

Ultimate Isolation Theory

by Barry Kohan
President of Bright Star Audio

Say something. Go ahead, say anything. Now cover your ears with your hands and say the same thing again. Sounds different, doesn't it? "Of course," you say, "my ears are covered!" Of course, you're right, but what you're still hearing are vibrations being transmitted directly from your voice box - the tissue of your body is absorbing and releasing the energy from your throat to your ears. Now play something on your audio system and cover and uncover your ears. Even with ears covered you are still able to hear the music directly through the air from the speaker. In addition, some vibrational energy may be reaching you through the floor and chair in which you are sitting.

Your CD or DVD player is like your body and the equipment stand is like your chair. As the system plays the chassis is absorbing the radiated energy through the air and the conducted energy through the floor and stand. The chassis starts to resonate and conducts these vibrations into the CD disc, the player's electronic circuitry and the mechanical parts. As these parts vibrate the musical information the player is reproducing becomes contaminated. Jitter in the digital bitstream increases, microphonics from the electronic circuits and mechanical parts induce a "ghost" image over the original music wreaking havoc with tonality, pace and rhythm as well as increasing the noise floor.

The recordings that you play on your audio system have captured a musical event and contain the unique and fragile interplay of instruments. To play back these recordings with maximum fidelity we must ensure that our audio systems do not alter the musical signal. Anything, which is added or taken away from the content of the original recording, is distortion. Resonance and vibration have an audible effect on the musical signal that takes us further away from the faithful recreation of the musical event.

Each musical instrument captured in the recording has its own unique resonance. That is what makes a violin sound different than a cello and indeed what makes one violin sound different from another. The choice of the actual instruments used and their combination during the musical passage is a very serious matter to the composer, arranger and musicians. The interplay of the instruments, including their unique resonance signatures, is vital to convey the ensemble's musical ideas. The playback system, however, is *not* a musical instrument. Its function is to play back many different recordings of many different instruments. A playback system which has its own resonant signature will color *every* instrument which it tries to reproduce. The most faithful playback system will not exhibit resonance and

reproduce only what is contained in the recordings - nothing more and nothing less.

How do we best control unwanted vibration and resonance? We must *eliminate* harmful vibration and resonance at the playback components. Individually isolating each component in the system to eliminate the harmful effects of loudspeaker vibration, AC & heating systems, traffic, etc, allows the music to be heard uncompromised by vibration and resonance. This is Bright Star's Ultimate Isolation Theory.

Bright Star Audio's Ultimate Isolation System creates an environment of high mass *and* high absorption *and* shielding around each component for the highest degree of vibration control. The Ultimate Isolation System consists of an Air Mass placed on the shelf, a Big Rock placed on the Air Mass, next is the component with a Little Rock set on top. The Air Mass/Big Rock combination has the ability to absorb a huge amount of energy without saturating - effectively dissipating unwanted vibration from below and draining harmful resonance. The Little Rock's high mass stiffens the component making it repel air-borne vibrations while firmly coupling it to the Big Rock as well as shielding EMI. Eliminating vibration and resonance has a profound effect: imaging, tonality, dynamics, low frequency extension, detail, clarity, paces, and dimension are all enhanced. In fact, *every* aspect of musical reproduction is significantly improved!

Options: a Gemini isolation twin (which combines an Air Mass and Big Rock into a single high performance platform) can be used instead of a Air Mass / Big Rock combination. An IsoRock can be used as on its own under a component if budget or height is a consideration. IsoNode anti vibration feet can be used on their own under a component for terrific improvements at a bargain price. The new IsoRock 3 Reference provides the finest audio and video components with the foundation they deserve.

Bright Star vibration control products have been nominated by *Stereophile* four times for '**Accessory of the Year**', '**Editor's Choice**' by *Fi Magazine*, *The Academy* for the '**Golden Note**' award and rated '**Best of the Year**' by *The Absolute Sound*. IsoNode feet have been voted '**Product of the Year 2003**' by *Enjoy The Music* and '**Best of CES 2003**' by *Audio/Video Forum*. Our products have received *Bound for Sound's* '**Component of Merit**' award five times, the '**Golden Note**' Award nomination (three times) from *The Academy*, and was rated '**Cream Of The Crop**' by *The Absolute Sound*. Bright Star's Isolation Series has earned numerous industry design and engineering awards.

Two Coins, Some Toilet Paper and a Speaker

(a response to the article in Stereophile)

I thought I'd throw in my two cents (sorry, but I just couldn't resist) on the subject of "Hey, let's try this and see what happens" tweaks. The fact that placing a few coins on top of a speaker or toilet paper under one perceptively changes the sound clearly illustrates the insidious nature of vibration. Almost every aspect of sound reproduction - tonality, spatiality, dynamics and coherence - is compromised when vibration disturbs the relationship between frequency, amplitude and phase of the original signal.

As the speaker sends acoustic energy into the room (the energy that we want - music) it is also sending energy into the cabinet which becomes *unwanted stored energy* (USE). This USE causes the cabinet walls, the crossover, the speaker cable, etc. to vibrate and corrupts the speaker's performance. If we were able to quiet the drivers and just hear the result of the cabinet walls vibrating we would be shocked as to just how much audible acoustic energy would be present! *This* version would have a very different frequency balance (sounding muffled, being dominated by the cabinet's primary and secondary resonance frequencies) be lower in amplitude (but not uniformly, due to the non-linear nature of the cabinet materials) and be delayed in time (the time necessary for the energy to leave the drivers, be absorbed by the cabinet and released into the air) thus affecting phase integrity. If we think about this 'smeared' version of the signal being mixed into the original signal it is no wonder that USE significantly corrupts performance and altering it has an audible effect!

Coins on top of the cabinet, even though the coin's mass is quite small, will change the resonance of the panel with an audible variation in performance. Different coins, or a shift in placement will have a different audible result - but change (ha!) will still be discernible. A large reduction of USE would produce a profound audible difference. Placing high mass on top of the speaker will significantly increase the resonance frequency (a good thing) and decrease the amplitude (also a good thing) of the top panel. The weight load will then be translated onto the side panels with a reduction in resonance and the added mass will more effectively couple the speaker to its support, preferably a high-mass high-absorption platform, so the USE can be drained from the speaker cabinet. This arrangement produces a far greater amount of improvement than coins, dots, pucks, M & Ms, wooden discs, cones, etc. could possibly convey!

Toilet paper improves a mounted speaker by providing slightly greater coupling between the speaker's bottom and the stand's top plates. The bottom and the top plates appear to be flat but close inspection

reveals that there are variations in the surface smoothness so they do not really mate very well and they waste energy jittering against one another. The cellular toilet paper can fill *some* of the small irregularities between the two panels but it is not as effective as would be screwing through the stand's top plate into the cabinet. Blue-tac placed between the panels stops the jitter but its compliance reduces rigidity and coupling plus acts as a barrier to drain USE from the cabinet.

The other components in an audio system also benefit by a reduction of USE. Besides speakers, turntables exhibit the largest degree of improvement. Since they are electro-mechanical it is intuitive to us that this be so but purely electronic devices also benefit: tubes are microphonic, the master and sub-clocks (based on oscillating crystals) in digital devices are affected, a spinning disc will wobble, all parts (transistors, ICs, capacitors, resistors, wire, etc.) that process the signal become microphonic, motors, fans and transformers induce vibration, and the list goes on.

What are the sonic results? As we discussed, frequency, amplitude and phase are corrupted. Frequency balance is skewed: one portion of the spectrum is highlighted or diminished as compared with another. Brightness may increase, midrange may become too forward, bass may bloat and become ill defined. Amplitude of the signal is changed: the dynamic range of an instrument and indeed the dynamic relationships *between* the instruments are altered. Phase integrity of the signal is deteriorated: the spatial relationship of the instrument with its environment and the spatial relationships *between* the instruments are altered. In fact, frequency, amplitude and phase are interrelated and changing any one affects the other two. When all three are simultaneously affected (by the presence of unwanted vibration) the resulting cacophony significantly reduces the ability of the system to convey what is actually contained in the recording - and *that's* what audio is all about. Not just what sounds pleasing because it makes someone feel fuzzy all over but what is musically and emotionally fulfilling because it reflects the actual sound of the instruments as they have been captured in the recording.

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