



Dynamical calibration of MB2000/5 microbarometer widely used in the IMS infrasound Network

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One of the IMS technical specifications for infrasound station require the microbarometer frequency response (FR) to be known within the 5% accuracy. Meeting of this specification has a need of precise method of microbarometer dynamical calibration within the required frequency passband.

One of the general and well-known techniques of dynamical calibration of a microbarometer is to use the known pressure changes induced by the volume changes in the special chamber attached to the microbarometer. However, this method may introduce calibration distortion caused by the fact that rapid volume changed injected by the piston does not introduce corresponding equal pressure changes within the passband of the infrasound channel. The thermodynamic process in the calibration chamber triggered by the rapid volume changes includes also temperature changes thus corresponding pressure changes do not equally flat within the passband of interest.

The calibrator prototype which takes into account the above explained issues has been developed and tested in the Engineering and Development Section of the IMS.

This calibrator utilizes the design features of MB2000/5 microbarometer which is widely used in IMS infrasound Network. It has two outputs: filtered and non-filtered flat to DC for measurements of the absolute pressure fluctuations. Temperature effects mentioned above have the same impact on both filtered (BDF) and flat to DC (TP9) channels. Transient responses (on rapid volume change injected by piston) of absolute pressure TP9 channel together with filtered data from BDF channel have been examined simultaneously by applying conventional technique of Fourier analysis for retrieval of the shape of the frequency response as well as its sensitivity.

It was demonstrated with the prototype that spectral ratio of the Fourier transforms of two transients has efficiently suppressed the impact of temperature and thus provided accurate estimate of the frequency response of the BDF channel using volume step as the input calibration signal. The estimated FR matched very well with nominal response provided by the manufacture. The BDF channel was chosen for calibration as its data from IMS infrasound stations are mainly used by IDC for signal detections and event locations purposes.