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## **A Speaker For All Seasons Audio Artistry and The Vivaldi Loudspeaker**

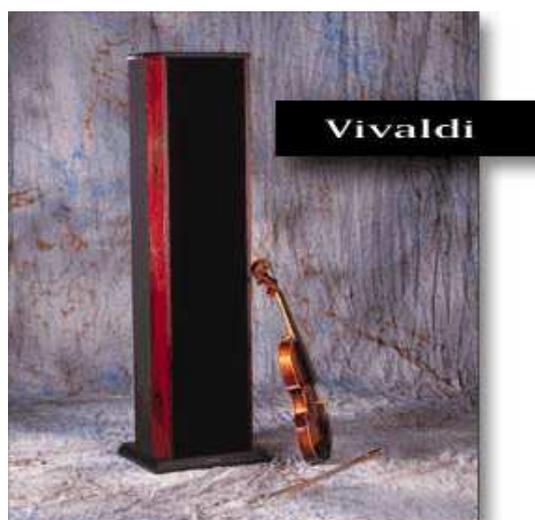
By Adam Walinsky  
(Introduction by Tom Miller)

Intro - The Players Long before Siegfried Linkwitz ever designed a loudspeaker, he was a famous loudspeaker designer. Linkwitz is a senior engineer and one of the most respected minds at Hewlett-Packard. In his spare time, he has been a relentless audio hobbyist, making his own recordings and building his own speakers. But he has done more than that. He was half of the Linkwitz-Riley team that introduced the fourth-order crossover to the speaker world. That's how he got to be a famous speaker designer without "designing" a loudspeaker or, at least, a speaker anyone had heard.

Over three decades ago, Linkwitz, who had a degree from Darmstadt Technical University in Germany, came to California to work for a few years at Hewlett Packard and experience the American culture. The work and the people he met were so interesting that he never went back to Germany. Also, as a fanatic windsurfer, he would have dearly missed the wind. At HP, Linkwitz, in the Seventies, led the team that designed HP's state-of-the-art spectrum analyzer - a design that is unsurpassed to this day. Understanding and using technology are a way of life for him, and when he designs a speaker, it's by the book. But a special book: his book, the product of his research and intellect, so you won't find it on a library shelf - although scores of speaker designers would surely pay handsomely if they could.

Even after years of "fiddlin' " with speakers, Linkwitz had little desire to design a commercial product. That's where Marshall Kay, another HP engineer comes in. Kay, president of Audio Artistry and a test and measurement applications engineer, grew up in Texas listening to music on his dad's old military headphones. By high school he had designed his first speaker. When he graduated from Texas A&M in 1980, he started to pursue his speaker hobby with ardor and naturally ended up reading a paper on crossover design by Linkwitz-Riley. As his career progressed at HP, he knew that Linkwitz worked with the company and eventually summoned the courage to call him. Kay was more than a little nervous, but when the time finally came, he and Linkwitz fell into one of those hour-long calls between brand-new audio buddies, and a friendship developed.

By now, Kay was living in North Carolina and managing HP's account with IBM in Raleigh.. In 1988, a New Yorker named Tom Hoffman, looking for a better environment in which to raise his kids and run an audio store, also moved to North Carolina. He opened Advanced Audio in Raleigh and started attracting the local audiophiles, including Kay. Another patron, Kurt Pasquale, heard a pair of (large) Philips speakers in Hoffman's store and was dazzled. Turning to Hoffman, Pasquale announced that he was a



cabinet-maker and asked how he could get into speaker building. Hoffman, recognizing a natural match, gave him Kay's name and number.

Pasquale, however, is more than a simple "cabinet-maker." Possessing a degree in mechanical engineering, he is an expert in computer-aided design (CAD), and is responsible for both the look and finish of the Audio Artistry speakers. It is impossible, Kay insists, to give Pasquale too much credit. Aside from designing the look, he figures out how to fit large drivers into spaces that should be way too small, allowing the design to remain compact. First Kay and Pasquale designed a conventional box loudspeaker called the Mozart, and called their new company Audio Artistry, even though they hadn't yet incorporated. Meanwhile, Kay was trying to bring Linkwitz aboard. Linkwitz, however, had moved beyond box design and was working on a compact dynamic dipole, as outlined in his 1992 AES paper. Finally, however, he decided to become involved and, working with Kay and Pasquale, completed the design of the world's first full-range dynamic dipole speaker - the Dvorák. After the Dvorák was introduced at the 1994 WCES, Linkwitz decided to join the company, and shortly thereafter Audio Artistry incorporated.

The final player in Audio Artistry's quartet is the man who brought Kay and Pasquale together. Hoffman, known as "Tommy Tweak," is not only responsible for marketing Audio Artistry speakers, he is deeply involved in the final parts selection. He gets the prototype speakers and spends long hours auditioning different capacitors, resistors and other passive components. Searching, as always, for the perfect match.

Linkwitz's first dynamic dipole design was a tri-amped system. Although he protested that a bi-amped system was not possible, Kay pushed him until he found a way to bi-amp the Dvorák. Then Kay started pushing again - this time toward a full-range dynamic dipole speaker, with a purely passive crossover that could be driven by one amplifier. "Impossible!" cried Linkwitz.

Now, for your reading and listening pleasure, the impossible speaker - Audio Artistry's \$4,495 Vivaldi.

### **Separating Sounds: Brown's Law**

To begin: these are outstanding speakers. Start with the quality of resolution, the ability to separate sounds from each other. Some analysts say this is the most important of all qualities to listen for in a component or system. This is what Richard Brown of Brown Electronic Labs (BEL) listens for when he designs his amplifiers, which are still the very best I have heard, though they cost "only" \$3,000. Here is Brown's Law: Equipment is capable of smearing, confusing or otherwise distorting two different sounds. Thus a speaker may mute a loud bass note, making it sound like a softer one; the intended dynamic contrast is lost. Or an amplifier may layer the entire orchestra with sweet chocolate; there is no apparent difference between one woodwind and another, or between a violin and a viola.

But whatever distortion is imposed by a component will necessarily tend toward uniformity. It is not possible for any component to make two like sounds seem different. The best, the most accurate a component can be, is to preserve the difference that already exists. There is not, there cannot be, more of a difference between two musical sounds than was created when the instruments first set the air about them vibrating.

Therefore, says Brown, the way to use our most sensitive measuring devices - our ears - is to listen for the sharpest difference between notes, between instruments, between voices. The greatest differences will mark the most accurate reproducing equipment. This is true for tonality, for harmonics, for dynamic contrast and shading: the more internal differences, the greater the accuracy.

Of course, to hear the difference made by one piece of equipment, the rest of your equipment should itself preserve the maximum differences. (Here Brown's Law dovetails perfectly with Ivor Tiefenbrun's classic theorem, that the most important element in a system is the first reproducer, which for him is the turntable. What is lost when the stylus hits the record, or the laser hits the pits, can never be recaptured.) In the last two years, I have made a series of changes to my system. Each has increased its resolution, making it possible to hear what changes were affected by the other components. The first piece was the BEL 1001 MkII. Never did I believe a piece of electronics could make such a dramatic change, at one stroke stripping away layers of distortion and grunge that all other amplifiers put upon the sound. With the 1001 MkII came BEL's The Wire speaker cables and interconnect; Tom Miiller claims that MIT speaker cables beat the BELs (at a much higher price), but he doesn't have anything better than the BEL interconnect for connecting the turntable to the phono stage. Then I put in a new cartridge that cost me (old price) all of \$200 - the Audio-Technica AT ML-170, which outperformed all the moving coils that had cost me so dear in the past.

Of course each change, each improvement, each increase in what I was hearing, only increased my thirst for more. So out went the fine Rega Planar 3 turntable, and in went Harry Weisfeld's VPI TNT Jr. Just as Weisfeld promised, the bass extended, noise vanished and overall resolution increased. But I was waiting for the pièce de résistance, his JMW arm. That increased resolution more than any component since the BEL 1001 MkII. Then Brown sent along his new, improved speaker cables, which make a relaxed and open sound even more so. And for Christmas, and this review, arrived the improved BEL interconnect, which just disappears. With wire, you can't ask for better.

### **Enter The Vivaldis**

All this was by way of preparation for the Vivaldis. My reference speakers are the Apogee Stages. These planars are uncolored and transparent - the sound seems to come "clean," which is probably just another word for the same quality of resolution. But the Vivaldis are another order entirely: they let you hear differences even speakers as fine as the Stages only hint at. Here is an example. One of the first records I played was the Mozart Symphony In C Major, K. 213c, an eight-minute miracle that flows continuously from one singing passage to another, including an astonishing segue into slow three-quarter time. It was derived from his opera The Shepherd King, and the glorious andantino has the oboe taking an aria once sung by a castrato. The recording is by Hogwood and the Academy of Ancient Music (L'Oiseau-Lyre D171D4), for the most part with Eighteenth Century instruments. The violins were initially so sharp that I could listen only by greatly lowering the VTA (on the VPI arm, this is done during play with the turn of a large dial). After about half an hour, the cartridge warmed up, and the sound relaxed - the cantilever mounting loosening, perhaps. The point is that with the Vivaldis the difference between a cold stylus cantilever and one flexed by the heat of playing was startlingly obvious. I thought this might have been the speakers warming up from their shipment, but the effect has persisted into every listening session. With these speakers, you hear everything that your system feeds them.

## A Meaningful Musical Dialog

What does this mean for the music? Most concerto recordings, played over most systems, give you a reasonably good idea of the dialog between the soloist and the orchestra. But the great concerti aren't simple dialogs; they are full of other voices, as in the counterpointing solo cello and the softly plucked strings in the finale of Beethoven's G Major Piano Concerto. In the concert hall, we hear all of this without strain or effort: it is just there. With most home systems, those voices are muted, and if you don't listen very carefully they disappear. With the Vivaldis all of it is laid before you. This contributes directly to enjoyment of the music. Mozart wrote his Concerto For Two Pianos And Orchestra, KV 365, to be played by him with his sister, and its charm depends on the dialog between the two pianos, in which the pupil repeatedly mimics the master. My record is by Emil Gilels with his daughter Elena (DG 2530 456). Their playing is captivating, but it is easy to lose track of which is playing when. The resolution of the Vivaldis keeps them clear and separate, and the piece holds its meaning. Moreover, the Vivaldis give the sound of the piano a fullness and weight that is rare in reproduced music. I don't know whether to ascribe this more to resolution or harmonic rightness; but comparing the performances of Beethoven Opus 53 ("Waldstein") by Charles Rosen on Nonesuch (NC78010) and Hyperion Knight on Wilson Audio (W-8313), I was able to hear not only every nuance of their different renditions, but I could also almost to feel their instruments, their use of the pedals and the pressure of their fingers on the keys. Or listen to the Corelli and Handel recordings of Nicholas McGegan with the Philharmonia Baroque Orchestra (Harmonia Mundi 7014 and 7010). These are brilliant small-force recordings, fewer than 20 players. With the Vivaldis, you have the illusion that you are hearing each individual player, each violinist with his own tone. (Of course you're not supposed to in the concert hall; composers deliberately rely on the effects of what we would call intermodulation distortion, taking the edge, for example, off brass instruments by combining several of them. Recordings, however, provide a more immediate perspective and greater separation.)

The Harmonia Mundi recordings are sonic spectacles, engineered by Peter McGrath in HM's last analogue glory. The reason for great systems, however, is to better hear great music. I have a 1964 Angel record of Klemperer and the Philharmonia playing Mozart's Symphonies No. 31 and No. 34 (5-36216). For years I could barely listen to this record, because my previous system produced from it only a thick glob of bad-tasting sound. Today, especially on the Vivaldis, the Mozart is all disentangled, the sounds as they should be. The finest recorded performance I know of the under-appreciated Beethoven Mass In C is a mid-Sixties Angel (5-36775) with Giulini conducting and Elly Ameling, Janet Baker, Marius Rintzler and the incomparable tenor, Theo Altmeyer. On any lesser system (like my old one), this is as sonically turgid as it is musically soaring. The music is ethereal and dynamic all at once, in the manner that Beethoven shares only with Bach. With the VPI/BEL/Vivaldi combination, it is still not a great recording, but you will get lost in the music without electronic interference. (And when they are remastering old EMI-Angels, why don't they look for the great music like this and the Klemperer Mozart, and leave the sonic highjinks alone?) When voices are well recorded - as on the marvelous Marriage Of Figaro of Erich Kleiber, with Cesare Siepi, Hilde Gueden and Lisa Della Casa, now available on a vinyl reissue from Acoustic Sounds (Decca SXT 2087- buy this record) or on CD from London (417 315-2) - the effect is lovely and powerful as only the human voice can be.

## Vivaldis Take Off The Mask

Tom Hoffman of Audio Artistry says the Vivaldis' resolution is accomplished by unmasking. Conventional speakers, he says - especially dynamic box speakers, as distinct from planars, ribbons and electrostatics - have enormous interactions with the enclosure and with the room. Room resonances and reinforcements fill our ears with all sorts of extra sound, and we just can't hear the delicate highs and overtones that give music its flavor and distinguish one sound, one note, one instrument or voice from another. The Vivaldi, like Audio Artistry's more expensive Dvorák and forthcoming Beethoven statement speaker, is designed to minimize room effects. Hoffman claims the dipole design directs the sound to our ears, rather than at the room.

Hoffman and Siegfried Linkwitz must know something. They are using Vifa drivers and a Vifa silk-dome tweeter (the only part of the system that is monopolar) that are used by many other speaker builders. But Audio Artistry's results seem to me superior. Some of this may be Linkwitz' crossover design, and some may be from the use of eight-inch midrange units - larger than many use for woofers - to move the necessary air with smaller excursions. But the Vivaldis seem to keep their essential tonal character regardless of where they are placed in the room, so perhaps the dipole design is indeed the key. It may also be the key to the Vivaldis' excellent bass. The Vivaldis use the same two 12-inch woofers as the Dvoráks, but they do not go as low as the Dvoráks, with their larger, separate bass cabinets (both speakers are also dipolar in the bass). These are not tub-thumping subwoofers, they yield a large amount of accurate and tuneful bass, real music in the bottom octaves. Once again my test is a mediocre recording of great music, the Bach Cantatas For Pentecost BWV 68 and 172 (Nonesuch H-71256), with spectacular German singers and players. As the great basso Jakob Stämpfli sings of God's glory, the drums and continuo stride behind him with absolute rightness. The Stages captured his voice and the trumpets; the Vivaldis added a more solid continuo foundation. They also disentangle the horns and oboes, but the bass is the most striking difference from the Stages. Its addition is heard in every piece of music, seeming to make each phrase and movement more rhythmic.

A good part of the Vivaldis' rhythmic bounce is due to the excellent dynamics that are one aspect of their resolution. Notes that were accented either broadly or subtly retain those accents, much more than on most speakers. Try either of three sets of string quartets: the Beethoven of the Italian Quartet on Philips, or the late Haydn of the Takács Quartet on London and the Kodály Quartet on Naxos. Without drums, brass or large numbers, the string quartet can impart a sense of tremendous dynamism - famously, as in the finale of the Beethoven Op. 59, No. 3 ("Rasoumovsky"). But this rhythmic drive depends upon the perceived dynamics that can be produced by 16 strings on four instruments. The Vivaldis, with their dynamic resolution, are a revelation.

On popular music, try the wonderful Will The Circle Be Unbroken (UAS 9801) - bass lines whether string or electric are part of the music, rather than the tuneless thump, mashing together with the bass drum, that is common with systems that try too hard to produce too much bass. The room doesn't shake, nothing falls down. It is music. There is not the physical sense of skin being struck that is the natural sound of the drum in the concert hall. But the deep strings of Colin Davis' small-force Messiah (Philips C71Ax300) come swelling up with power and absolute conviction.

Real bass - actually, a dramatically lower perceived balance of frequencies - is one of the major differences between live music and audio systems. The Vivaldis supply a lot of the musical bass that is missing from the Stages, not to mention many speakers less good. This is bass that, once heard, you are most reluctant to surrender.

The Vivaldis do not, however, tilt the entire frequency spectrum (as the Stages do); the treble stays as bright and full as your signal sources and amplification will supply. Precisely because the Vivaldis do not act as tone controls, they also do not sound like live music in the concert hall. At the end of Don Giovanni, when the survivors are picking up the pieces and pairing off, Mozart gives us a moment, a short swelling of unutterable sweetness from the cellos. I have heard systems that give us every scratch of the bow across the strings, and the Vivaldis do this. But they do not, with my associated equipment, yield the sweet sounds of the opera itself. And that raises an interesting question as to the obligation of an audio component.

### **What Is Accuracy?**

All this points us toward the heart of the mystery: what is it that a system is supposed to do? For decades we have assumed that a high-end system is supposed to reproduce with maximum accuracy - what? If the aim is to reproduce the original sound, the absolute sound, then how are we to compensate for the multitude of changes made in recordings by the thousands of mostly faceless engineers who have made or edited our recordings over the last 50 years? These technicians have introduced massive distortions, intended to make up for the limitations of the recording and reproducing process, as those were perceived at the time. Compensating for those distortions would require a complex and comprehensive set of sound-shaping circuitry and controls (not to mention an excellent trained ear): exactly what the high end has rejected as a spurious corruption.

Even with the most modern recordings, using the most sophisticated technical means, there are serious questions. Recording engineers - they are after all engineers - devote enormous effort to capturing the frequency spectrum flat from 20Hz to 20kHz. But I suspect that the great concert halls (at least midway in the orchestra and back) do not bring sound to our ears with that flatness. Especially they muffle the more discordant squeaks and brays, while somehow letting the music come through with seemingly effortless clarity. Composers (at least before the mid-Twentieth century) wrote not for recording but for the concert hall. They were writing with a direct ear to popular opinion and financial success, and we have to assume that their choice of voicings and instrumentation was made in consideration of how the music would sound to its listeners - that is, in the hall, church or chamber. Most recordings give it to us with a flat balance that I believe is much brighter and sharper than the composers intended us to hear.

Even assuming recording by extremely sensitive and musical engineers, with which we are blessed remarkably often, audiophiles have left virtually unaddressed the full extension of Ivor Tiefenbrun's first-things-first principle: that everything depends on the microphone. In the many hundreds of equipment reviews that have appeared in the absolute sound and Stereophile, not to mention Stereo Review and High Fidelity before them, how many have been of professional recording microphones? How much critical analysis has there been of their flaws and quirks, to push their designers to improvement? More important than reviews are the imperatives of the marketplace. Even high-end speakers may sell in the thousands, amplifiers and disc players in the tens of thousands. But professional microphones can hope to sell at best in the hundreds. There are not the same revenue possibilities to attract and pay for the same engineering investment. Moreover, microphones, like all transducers, are art as much as science, and the electrical engineers who have dominated American audio design seem more comfortable with science than with art. That is why we have a choice of hundreds of amplifiers, why new digital converters appear every month, and why (even in the heyday of analogue) we had a relative paucity of phono cartridges, most of them from Japan and Europe.

So while we all consume their output, microphones are entirely a professional product. And the audiophile community just eats whatever it is given, without analysis or comment.

With so little control over the start of the process, and with recordings subject to so many distortions deliberate and inadvertent, what does it mean to say that our systems are "accurate?" Of course one system, or one component, can be a more accurate reproducer than another. But it is at least arguable that accuracy of signal reproduction may not be the right criterion. I am reasonably certain it is not the only one.

### **The System As Music Maker**

Let us think for the moment of our systems not as electro-mechanical devices, but as musical instruments. This is not farfetched. Consider a piano transcription of a symphony. We do not play these, but four-hands versions were widely available for amateur music-making in the days before recordings, when pianos and playing them were features of the enlightened middle-class home. Or consider Bach's Musical Offering, which can be played on virtually any instruments. The different versions will sound very different, but they are the same composition, and they convey the same musical emotions. This is equally true of a comparison between the usual modern Messiah, even a small one like Davis', and the lovely original instrument version of McGegan (HMU 907050.52): they sound very different, they differ in emotional detail, they have a different musical impact. Yet the reverence and devotion are the same. And if your eyes don't at least glisten at "He shall feed His flock" or "For unto us a child is born" on either version, get a home theater and watch Arnold movies instead.

By this token, we might think of our systems not as making the vain attempt to reproduce the absolute sound of the real instruments in a real hall, but rather as producing a different, yet still valid presentation of the same underlying musical composition.

This would seem to be a standard of unabashed subjectivity. Yet any judgment of music is inherently subjective. This is not to say that everyone's opinion is entitled to equal weight, much less that no comparative judgments are possible. The authority of a Tovey is very different from that of a Leonard Bernstein or Charles Rosen, yet each of these great performer-analysts is recognizably profound and far above common opinion. There is no "objective" standard by which we can rank Mozart ahead of Spohr, or Beethoven above Rossini, but their contemporaries and all who have followed have been able to tell the difference.

Judging audio components and systems as musical instruments would require us to thoughtfully consider what systems should sound like. Obviously they should sound the way music sounds in its natural state. But we don't have systems that really do that. And the ways to approach "natural" sound will cause some debate. I, like most of us, keep reaching for more detail, more resolution; yet I also know that any system that sounds sharper than the concert hall, that loses the sonorous richness of reality - no matter how accurately it reproduces the signal it is fed - is not musical, and is inferior to a system that produces, even through distortion of the signal, a more mellifluous and balanced sound.

Moreover, the manual warns that music may have to be played at a certain level to sound right: at a lower volume, the sound will be thin, at a higher one "unnatural." On a number of recordings I found the manual right, and the range of correct sound volume to be relatively narrow. But then I tried the Decca

re-issue of Tchaikovsky's 1812 Overture with Alwyn and the London Symphony Orchestra (SXL2001). I played it at huge volume, without pain or distortion; but recordings less good will require careful adjustment. Since a lot of volume controls - like those on my SP9 MkII - change the balance when the volume is changed, you can do a bit of hopping up and down at the start of a record. And forget about preamps that (in the modern fashion) omit balance controls. With the Vivaldis you should have a balance control even for digital, since no room is perfectly symmetrical; for vinyl it's indispensable. In summary: The Audio Artistry Vivaldis are a big step forward: speakers of great resolution whose sound has much of the relaxed detail that characterizes live music, if that is what you feed them. They are, however, absolutely intolerant of sharpness or edge in the signal. This can be a special problem on high-resolution vinyl, and you will have to dial down the VTA. But they will also give you much of the bass foundation and midrange warmth that make music sound right. And, most of all, Audio Artistry appears to have succeeded in significantly reducing room interactions. These speakers are not cheap, but they are built to a price that is affordable by many music lovers willing to make a reasonably serious commitment to home music reproduction. Without regard to price, the Vivaldis are outstanding. Considering their price, they are spectacular.

### **Inside The Box**

The Audio Artistry Vivaldis have a footprint of about 14 inches square and stand 50 inches high. They weigh 85 pounds each and the finish is excellent. There are five drivers in each cabinet: two 12-inch woofers, a pair of 8-inch midrange units, one above and one below the 1-inch tweeter. Only the tweeter is a traditional monopole - the midrange and woofer units operate as dipole radiators in free air. That means that the midrange and woofer drivers are mounted to a structure that does not enclose them. Thus, the sound of each driver radiates in both directions; in-phase sound projecting forward toward the listener and out-of-phase sound projecting backwards, away from the listener.

Because the woofers and midrange drivers are mounted in free air, the forward and backward outputs of the drivers wrap around the edge of the driver and cancel each other. Thus, the speaker radiates very little sound directly to its side, reducing the acoustic energy put into the room by approximately 5db according to Audio Artistry. The result is that the sound of the room - its resonances - is substantially reduced, "unmasking" the direct sound from the speakers and letting the listener more clearly hear the music. Unlike the more expensive Dvoráks (see sidebar), the Vivaldis do not use an active electronic crossover. The Vivaldis' crossovers are passive and, consequently, the speaker is more difficult to drive than its sibling. Audio Artistry recommends a solid state amp of at least 100 watts (the 50-watt BEL 1001 MkII is an exception to this power requirement). Specifically, the Vivaldis want to see an amplifier with low output impedance (less than .5 ohms) and high damping factor (over 50). Further, Audio Artistry strongly recommends bi-wiring the Vivaldis, and there are high-quality gold-plated binding posts for this purpose. That means that a separate speaker cable runs from the amplifier for both the bass and the midrange/treble of the Vivaldis.