

## **DAMPING FEET**

The mission of loudspeaker damping feet is to make the loudspeaker cabinet motionless and to isolate it from the floor and other objects in the room.

This has been hard to achieve but it turns out that it is possible to get substantial improvements compared to the standard solutions of today.

What difference will the Sonic Design feet give in practice? Can you really hear any improvements?

These feet will give a substantial decrease of the cabinet's movements. This is apparent when you put one finger softly against the top of the front baffle, as it vibrates much less when playing music. The transmission of vibrations from the cabinet into the floor will be reduced. The music will be cleaner, with a less coloured sound quality. The transmission of noise to the neighbours will be reduced.



*The extensive range of Sonic Design Damping Feet.*

## **TECHNICAL DESCRIPTION**

### **Sonic Design Audiophile Damping Feet for loudspeakers**

Every loudspeaker rests on a surface that can be compared to a spring, even though the surface may be quite hard. As a result, a resonance appears within or outside the loudspeaker's frequency range. Below this resonance frequency the

loudspeaker is coupled to the floor, and above this resonance it will be more or less isolated from the floor.

The traditional approach has been to try to make the suspension so stiff that the resonance might be placed above the audible range. This is one of the basic ideas behind the use of "spikes". However, this approach does not work. The resonance between the cabinet and the floor will not be any higher than the upper bass range. Not even a concrete floor will do, as anyone who has drilled a hole in a concrete wall will be aware of after having experienced the resonances and sound transmission in this material.

The spokespersons for spikes also bring forward two more incompatible theories:

1. Spikes work as mechanical diodes, transmitting vibrations one way only.
2. Spikes rest on an infinitesimal area unable to transmit vibrations.

Regarding theory 1, Sir Isaac Newton has yet to be proven wrong. A force causes a counterforce. This is of course valid both ways.

Regarding theory 2, the tip of the spike may be very small, but not smaller than necessary to carry the weight of the speaker. In that way a force exists between the spike and the floor. This force will be modulated by vibrations and thus transmit them.

Consequently, to isolate the loudspeaker from the floor, the resonance frequency should be lower than the lower limit of the frequency range of the loudspeaker.

This leads to some very low frequencies, far below 20 Hz.

This concept can be compared with that used in turntable tonearms, where these ideas have now been accepted for a very long time. There nobody claims that the fundamental resonance of the tonearm/cartridge combination should be in the audible range to produce solid bass or musical sound.

In article 34452 of the rec.audio Usenet newsgroup a calculation of the loudspeaker cabinet movement magnitude was presented. An 8" woofer vibrating at 50 Hz with a 0.5 cm cone displacement in a 20 kg cabinet will move the cabinet  $6 \times 10^{-6}$  m, (6 millionths of a metre). The cabinet in this example is assumed to be free floating in air, attached to nothing.

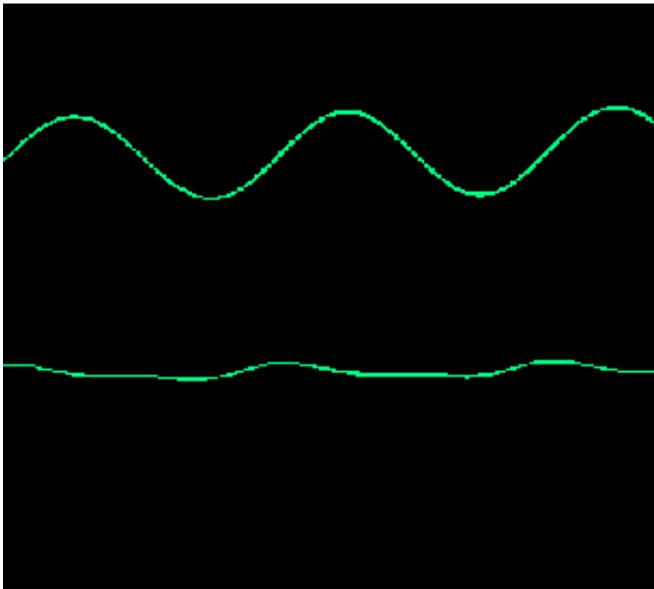
The conclusion that the resulting movement is small enough not to cause any trouble is surely correct. One could however get an implied conclusion that spikes could improve things ever so little. This is simply not so. A high Q resonance will multiply the movements until they become quite noticeable. The free floating approach should be the goal.

Until now it has been hard to design a foot made from rubber that is soft enough. Also, it has been impossible to prevent foam materials from gradually settling and

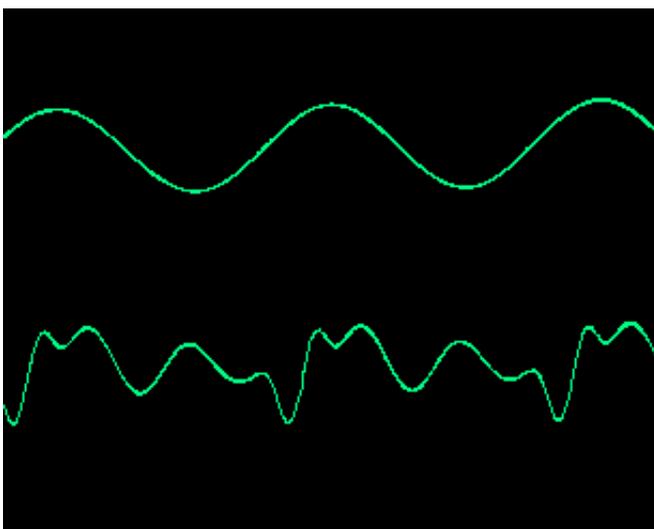
eventually becoming hard. Also, sufficiently soft coil springs do not have enough horizontal stability without special mechanical arrangements.

Now Sonic Design can offer a foot made from a special engineering foam with open pores. The open pores make the material structure of the foam spring independent of any contained gas that would eventually escape. The material is created to be stable over long periods of time.

The Swedish audio society "Ljudtekniska Sällskapet" has taken measurements that show that a loudspeaker standing on a soft spring moves less from music than if put on hard feet. They also found that spikes contribute both measurable and audible distortion:



*Sinus signal 125 Hz to the speaker (top),  
floor movement below, using soft feet.  
Floor signal magnified 2 x.*



*Sinus signal 125 Hz to the speaker (top),  
floor movement below, using spikes.*

Spikes can give an open but slightly hard and distorted sound, which some may say is more musical. But resonances and overtones in the floor are equivalent to harmonic distortion in the amplifier.

A soft overdamped support where the resonance frequency is a little too high seems to make the music sound dull.

The use of "Blue Tack" or damping feet with extremely high internal damping can be compared to a car with too hard shock absorbers, where much of the vibrations will pass through even if they are not amplified.

The special engineering foam used in Sonic Design's damping feet also has other unique qualities. One of these is that its modulus of elasticity decreases when loaded. Consequently the thickness of the foot and its compression can be less than the low resonance frequency otherwise would require. The result is a resonance frequency of less than 7 Hz horizontally.

It appears that loudspeakers on stands have major problems with resonances. In these cases the damping feet should be placed between the loudspeaker and the stand. In this way the vibrations will be reduced as close to the source as possible.

To get the best possible isolation and damping it is important that the feet are optimised to the weight of your loudspeakers. Both the stiffness and size of the feet are chosen to achieve this. The range for optimising is between 5 and 200 kg with 30 different units.

The material has a different colour for different stiffness properties.

### **Sonic Design Standard Damping Feet for loudspeakers**

The standard damping feet are somewhat thinner, have a larger overload margin, and are lower priced than the audiophile model. The resonance frequency is a few hertz higher. The colour is nut brown, except for the stiffest feet which are grey. The standard feet are produced in four different weight classes and do not need to be fine tuned to specific loudspeaker models.

The weight classes are: under 12 kg, 12-28 kg, 28-50 kg, 50-100 kg.

### **Sonic Design CD Damping Feet**

The CD damping feet are made from the same material as the Standard Damping

feet. If the sound of your CD-player is sensitive to vibrations, the CD feet will be the way to go. The sensitivity to shock and the accompanying mistracking will be reduced with the use of the CD feet.

They can also be used with any audio product that you would like to isolate from vibrations.

The set contains four small and one large foot. The large foot would be used if the centre of gravity is far off the centre or for those CD players that have five feet.

The weight classes are: under 5 kg, 5-10 kg, 10-25 kg.

### **How about turntables?**

Serious turntables should already have an internal floating chassis with a resonance much lower than the already low resonance frequency of the tonearm/cartridge combination. The introduction of a third series decoupling resonance would fail unless it was lower than 1 or 2 Hz.

## **REVIEWS**

[A review of the SD-feet on TNT-Audio - Internet HiFi magazine.](#)

### **Some comments taken from some Scandinavian magazine reviews, translated into English.**

"Of course you would wish that everyone would be given the opportunity to enjoy a foot like this."

*(Musik och Ljudteknik No. 4-91, Sweden)*

"The stereo perspective has grown in all directions and the music contains many more delicate details, reproduced more calmly."

"The bass seems to go deeper, with increased ability to follow the tune."

"You can play much louder without being irritated by the sound (read unwanted resonances)."

*(HiFi and Musik No. 10-92, Sweden)*

"Especially the bass reproduction was tighter, cleaner and better modulated."

"To sum up: The Sonic Design foot resulted in a cleaner, clearer sound with better focus and greater depth."

*(High Fidelity, No. 2-93, Swedish edition)*

"Choose the right thing! If you want the loudspeaker to stand still, it is better to damp the resonances with a soft cushion than with stiff points."

*(Elektronikvärlden No. 9-94, Sweden)*

"That turntables are very sensitive to acoustic feedback is no news, what is less known is that CD-players are also sensitive to feedback. Softer, cleaner, more detailed and better spatial representation with a firmer and deeper bass will be the result from soft feet. Also, for power amplifiers you can get improvements in the CD-class."

*(High Fidelity, No. 8-95, Swedish edition)*

"I got improved clarity and impulse stability over the entire frequency range. These improvements are felt far, far more than when changing to double priced cables or even a more expensive active component. Then you must consider that better components will even more expose the problems that the damping feet will remedy."

*(Audio 38, No. 1-98, Norway)*

"It's hard to be soft..."

"The main obvious change when you go from spikes - or nothing - to the SD-feet, is going on in the bass range. It's like if the bass is being kept in an iron grip. This gives that the feet do what one would expect from spikes!

It seems a little against nature because when you give the loudspeaker a light push, it sways gracefully! But it works!...

And further:

...One of our editors have tried the feet on his subwoofer. In spite of the limited frequency range used, from 18 Hz to just below 50 Hz it could be improved with these feet. He also made an experiment, that you could try yourself at home. Put a coin standing on its edge on top of the loudspeaker cabinet. Turn up the volume. With the SD-feet it will remain standing, without them the coin falls over - and that's pretty smart."

*(High Fidelity No. 7, 2000, Danish and Swedish edition.)*

"And the first thing we notice is that spikes are the absolute worst, at least when it comes to the neighbors' welfare. Away with them then, and the same way with all hard plastic feet also, as they, like spikes, ensures that all vibrations go straight down to the floor and on to your neighbors. "

"The best rubber feet from comes the Sonic Design and called simply the SD feet."

*(HemmaBio no 3-2008, Sweden)*

"There, now you've got tighter bass yourself. And your neighbors will hear less of your movie sound. If you have other speakers that are full-range, this is just as effective with them as well."

*(HemmaBio no 7-2015, Sweden)*

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## **INSTRUCTIONS FOR FITTING THE DAMPING FEET**

Put the feet under the loudspeaker cabinets with the smooth side upwards and in contact with the bottom of the cabinet.

If the rear feet are compressed less than those at the front because the back of the

cabinet is lighter, you can move the rear feet inwards until they are compressed as much as the front feet. If you prefer, the feet can be fastened with double-sided adhesive tape.

When the loudspeakers are used with stands, the feet should be placed between the stand and the cabinet.

Keep the feet away from small children and pets. Use only according to the instructions.

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More information:

[Price list, how to order, addresses, etc.](#)

[SD-feet appreciation page](#)

[Back to the Sonic Design homepage.](#)