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New Methods for Quantifying Sonic Performance

Theory and Practice Part Two: How to Use Subjective and Objective Methods to Quantify System Performance

In Issue 246 the authors introduced a new method for measuring sound quality.

In this issue they discuss the application of their methodology in several comparative listening situations.

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Cones, Cones, and More Cones— Mechanical Decoupling and Vibration Control

The benefits of isolating equipment from external vibration have been known for several decades. One of the earliest specialty products introduced over 30 years ago were the ubiquitous Tiptoes (circa 1984) commercialized by Steve McCormick of the Mod Squad. These devices were machined from aluminum in both tall and short conical versions. Some audiophiles noted improved definition with the use of Tiptoes (usually three or four placed under electronics and speakers). Gradually, it was recognized that these cones had a resonance in the upper midrange that imparted an unnatural and annoying harshness to music. A later refinement of this concept was introduced in the form of Goldmund Cones that implemented a “mechanical

diode” principle claimed to drain away spurious mechanical vibrations generated within an equipment chassis while resisting the external influence of structure-borne vibrations in the opposite direction back into the equipment, hence the mechanical diode analogy. Goldmund Cones are no longer manufactured, but at the time, they were a sophisticated product, consisting of a machined-steel body terminated with a higher-density steel tip. Whatever natural resonant frequency that remained in the device was suppressed by a central filling of an elastomeric damping material. Placing the equipment on cones on top of a high mass substrate (for example, a 2–3cm-thick granite shelf) further optimized the beneficial effects. In direct comparisons to Tiptoes and other isolation devices of that era, the Goldmund Cones offered a significant improvement in overall sound quality with improved imaging, wider soundstage, tighter bass response (especially when placed under speakers), and better detailing. For many years these cones bettered many newly-introduced types of footers we evaluated. But finally they were surpassed by both Nordost Sort Kones and Stillpoints.

Initially we chose to compare three examples of product in this category that were comparably priced and that we already owned: our older, now-discontinued Goldmund Cones, along with the current Nordost BC Sort Kones in Bronze and Stillpoint Ultra Mini SS footers. We decided that it would also be a good idea to try footers at a higher price point. Through the kind auspices of Bruce Jacobs of the Stillpoints company and Paul Ritchotte at Nordost Corporation, we obtained samples of Stillpoints Ultra SS footers and Nordost TC Sort Kones (titanium) for testing. It is worth noting that all of these footers, except the original Goldmund Cones, use small ceramic balls (from 1 to 3 for each footer) as part of their isolation concept.

In Table 2, we show the comparative results of both our subjective and objective methods for evaluating the effects of various equipment support devices. Although Goldmund always recommended a tip-down orientation for its cones, Nordost and Stillpoints consistently recommend a point-up orientation. We tried the footers

in both orientations and chose that which sounded and scored best. Accordingly, the best-sounding footer orientation is also indicated in Table 2. It came as some surprise to us that we frequently disagreed with the manufacturer’s orientation advice.² We rank the degree of sonic improvement in order of increasing quality in the table. The retail cost is included as a purchasing aid for those inclined to act on our findings.

In System 1, where all of this testing was done, the two NuForce monoblock amplifiers and BSG qol processor were placed on Nordost Bronze Sort Kones. System sound quality was sensitive to footers placed under the PS Audio AC regenerator/line filter, so an extra available set of Nordost Titanium Sort Kones in a point-down orientation was used for this piece of equipment. The B&W 802 speakers were fitted with the manufacturer’s support spikes. Given this system configuration, the PS Audio PWD DAC was used as the variable to test the effect of each set of isolation devices. With this experimental setup the ability to detect significant differences and create a rank order of merit was easily accomplished using the objective height method.

Without the application of cones or BBs (intentionally removed from the DAC for this comparison), the PS Audio PWD had satisfying SQ, but it did not reach the levels of musicality of which it is capable. With Goldmund Cones, our prior isolation standard, a very substantial jump in the sound quality of the PWD was observed coincident with a large increase in the height measurement. The Nordost Sort Kones BC improved the sound further by removing a slightly harsh quality exhibited when using the Goldmund Cones, while simultaneously increasing clarity, attack, and harmonic overtone structure. This improvement was similar to that heard when moving from no cones to the Goldmund Cones. Switching to the Stillpoints Ultra Mini SS footers resulted in another level of improvement, conservatively at least as large an increment as that between the Goldmund and Nordost cones. Yet, this last upgrade seemed to lock in a harmonic correctness and complexity that created an immediate increase in emotional connection to the music and the soloist. In all of these comparisons, it

was amazing to hear immediate improvements in SQ that were obvious in a single A/B sonic comparison and which were even more apparent in the height measurements.

We then began to test the higher-priced tier of footers. Of the two types of footers tested, the Nordost Titanium Sort Kones and the Stillpoints Ultra constituted one of the rare cases where we could not distinguish any difference between the top two performers. The Titanium and Brass Sort Kones look identical except for the construction material, but in direct comparison the Titanium Kones easily achieved a 30 point SQ improvement over the Brass Kones.

In discussion with Bruce Jacobs, the use of granite shelving in our systems was questioned. He suggested that the Stillpoints product might sound better with a dense piece of flooring bamboo inserted between the footer and the granite. We obtained 4" x 4" x 1/2" squares of this material for additional testing. When the Stillpoints Ultra footers were used in our preferred inverted position in combination with the bamboo between the footer and the granite shelf, we

instantly observed degradation in SQ, with a loss in transparency and focus, along with a 13" height drop in our soprano measurement. When we used the bamboo with the same footers in a non-inverted position, the SQ was found to equal that found with the inverted footer position in direct contact with the granite shelf, so the results shown in Table 2 stand as reported. Nonetheless, if you are using wood or other types of shelving material, it is best to try all footer products in both orientations—you must do the experiment yourself to determine the best sounding orientation in your particular circumstances.

Although we chose just the PWD DAC for testing the effect of footers on sound quality, we would point out that the addition of footers of some sort under each piece of equipment in the signal path is cumulative. Jacobs also pointed out that using the same manufacturer's footers throughout the system (rather than mixing them as we did in our tests) can produce synergistic results. To test for this possibility and also to see whether there might be any subtle but cumulative negative properties as we increased the number of support devices, we

compared a system equipped entirely with the Nordost titanium Sort Kones against one equipped entirely with Stillpoints Ultra SS footers. In addition to assessing height, we also paid close attention to our subjective criteria, particularly dynamic range and harmonic overtone structure.

After the more limited testing shown in Table 2 and the near identical performance of the two brands of the more costly competing footers, we were truly surprised at the subjective SQ advantage exhibited by the Nordost titanium Sort Kone-equipped system compared with the Stillpoints Ultra SS-equipped system (see Table 3, lines 1 and 2). Despite this obvious sonic difference (estimated to be somewhere between 30 and 50 points better on our subjective scale, a difference falling within our definition of the very large category of sonic significance) we could detect no significant difference in our soprano height scale. We suspected that we might have run out of available headroom with this sonic marker as a result of a real recording limitation in capturing the original performance. To test for this possibility we decided to handicap the system performance in order to reduce the height of the sopranos by making certain modifications to the standard system setup. We removed the BBs from the top of the DAC (see Fig. 2B) and replaced the Wireworld Platinum USB cable between the computer and USB to SPDIF adapter with a generic computer-grade USB cable. We now could observe a major soprano height difference of 23" while still retaining a subjective SQ point advantage in the 30 to 50 point range observed with the Sort Kones prior to handicapping.

We chose to focus our attention on the Nordost and Stillpoints products because, in our experience, we believe these two brands represent the best of the breed of support devices on the market today. As we were unable to detect a sonic difference when comparing the effect of the Nordost titanium Sort Kones with the Stillpoints Ultra SS footers on just the DAC (see Table 2), the measurements and SQ changes shown in Table 3 came as a complete shock. Our involuntary, non-intellectual, non-left brain emotional response was totally unexpected and unmistakable.

While we propose that our height measurement system is a new and very useful way to rank performance variations, a tape measure (or for that matter, an oscilloscope

Table 2 - Comparison of Vibration Isolation Footers (listed in order of increasing sound quality)

Support Device	Soprano Height Measurement ¹ (inches)	SQ Point Differential ²	Retail Price (set of 3) (\$US)	Orientation	Sound Quality First Impression
No Supports - the baseline configuration	35"	0	-NA	-NA	Narrow soundstage, voice and instruments unfocused, choir restricted in both height and width, lack of clarity.
Goldmund Cones (1 - 1/4 " version)	42	15-20	\$400 (last available price)	Tip ↑	Immediate improvement in all aspects: voices much easier to differentiate, tighter focus, more ambience, wider soundstage.
Nordost Sort Kones BC (Bronze)	48 (44 + 4)	15	\$420	Tip ↑	Further improvement in focus and ambience, noticeably improved harmonics, big increase in soundstage, better separation of choir voices.
Stillpoint Ulta Mini Footers	60 (44 + 16)	15	\$375	Tip ↑	Instruments sweeter in sound, excellent transient detail, overtones change to greater harmonic consonance, another improvement in voice focus. Subtle but noticeable increase in musicality.
Nordost Sort Kones TC (Titanium)	79 (44 + 35)	15	\$1095	Tip ↑	Both of these footers presented a similar and significant improvement over the other footers. And minimal difference between these two footers was difficult to discern.
Stillpoint Ulta SS Footers	79 (44 + 35)		\$747	Tip ↑	

¹As noted in **Part 1** of this series, the height of the sopranos in Misa Criolla, Track 5 was an easily discernable measurement that is representative of sound quality. The total value is reported as the sum of the height above the center of the B&W 802 midrange driver plus the distance folded forward along the ceiling as in **Table 1**; the contribution of each is shown in brackets after the summed total. ²The point differential is the subjective improvement in sound over the previously listed footer product.

²Nordost recommends only the tip-up configuration to guarantee stability and safety when placed under equipment.

Table 3 –Sound Quality Effect of Whole System Treatment with Nordost Titanium Sort Kones TC versus Stillpoint Ultra SS Footers

Support Device	Soprano Height Measurement ¹ (inches)	SQ Point Differential	Orientation	Sound Quality First Impression
Stillpoint Ultra SS with optional base	90 (44 + 56)	Baseline performance	Tip up, base on bottom	Very nice in all regards.
Nordost Sort Kones TC (Titanium)	88 (44 + 54)	~+ 30 to 50	Tip ↓	An emotional threshold was crossed with involuntary toe-tapping and singing along with the music, greater clarity, vocal articulation, harmonic detail and overtone structure, ambiance retrieval, stage width, and focus of soloist, choir, instruments consistent over 7 different high resolution recordings; small difference in height judged to be result of more precise image focus; instrumental and drum attacks were judged to be better but no significant differences in tonal balance or dynamic range could be reliably detected between the two types of footers.
Comparison below conducted by handicapping system as noted in text to compress overall height measurement				
Stillpoint Ultra SS with optional base and with sonic handicap	54 (44 + 10)	Baseline performance	Tip up, base on bottom	Obvious drop in sound quality.
Nordost Sort Kones TC (Titanium) with sonic handicap	77 (44 + 33)	~+ 30 to 50	Tip ↓	Smaller drop in performance while still retaining emotional connectedness with the music.
¹ See Note in Table 2. ² In order to maximally optimize the performance of the Stillpoint Ultra SS footers, we also added the optional base, an additional \$65 option per device, as this is purported to further improve SQ. We re-tested whether point up versus point down had any performance effect when placed on our granite shelving with or without intervening bamboo isolation between the footer and the granite as described earlier. With the addition of the optional bases, we now found no difference in performance with any of these combinations. We ended up using the Ultra SS without bamboo in the base down, tip up orientation for each piece of the equipment, including the computer server. For the tests using the Nordost titanium Sort Kones, we were one set short of the total height number needed and substituted a set of the brass Sort Kones, under the System 1 computer server.				

or distortion meter) cannot quantify or evaluate the black-and-white difference that exists between being emotionally connected with our music versus not connected. Only the human brain has that capacity.

We would caution that these results could vary with the composition of equipment stands and the internal construction of the equipment used. For example, differences in the isolation of internal circuit boards, the thickness and resonant frequency of circuit board material, the proximity of circuits to shielded or unshielded power transformers, and even the layout of circuit traces could yield different results.

The conclusion readers should draw from our particular findings is that they must compare different footers in their own systems if they want to get the best results. The most important fact is that adding good footers throughout a system can very easily be more beneficial than spending far more on a particular electronic component, and can improve the performance of any existing device, regardless of price. We want to stress without equivocation, that, in our opinion, the full effect of treating a complete system with the best footers one can afford is revelatory and the sonic value they confer on any good system is money wisely spent. **tas**

