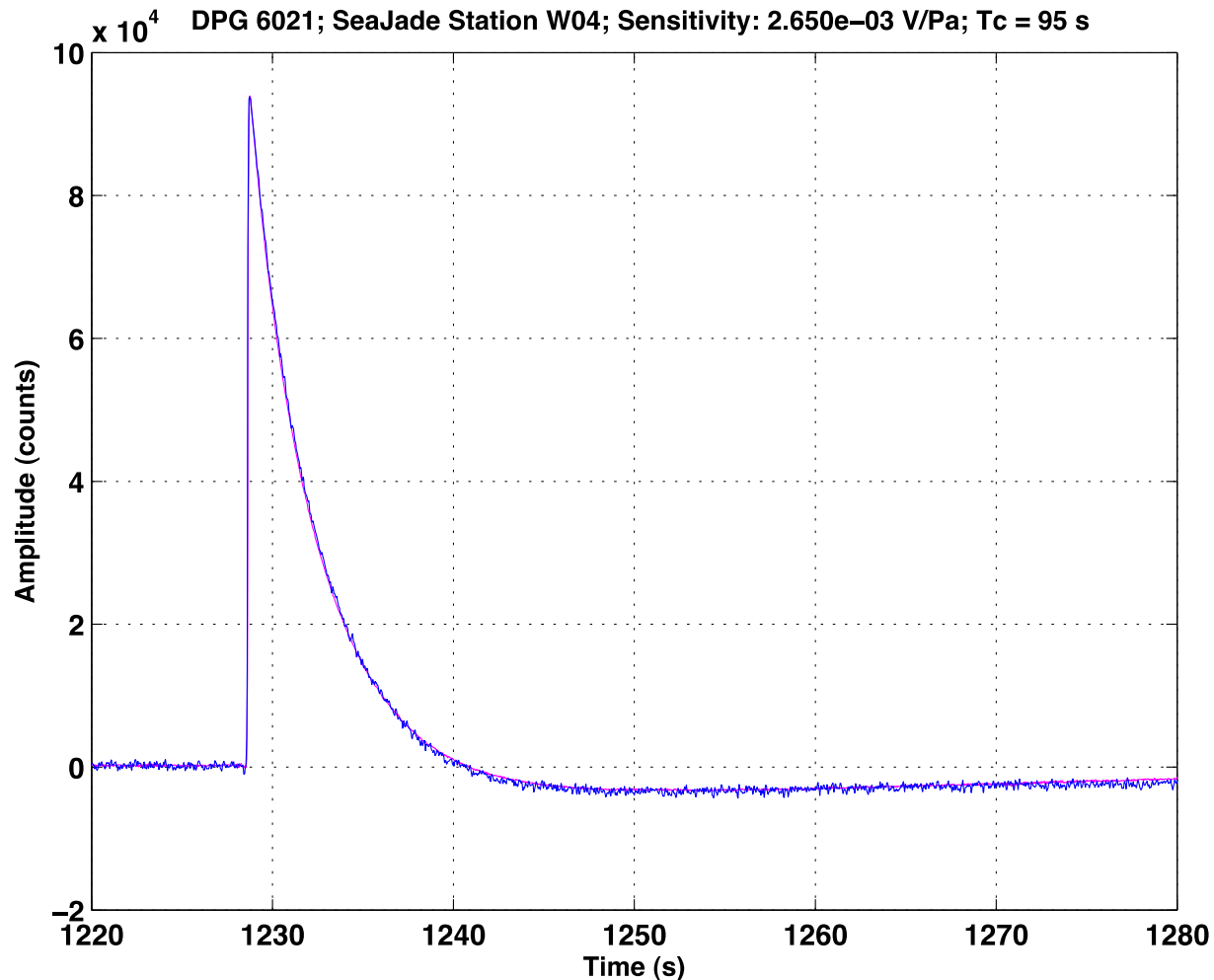
DPG In Cold Room



DPG Testing Process

- The DPG is placed in a special chamber to isolate from outside pressure changes. This isolation chamber significantly reduces the DPG output by sealing the DPG's bladder from outside pressure changes and allows the sensor to come to a quiescent state.
- Using pneumatic pumps, an Arduino controller and microprocessor-based system charges and monitors the pressure within two separate pneumatic holding tanks. One tank is positively charged to 6 psi and the other tank is negatively charged to -6psi.
- Through a series of solenoid-controlled valves and pneumatic tubing, a valve is opened for a couple of milliseconds allowing a positively charged pneumatic slug of air to enter the isolation chamber. Pressure within the isolation chamber is monitored using a calibrated (NIST-traceable) Setra® model 270 pressure sensor. Both the DPG and Setra® outputs are digitized by a Quanterra® Q330 data-logger, i.e. both data streams are referenced to the same reference time. The solenoid valve closes and the chamber is again sealed from outside influences. The DPG responds from its quiescent output state to near a near-positive rail output. The sensor output is monitored and recorded as the DPG decays back to its quiescent state.
- Once the DPG has returned to its quiescent state, the process is repeated a second time with a negatively charged pneumatic pulse. The output jumps from its quiescent state to near the negative rail output. The outputs of both DPG and Setra are again recorded by the Q330 until the DPG returns to the “zero” pressure state.
- The positive and negative step-function responses are analyzed for the sensitivity of the DPG's strain gauge and for the time constant of the capillary leak that vents the oil-filled reference chamber inside the DPG.

Sample Output



Example of the output from a calibration run. The magenta curve (barely visible) is the DPG output, and the blue curve is the predicted response for the sensitivity and time constant listed in the title. The predicted response is the convolution of the Setra barometer response and the impulse response of the DPG.