

Calibration of the UAF Portable Chaparral Microphone Calibrator

by

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The calibration constants for the portable UAF calibrators were determined with reference to the measured sensitivities of ten different Chaparral Model 5 sensors. The microphone sensitivities had been determined previously at the Los Alamos National Laboratory (LANL) by Tom Sandoval and Rod Whitaker. The pressure tank in the infrasonic laboratory at LANL, operating at one hertz frequency with a peak-to-peak pressure of 3.22 pascals, was used as a standard reference to obtain the ten individual microphone sensitivities in units of volts per pascal. The ten Model 5 Chaparral sensors were then recalibrated using a one Hz calibration signal produced by the UAF calibrators. Using the individual sensor sensitivity, as determined at LANL, the average value of the calibrations constants for the UAF units were obtained.

The calibration constant is a dimensionless number that depends on the ambient atmospheric pressure. When the value of the ambient pressure is multiplied by the calibrator calibration constant, one obtains the peak-to-peak calibration sinusoid signal amplitude. The average values of the calibration constants of the UAF calibrator units # 2 and # 3 were found to be:

Unit # 2: Cal. Const. = 1.328E (-5)

Unit # 3: Cal. Const. = 1.331E (-5)

Statistical studies were made with the UAF calibrators to determine the repeatability of measurements under both laboratory and field conditions at several different frequencies. The results were consistent to within 5% across all microphones.

Dynamical calibrations were also made of the French MB-2000 sensor, over the frequency range from 0.02 to 1.5 Hz, with the UAF calibrator using an adaptor especially designed for this purpose. The results will be shown.

Finally, experiments were performed using the step-impulse function of the UAF calibrator in order to assess whether the step-impulse could be used in the field to determine the system response function. Impulse responses for both the Chaparral # 5 and the MB-2000 sensors were measured. The purpose of these experiments is to determine if the impulse-mode function can be used in the field with the UAF calibrator to assess the system response function.