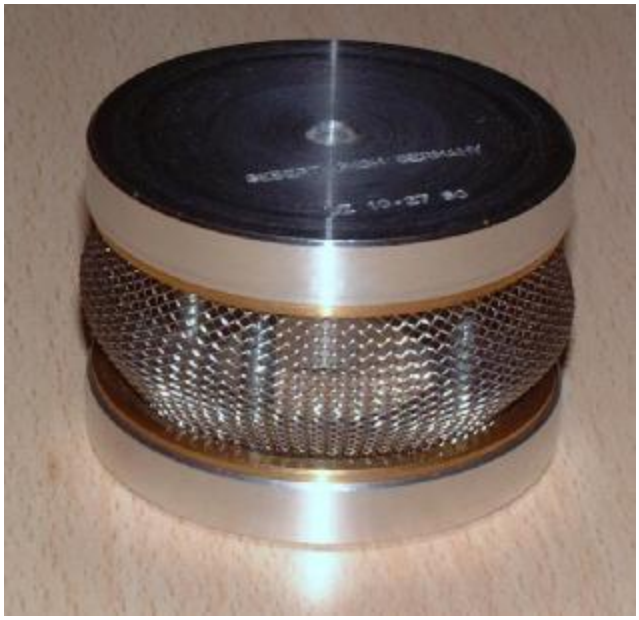
LOGO SOUND Audio Feet by Sebert Schwingungstechnik GmbH



Since 1984 Sebert Schwingungstechnik GmbH has been working in the field of reduction of vibration in the most different areas. In a casual conversation on vibration technology about two years ago the general question was raised because of our long-standing experience 1.) as to what extent the sound quality of loudspeakers may be influenced by the housing‘s eigenfrequency (narural oscillation) and 2.) to what extent this sound can essentially be improved by employing appropriate vibration dampers that are able to damping or reduce this natural oscillation. Due to our practical knowledge from vibration technology it was clear that only low frequency feet could be considered suitable, that is feet which together with the sound equipment or loudspeaker located above constitute an oscillatory system with an eigenfrequency of less than 20 Hz.

Why?

Each oscillatory system emits noise at levels of its natural frequency. If the aim is to reduce resonance caused by the housing , this must be in a range below the human hearing ability, thereby avoiding that the amplified vibrations occurring at levels of natural frequency will become audible again and thus distort the sound.

First experiments with a different kind of damper have immediately been quite impressive. However, a big problem arose, namely stability. In addition, hi-fi experts informed us that loudspeakers – as simple as that - should also be firmly anchored in order to achieve the appropriate impulse stability. In the face of these two requirements, ordinary or standard vibration dampers could not be utilised. The reason was that both these requirements have so far been incompatible. One of our employees at that time came up by chance with the idea of producing a damper from woven wire tissue. After having conducted initial tests on prototypes we were quite surprised to find out that depending on the ratio of height to diameter vertical stiffness could be adjusted to horizontal stiffness according to the diameter used. Therefore, by using the flattest design possible for the dampers, as is the case with our audio feet, we could achieve extremely high horizontal stiffnesses.

Should these dampers – apart from their attractive design - really be able to meet these two above-mentioned contradictory requirements? We eagerly awaited the first experiments. Lo and behold! The sound of the loudspeakers was shown to be essentially improved. The housings were firmly standing

on the ground; they could be moved on top, but this could only be achieved with very great force and a correspondingly large excursion. The audio foot LOGO SOUND was born. In addition, using it for amplifiers, CD – players etc. any pushing of buttons does not move the device at all.

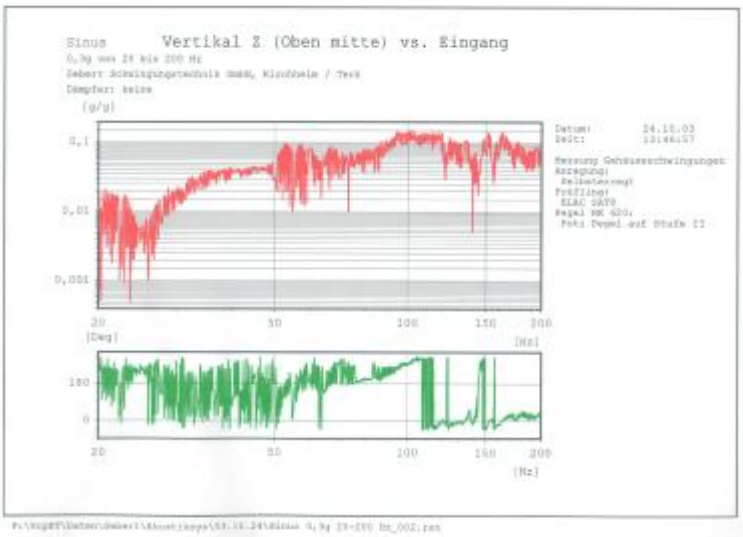
Of course, we are vibration and not acoustic technologists so that we are currently not equipped with the measuring devices necessary. Using our own laboratory equipment (modal analysis) though, we have performed measurements of loudspeakers that remarkably reflect the considerable dampening effects on the loudspeaker housing. Most interesting to note is that the phase practically shows just one (1) single phase shift across the whole measured frequency range, in contrast to the vast number of phase shifts showing up on the other tests where spikes are used or where the loudspeakers are merely standing on the ground.

The results of our experiments with loudspeakers can easily be generalised to the devices of source and amplifier electronics, which also demonstrated a remarkably improved performance when set up accordingly.

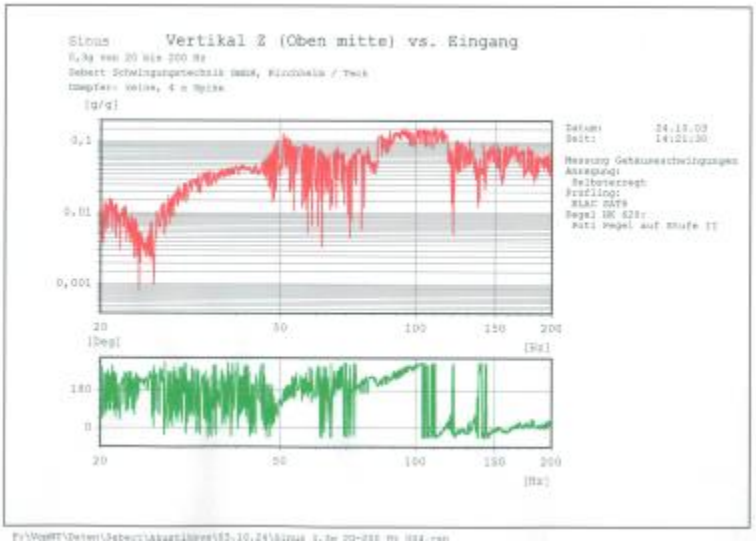
Since we try to provide all equipment with a natural frequency below 20 Hz the result is, of course, several sizes. The LOGO SOUND audio feet cover a load range per unit from 0.5 kg to 120 kilogram in more or less the same volume.

The following page shows the measuring results of the experiments we conducted.

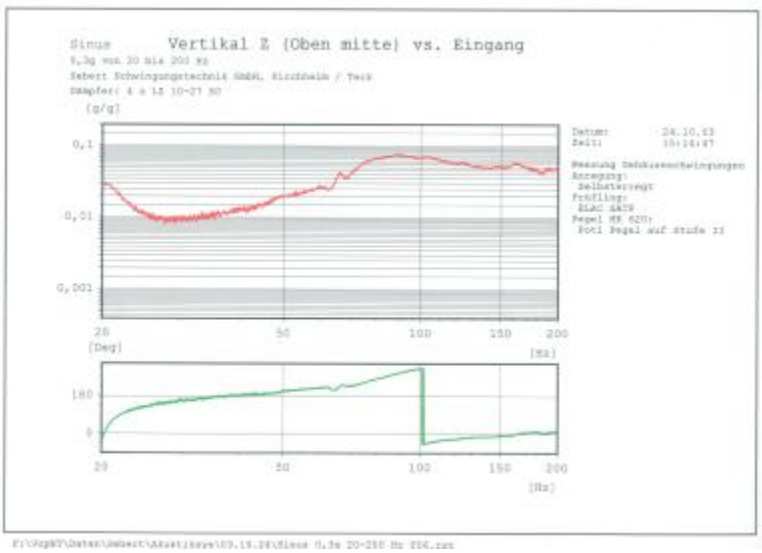
We are particularly delighted to announce that we have been granted the US-American patent on this kind of dampers. Due to the overburdening of the European patent office the European patent will probably be a long time coming.



Frequency and phase response in a loudspeaker standing on the ground



Frequency and phase response of a loudspeaker standing on spikes



Frequency and phase response of a loudspeaker standing on LOGO SOUND