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I'm very fortunate! Years in retail allowed me to indulge my natural curiosity while experiencing audio systems and components in ways hobbyists and equipment reviewers can only dream about. In the course of my work I got to listen to recorded music for 4-10 hours a day, 4-7 days a week, 48-52 weeks a year for nearly 3 decades. I listened to and compared all the top products and many failures, too. It was a tough job but somebody had to do it.

Music, Live and Recorded

I had season tickets to the Long Beach Symphony, spent lots of time in local clubs for exposure to live jazz, rock, folk music and pop, and I played my own piano nearly every day. This constant exposure to live music kept the real thing fresh in my mind when listening to recorded music and I did plenty of that!

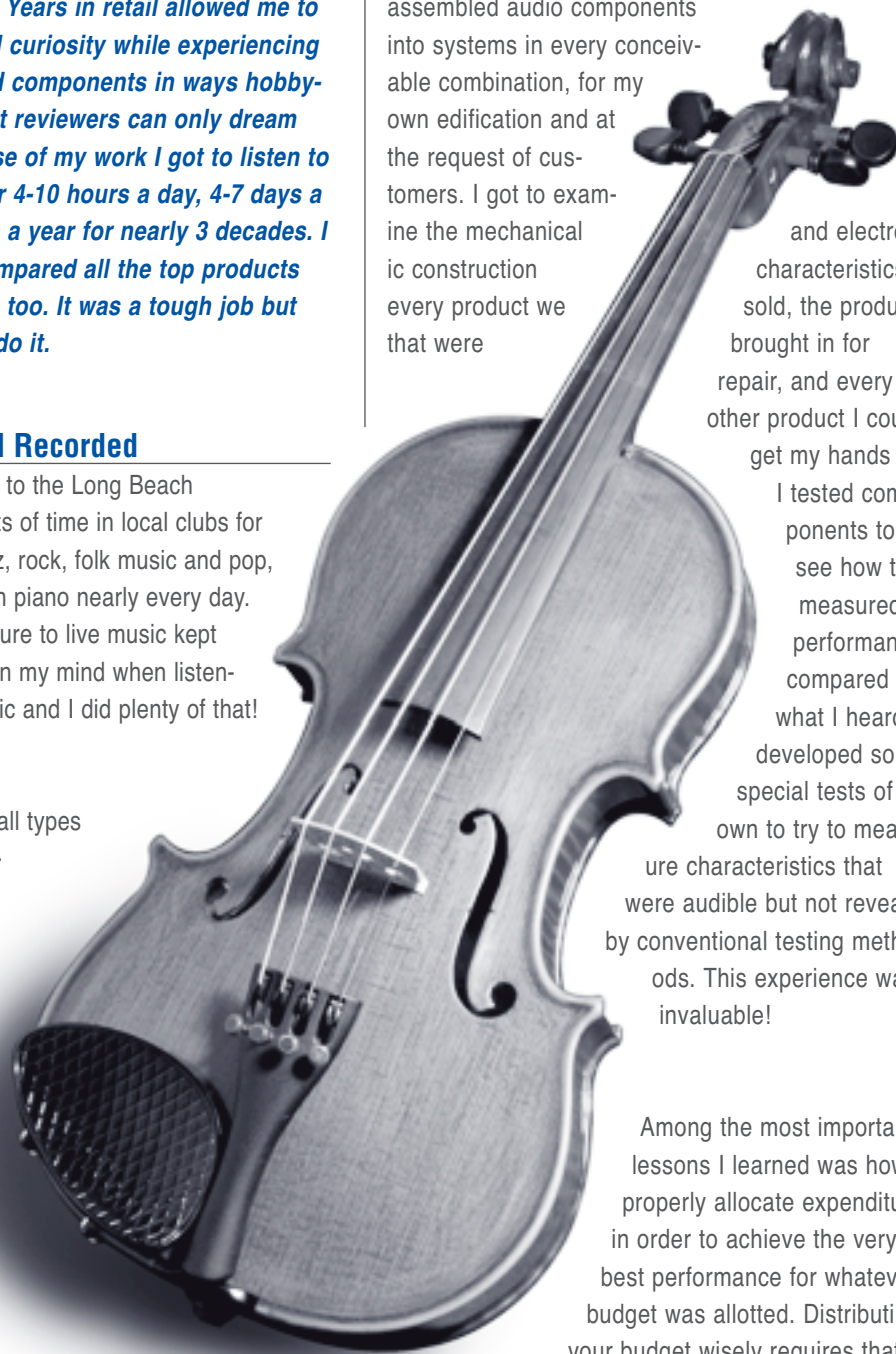
I directly compared all types of speakers side-by-side in the ideal listening environment of my store, and individually in home environments that were far from ideal. I

assembled audio components into systems in every conceivable combination, for my own edification and at the request of customers. I got to examine the mechanical construction every product we that were

and electronic characteristics of sold, the products brought in for repair, and every other product I could get my hands on.

I tested components to see how the measured performance compared to what I heard. I developed some special tests of my own to try to measure characteristics that were audible but not revealed by conventional testing methods. This experience was invaluable!

Among the most important lessons I learned was how to properly allocate expenditures in order to achieve the very best performance for whatever budget was allotted. Distributing your budget wisely requires that



each section of the audio system be considered according to its role. Proper consideration of the roles of each system section requires a complete understanding of the signal flow through that system. This is so important that it's time to reintroduce the necessary information.

The Natural Order of Things

In **Audio Perfectionist Journal #3**, I introduced the concept of *the natural order of things* to illustrate the signal path through the various components in an audio system. This is not a theory and I didn't invent it, it just is.

Grass is green, the sky is blue and the signal flows through an audio system in a prescribed manner. Speakers are always preceded by an amplifier. Amplification components are always preceded by a source component. If you have any doubts about how the signal flows through *your* audio system simply unplug the interconnect cables at the input to your amplifier and see if the speakers continue to produce sound. They won't, but you don't have to take my word for it. You can proceed back a section at a time and break the signal path to prove this concept to yourself.

***“This is not a theory
and I didn't invent it.”***

Ivor Tiefenbrun, founder of Linn Products in Scotland, first brought these facts to the attention of the public more than thirty years ago. (See interview with Ivor in this issue.) In order to draw attention to the importance of a turntable he called it *hi-fi hierarchy* and used an analogy from the computer world: “garbage in, garbage out.” Ivor's use of the word “hierarchy” has stirred much controversy because it seems to imply that some components are more important than others but that's not the actual purpose of this information. After all, which is more important to penmanship, your hand or your arm? You can argue about this question but for the best dexterity you need both. In an audio system, you might get more performance by upgrading your source component before upgrading your speakers but you can't listen to either one alone.

I prefer calling it *the natural order of things* to avoid any debate about what's more important and to make it clear that this is a guide that helps you get the most performance for your money. Understanding the signal path helps in the allocation of resources when assembling an audio system for the first time and especially when upgrading that system.

***“The signal flows through an
audio system in a prescribed
manner.”***

The High Fidelity Approach

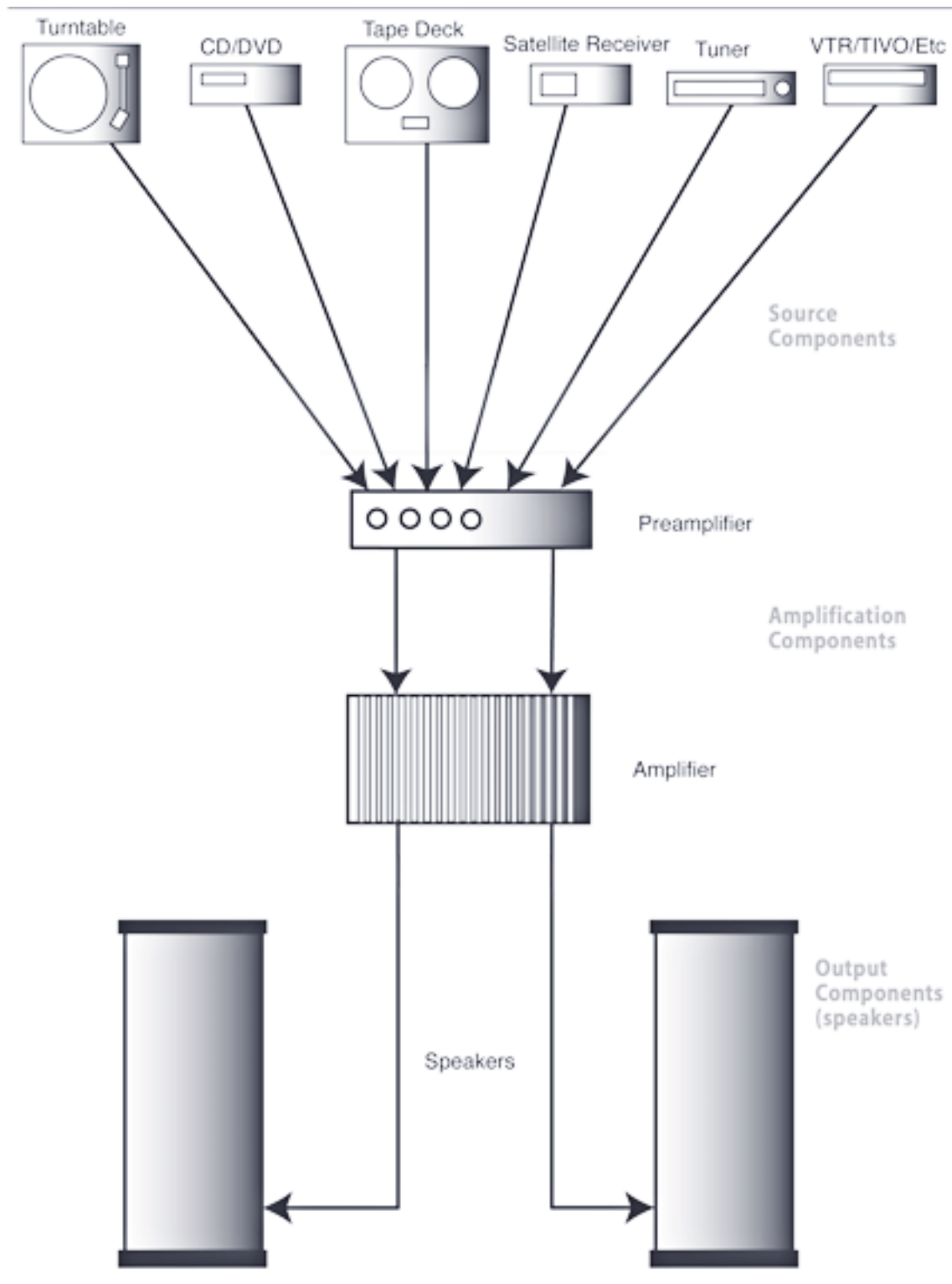
Remember, **Audio Perfectionist Journal** follows the high fidelity approach to home music reproduction. This approach assumes that our goal is to accurately reproduce the information that was recorded and that the components we choose are designed with that purpose in mind. Unfortunately, that's not always the case. With the exception of some unusual amplifier designs, most audio components other than speakers are relatively accurate. It's fashionable today for some speaker designs to create their own sounds rather than just recreate what's been recorded. Some people enjoy hearing these extra sounds, even though they are not part of the recorded information.

If you like the sound of the exaggerated reverberence created by speakers with dipolar or bipolar radiation patterns or you enjoy the sharper, more forward sound from speakers with ringing, fourth-order crossover filters, a caveat is in order. These speaker artifacts—and believe me, they are artifacts—will be superimposed on everything you hear. When you put a better signal into a system that includes speakers (or other components) with these or other artifacts, better sound will probably come out but the difference may be somewhat less discernable. Garbage in always means garbage out. Putting a better quality signal in usually means that better sound will come out.



Richard Hardesty circa 1999

If you want to assemble or upgrade a high fidelity audio system, the information in this **Journal** is very important. We'll revisit the natural order of things to put the sections of an audio system into perspective so you can see how each section affects the others. I'll interview Ivor Tiefenbrun, founder of Linn Products in Scotland, who first brought this simple concept to the attention of consumers. Shane will review some new components and I'll finish with articles about how to assemble an audio system for the first time and how to systematically upgrade that system while getting the most performance for your money. [APJ](#)



The Natural Order of Things

Yes, There is a Natural Order of Things

by Richard Hardesty

Recording a live musical event requires the conversion of acoustical energy into electrical energy by the microphone(s). Air pressure waves from instruments and voices move the diaphragm in the mic and a tiny AC voltage appears across the microphone cable. The resulting analog waveform is then amplified, processed and converted again to some other form for storage.

*If the storage medium is an analog record the electrical energy is converted back to mechanical energy by the cutter head, which makes physical grooves in the lacquer-coated master. If the storage medium is a compact disc the electrical energy is first converted to a digital code and then engraved into the aluminum foil of the CD. If the information is to be stored on magnetic media, such as recording tape or hard disc, the energy is converted to a concentrated magnetic field by the recording heads, which magnetize ferrous particles on the tape or disc surface. If the original event is going to be broadcast over the airwaves the electrical energy is used to modulate radio waves. **Audio Perfectionist Journal** is primarily about the audio systems we use when playing back this recorded or broadcast information in our homes*

“The electrical signal... flows through the individual components in a home audio system in a prescribed order.”

Reproducing Recorded Music

To reproduce the musical performance in the home the information that represents the original event must be retrieved from the storage medium, converted back to electrical energy and then processed and amplified to a level which is sufficient to drive the loudspeakers. The speakers convert the electrical energy to mechanical energy in the form of sound waves.

Then your ears convert this mechanical energy back to electrical energy for interpretation by the brain. And you thought this was simple!

Here's the most important part: The electrical signal that represents the acoustical information from a recorded musical performance flows through the individual components in a home audio system in a prescribed order. This is not theory, it's an easily observable fact.

Understanding the signal route and what happens to the signal as it follows this path through the chain of components is important. It allows us to efficiently allocate our resources when purchasing or upgrading an audio system. Most of us will have to set limits on the total cost of our audio systems and spending too much on one component and not enough on another can lead to disappointing results.

Too Much Here, Not Enough There

The most common error that budding audiophiles make is spending too much on speakers and not enough on the amplifier that drives them or the CD player that sets the limits for signal resolution well before the speakers get a chance to reproduce anything.

“Speakers cannot improve signal quality.”

The speakers are the final components in the signal chain and they certainly are an important factor in the sound of an audio system, but they cannot reproduce musical information that doesn't come down the speaker cables in the form of an electrical signal. Speakers convert electrical signals to mechanical energy. They should not create information, they should reproduce it. Speakers cannot improve signal quality.

If a low-quality CD player fails to retrieve musical information from the CD, the best amplifier in the world can't amplify that

lost information and the best speakers in the world can't reproduce that information—it's gone forever. If the CD player, or other source component, successfully retrieves every bit of the stored data from the source but parts of that signal get lost or distorted by some component along the signal path, the speakers can't replace that lost information or correct a colored or distorted signal in any way.

“An accurate speaker accurately reproduces the signal that appears at the speaker input.”

An accurate speaker accurately reproduces the signal that appears at the speaker input. If that signal is bad the sound that comes from the speaker must be bad, no matter how good the speaker.

Speakers, the Weak Link?

Speakers are almost always considered by novices to be the weak link in the chain of audio components. This idea is based on the ancient concept that harmonic distortion measurements determine the level of perfection that components achieve. Since speakers often have more harmonic distortion than amplifiers or other system components they must be less perfect. This is generally a misconception (see **Journals #12 & #13**).

The idea of the speaker as the weak link has been supported by dealers, some of whom know better, because dealers make lots more profit on speakers than on other components. They want you to spend a larger portion of your budget on speakers to maximize their profits. Magazines have also supported the idea because there are more speaker manufacturers than makers of other components and the magazines want to print as many reviews and sell as much advertising as they can.

Speakers get the most attention from hobbyists and magazine reviewers because even a novice listener can hear big differ-

ences between various models. It's easy to convince inexperienced listeners that speakers are the only components that make an audible difference and many people steadfastly believe this. Any amplifier will do because they all have low distortion, they'll tell you—just get good speakers and you'll have good sound. All CD players sound the same, they say—bits are bits; only speakers make a difference.

The facts about speakers paint a different picture and here they are: Loudspeakers are the final components in the signal chain. Speakers reproduce only the signal that is fed into them. If that signal is bad and the speakers are accurate, the sound will be bad. On the other hand, if you put lots more information into a simple speaker you'll get lots more information out.

“Speakers reproduce only the signal that is fed into them. Any other sound the speakers make is distortion.”

If you put garbage into an outstanding speaker you'll get garbage out. Placing a better speaker at the end of a system of flawed components may actually make the sound worse because a better speaker may be more revealing of the flaws in the components that precede it in the signal chain. Speakers reproduce only the signal that is fed into them. Any other sound the speakers make is distortion.

Are speakers important components? Absolutely. Are speakers the only components that really matter? Absolutely not. This statement may seem counterintuitive but with experience you'll learn that it's true.

You can easily hear the difference between a good amplifier and an excellent amplifier through modest speakers. When I was a merchant, I sold many \$10,000 amplifiers by comparing them to less expensive amplifiers using a \$1,200/pair speaker

system. The demonstration was far more effective because of the modest cost of the speakers used in the comparison.

An Audio System is Not a Chain

If you hang too much weight from a chain the chain will break at the weakest link. Hence the saying: a chain is only as strong as its weakest link. Making other links in the chain stronger will not make the chain stronger than the weakest link because that is where it will fail. Audio systems don't work that way and here's why: Each link in a chain is the same and has the same purpose. Each component in an audio system is different and performs a different job.

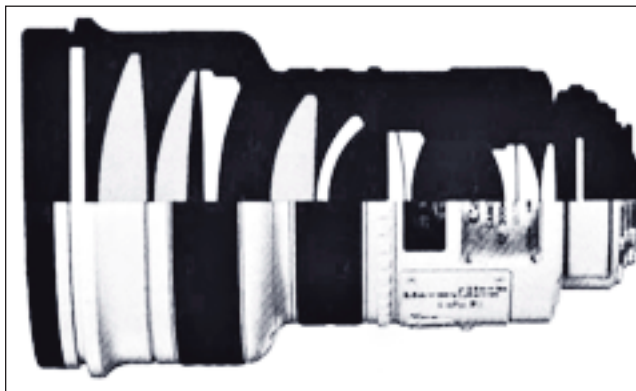
An audio system is made up of a series of components and the signal passes through them sequentially. The components in the signal path can't make the signal better, they can only make it worse. Each component is imperfect and each one degrades the signal somewhat by losing information and adding noise and distortion. Additive degradation includes noise, distortion and coloration. Subtractive degradation involves the loss of information or resolution and the compression of dynamic range.

Each component is somewhat dependent on those that precede it in the system but an improvement in any component will probably be audible because a better component will cause less damage to the signal providing a better sounding result overall.

Strengthening some individual links in a chain won't make the chain stronger but improving any of the individual components in an audio system is likely to make the system sound better. Every component makes a difference and improving any one will probably improve the overall sound. Some improvements will cost a lot more than others so we should study the purpose of each component in order to maximize fidelity and minimize expenditures. Let's consider the components in an audio system.

Elements/Components

The elements in a film or video projector lens make a good visual analogy to the components in an audio system. Each glass or plastic element in a multi-element lens bends or focus-



A multi-element lens provides a good visual analogy to the components in an audio system

es the light rays passing through it. Each element must perform its particular modification to the light rays that pass through with a minimum of light loss. Cleaning the surface of any lens element will improve the image. Audio components work in a similar way.

Each component in an audio system has a specific job to do. Each transforms or amplifies the signal in some way. Each one must perform its task while losing as little musical detail as possible, and adding as little noise, distortion and coloration as possible.

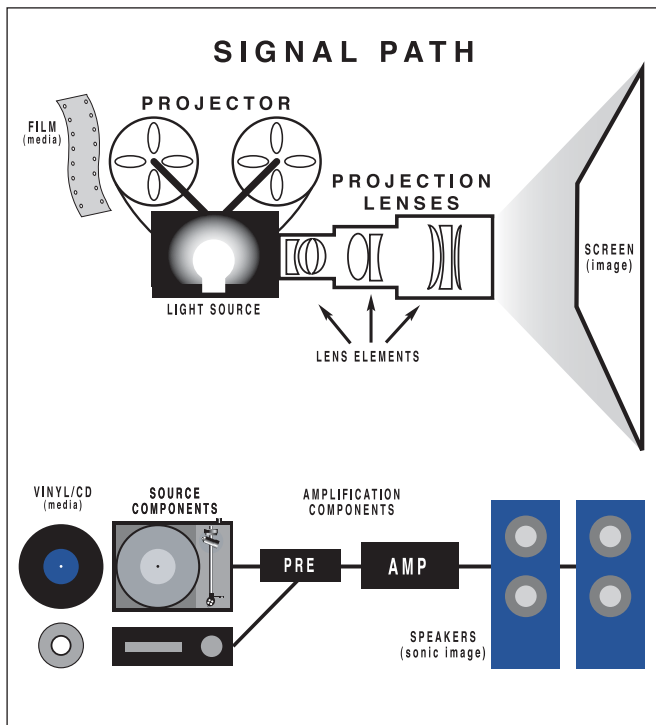
No lens element is completely perfect and some light will be lost and some distortion will occur in each element. If any element is tinted, the entire image will be tinted. A better lens provides a better image because it does less damage to the light passing through it. A projector lens provides a good analogy to an audio system. Because the image starts out small at the film frame and gets larger at the screen, distortions that occur early-on in the light path will be magnified.

No audio component is completely perfect either. Each component will lose some musical information or detail, and add some noise and distortion or coloration to the audio signal. If any component adds coloration the overall system sound will be colored. Because the signal is being amplified, distortions that occur early in the signal path will be magnified.

“No audio component can make the signal better.”

The projector lens can't improve the image on the film and an audio component can't improve the quality of the recording.

No audio component can make the signal better. An accurate amplifier, for instance, should produce an output signal that is a higher-powered replica of the input signal. A better amplifier will make a more accurate replica causing less degradation to the original signal. It can't improve upon the quality of the signal because there is no mechanism for signal improvement.



A better amplifier will pass along more information (less signal loss) and add less distortion, noise and coloration. Replacing an amplifier with a better one will improve the sound of the system regardless of the quality of the speakers at the end of the signal path because the signal will be degraded less by the amplifier along the way.

System Sections

An audio system can be divided into basic sections: the source components, the amplification components, and the output components (usually speakers). The cables that connect these sections together are important components, too. These will be considered separately in **Journal #16**.

Source components are all those devices that recover stored or broadcast data. These may include an analog turntable, a CD player, a cassette deck, an open-reel tape deck, a VCR, a DVR, a DAT deck, a satellite receiver or set-top box, a DVD player, a laserdisc player, or a tuner—any component that retrieves information from a storage medium or the airwaves. These components may have two or more signal channels.

The source component sets the limit for signal resolution. The amount of signal detail that comes out of the source component is the maximum amount that subsequent components in the signal path have to work with. A better turntable system retrieves more information from the record and creates less noise and distortion by producing less rumble and contributing less wow and flutter. A better CD player retrieves more data from the CD and distorts this data less with lower jitter. A better tuner resolves more of the broadcast information and adds less garbage.

The amplification components include a preamp and an amplifier. The preamp may be part of a surround-sound processor. An integrated amplifier is a preamp and amplifier on a single chassis. A receiver is a tuner, preamp and amplifier in one box. A stereo system has two channels of everything and a surround-sound system usually has five or more.

Amplification components take the low-level signal from the source components and make it bigger. The preamp is the control unit that provides switching, buffering and volume control along with some amplification—in the case of a phono stage, lots of amplification. The amplifier receives the signal from the preamp and raises it to a level that can drive the speakers.

The signal is actually amplified over and over again until it

reaches a power level that is high enough to drive the loudspeakers. The concept of a straight wire with gain is a misleading one. Every stage of an amplification component completely recreates the signal (see **Journals #10 & #11**). The amplification components can't replace information that was not retrieved from the storage medium by the source components, and the amplification components can't remove noise or distortion introduced by the source components. If the turntable distorts the signal from the record with speed fluctuations (wow and flutter) the amplification components will amplify these distortions along with the desired signal (see **Journal #9**). If the CD player produces a distorted replica of the signal during digital-to-analog conversion due to jitter, the amplification components will simply raise the level of these distortions. You don't have to be a trained engineer to recognize these simple truths.

Output components include loudspeakers or perhaps headphones. A stereo system has two speakers and a surround-sound system has more.

The output components receive the signal in whatever condition it's in after amplification and convert the amplified electrical energy into mechanical energy to move air and make sound.

There is no component in any speaker that can make the signal better. By the time the signal reaches the speakers it has passed through all the other components in the audio system. Information that got lost along the way cannot be recreated by the speakers, but noise and distortion can be. Noise and distortion in the signal will be clearly revealed by a high-resolution speaker system. You'll hear any noise and distortion that was contributed by any component in the signal path.

If you trace the signal path through the system it should become clear that each component can only work with the signal it gets from the component that precedes it in the signal path. But that doesn't mean that replacing a downstream component with a better one won't improve the sound of the system. Since each component degrades the signal a little, a better component is likely to provide a better overall result because the system as a whole will now degrade the signal a little less. Added coloration is a slightly different matter.

“There is no component in any speaker that can make the signal better.”

Coloration

If one component adds coloration to the signal the sound will be colored. Trying to cover up that coloration by adding components with “synergistic” colorations is a very bad idea. A coloration will remain until the last colored component is replaced. For the best results each component should be as neutral as possible in tonal quality.

You can also see that adding more components to the signal path will degrade the integrity of the signal even more. Every additional device will add noise and distortion and lose information. Every additional device will require another set of cables. The simplest signal path is almost always the best sounding and the least expensive. Consider adding components carefully.

Adding a stand-alone D-to-A converter, for instance, to improve the performance of the DAC in the CD player adds another component with another power supply along with another set of cables. These additional components will add noise and distortion and may lose signal information. Be sure that the outboard DAC is a *lot* better than the one inside the CD player or this expenditure may not result in an audible improvement.

Sources for the Source Components

The quality of the original recording or broadcast sets the absolute limit for resolution no matter how good your music reproduction system may be. The best audio system in the world won't make a bad recording sound good. The source components must retrieve the recorded or broadcast information and they set the limits for the level of resolution possible from your playback system. If you don't get all the information off the disc (or other source) that information won't come out of your speakers as sound. Read that last sentence again.

Time and time again I have seen disgruntled hobbyists with expensive speaker systems listening to \$400 CD players and wondering why their speakers don't sound like they did in the store demonstration. They're only bits, they say. Some magazines say all CD players sound the same.

“The signal from the source component sets the limit for resolution for the entire audio system.”

A CD or DVD player is the most common source for high-end audio or home theater systems today. These players read tiny pits on the discs with a laser beam and perform digital-to-analog conversion on the data that is retrieved from the disc (see **Journal #9**). This is an incredibly difficult and demanding task that requires a precision instrument to achieve high quality results. A \$79 CD player can read a CD but the analog signal that comes out is an inadequate source for a high-end audio system.

The signal from the source component sets the limit for resolution for the entire audio system. No component in the amplification or output sections of the system can recreate musical information that was lost or damaged by the source component.

Amplification

A preamp may not appear to do much more than switch input signals and provide volume control, and with line-level sources that's basically true. (With phono sources, a preamplifier can provide far more gain than the amplifier.) They may not seem to be important but preamps make a significant sonic contribution and, because they work with tiny signal levels that will later be amplified many times over, the sonic character that preamps impart to the signal will be a major factor in the overall sound of the system (see **Journal #10**). Good active preamps are expensive but worth it.

Amplifiers are the most underrated and possibly the most important single component in an audio system. Many people believe that amplifiers are nearly perfect because they all have low harmonic distortion. There is a large and very vocal group in the audio world that believes there are virtually no audible differences between high quality amplifiers. Believe me, nothing could be farther from the truth. For an experienced listener, the amplifier may be the audio component that makes the difference between musical satisfaction and boredom.

The straight wire with gain analogy, which is offered as a description of the ideal amplifier, is completely misleading. The input signal to the amplifier and the output signal from it are merely cousins, and in most designs distant cousins at that (see **Journal #10**).

Each stage of the amplifier recreates a replica of the signal from the stage that precedes it. The amplifier doesn't just take a tiny signal and make it bigger—the amplifier creates a big signal that replicates the tiny one. You could say that the signal you actually hear is created in the amplifier rather than passed through it.

Speakers

There are many terrible speakers available, of course, but the good ones are better than most people think. Some time- and phase-accurate speakers have better impulse response than the compact discs we play through them! These speakers are demonstrably more accurate in time and phase than the primary recorded music source of the day.

Speakers, like all other audio components, are not perfect. But their faults are remarkably agreeable with the human hearing mechanism. The acoustic errors that they make are similar to, and usually no greater than, the contribution from the natural environments in which we listen.

Modern high-quality speakers have very low distortion above the bass frequencies. Depending on how and what you measure, speakers may have less harmonic distortion than certain amplifier types such as single-ended triode tube amps. Most

high-quality speakers have amplitude response that is sufficiently linear to deliver good sound in real rooms.

“Modern high-quality speakers have very low distortion above the bass frequencies.”

A good speaker may have minor frequency response errors, but if these are balanced so that octave-to-octave energy is balanced, the errors are relatively benign and will be swamped by the room's acoustic contributions. Good speakers won't deviate from flat response by more than $\pm 3\text{dB}$ over the full audible range.

Most speakers have gross phase response errors which have been accepted in the era of the compact disc because the CD is a highly compromised medium. High resolution (96kHz or more/24-bit) LPCM on DVD and Super Audio CD discs may change all that. Some speakers are time- and phase-correct today and will be ready for tomorrow's improved recording technologies. See **Journals #12 and #13** for a discussion of this whole phase thing.

Cables

High-end cables can be the biggest scam in audio and some of the most expensive ones perform very poorly. But that doesn't mean that cheap ones will do or that cables aren't very important. Cables can dramatically change the sound of an audio system.

Yes, cables are an important component in the system. If you connect the world's best preamp to the world's best amplifier with cables that lose information or add distortion and coloration, the signal will be degraded by these cables, just as it would by any other component with similar aberrations.

Good cables are extremely important and the marketplace is a minefield of scam and hype. Anybody with a crimping tool can call himself a cable engineer these days. Don't buy any expensive cable product without carefully listening to it in your own system. Most of the mega-dollar cables perform poorly and should be avoided. There will be more about cables in **Journal #16**.

A smart buyer will consider individual audio components in the context of a complete system. The proper allocation of resources requires a balance of expenditures between the major sections of the system. If you spend too much on one section you will surely shortchange another.

If you are upgrading an existing system and you have one component that is of substantially lower quality than the others, change that first. If everything is well balanced quality-wise, start at the beginning with an improvement in the source section of the system. Then move down the signal path and improve amplification and finally the speaker system. Trust me, you'll get far more bang for your buck this way. [APJ](#)

Interview With Ivor Tiefenbrun

by Richard Hardesty

I've known Ivor Tiefenbrun for about 30 years and have visited his factories in Scotland on two occasions. During those visits I also had the privilege of seeing and learning about a foreign land from people who are proud of their country and heritage. I sampled outstanding beer and tasted single malt whiskeys that are memorable to this day. I was fortunate enough to directly experience the teachings of one of the industry's truly iconic individuals and the founder of Linn Products.



Ivor brought logic and common sense to an industry that had previously thrived on a sort of touchy-feely mysticism. He was selling turntables, of course, and to emphasize their importance he demonstrated that each individual component in an audio

system is somewhat dependent upon the quality of components preceding it in the signal path. And the previously ignored turntable is at the very beginning. Ivor called this "hi-fi hierarchy" and I call it "the natural order of things" but it's based on irrefutable facts. The audio signal passes through each component in a definite order. Each component can only process or reproduce the signal that arrives at its input.

Ivor posited that there are just two differences between noise and music: the tune and the beat. I call these melody and rhythm and while I also enjoy other elements of reproduced music like stereo imaging, experience has shown that there is no substitute for the basic musical fundamentals. The best imaging audio system in the world can't deliver musical satisfaction if you can't follow the tune the bass plays or tap your foot to the rhythm of the piece.

Charlatans have hijacked parts of our industry and I believe it's time for logic to rear its lovely head again. Three decades of experience have proven to me that the tenets of Ivor's original arguments remain sound but there have been substantial societal changes during this period. Pundits argue whether these changes are superficial or intrinsic to how we live now. I'd like to hear about what Ivor's learned during this time and I suspect readers will be enlightened, too.

Ivor, the world today seems so different from thirty years ago. Have people really changed or have I become a curmudgeon?

I think that we have both become curmudgeons. It is probably inevitable; however I think it's not that people have changed but that sometimes they have not changed enough. The problem is too many people still hold on to misguided ideas, which were misguided even 30 years ago. Music is now seen as less important than it was, with the focus being on vision, with cinema and games rather than music.

Music is a universal language of feeling and emotion. Leonard Bernstein believed that it would in the future replace religion in a way that would unite humanity and help eradicate conflict, so

it is tragic that people don't appreciate its importance or realize its power. A dear friend of mine, who passed away recently, the world renowned motoring journalist L J K Setright, once explained this phenomenon of focusing on vision by noting that people judge most things with their eyes because most people can see more clearly than they can think. But the biggest change over the last thirty years has been the shift in focus from listening to viewing.

Your background is in mechanical engineering. What prompted you to enter the hi-fi business?

Just over 37 years ago, when I got married, I bought my first hi-fi system. I noticed that the sound I heard through the headphones altered when the speakers were switched off, so I placed the turntable outside the room, closed the door and immediately gained substantially improved performance. I realized that the output from the loudspeakers was interfering with the turntable system. A discussion with a friend, who was involved with Decca for many years and familiar with every aspect of audio engineering, quickly convinced me the task of retrieving the fine information from a record groove was a challenge vastly beyond my expectations or previous understanding.

“People judge most things with their eyes because most people can see more clearly than they can think.”

In the closed-loop record cutting process, movement between the cutting stylus and the acetate faithfully captures all relative motion occasioned by the music signal, but the playback process is open with enormous scope for the loss of valuable music information.

These observations led me to the notion that the turntable, as the platform for the record/arm/cartridge combination, was the major determinant of the information that could be faithfully retrieved from a record.

With invaluable input from my late father, who was skilled in bearing design, and by employing the precision engineering skills and expertise that still exist at Castle Precision Engineering, the company my father founded, I developed and built a turntable which retrieved more information from the record. It also maintained more constant and stable rotational velocity and its operation was not only unprecedentedly quiet, but far less susceptible to external influences.

The idea that the quality of hi-fi systems was ultimately constrained by source quality offended anyone who believed that loudspeakers were the crucial components, the view at the time. Far from seeing the hierarchy of the system following its signal path from source to listener, most people believed the loudspeaker at the end of the chain was the most influential component. Fortunately for me, some open-minded people were prepared to listen for themselves and make up their own mind, as some retailers were excited by the prospect of selling a product that could improve any system and give people more pleasure from their record collections. The question was how to sell such an advantage. It seemed obvious that the best way to simply demonstrate the difference was by comparison and to let people hear for themselves what an LP12 would do to the sound quality of a system.

The pursuit of simplicity and innovation led to the continuous improvement of the LP12 as our knowledge grew. These values, standards and techniques enabled customers to upgrade their LP12 whenever they wished. This all helped to set Linn on a path that has made it, to those who use and enjoy our products, a cherished marque. The Linn Sondek LP12 has become, through many metamorphoses, a classic product that still excites the most discriminating customers more than thirty-six years after the first prototype sang its first song.

I appreciate the opportunity to talk about the start of Linn and the birth of the LP12 to your readers. The values that built its reputation and give its owners such pleasure persist in everything we do, but as I have always said, you should be the judge. All you have to do is listen and decide for yourself!

When we first met I could tell you were seriously interested in music. You preferred to talk about what message the composer was attempting to convey rather than the sound of your speakers. Today many forms of entertainment compete for our time. Do you still enjoy music without other distractions?

My wife listens a lot to the radio and chooses most of the music and so I'm happy enough to just listen to what's on most of the time, and my kids and grandchildren enjoy watching movies. Also, although I am no longer directly involved in all the day-to-day operational aspects of Linn, I seem to be busier than ever. Music listening at its most precious is usually a solitary and personal and private activity or perhaps involves a couple or a few close friends, whereas the cinema experience is more social, seldom solitary and usually involves a bunch of friends or kids watching a movie or a big concert or sports event.

Sound quality is important even when you are acquiring information, we also appreciate good sound quality when listening to the radio or watching a movie. As I get older I find poor sound more and more irritating. Of course, good music is as absorbing and enjoyable as ever and in my view 90% of the cinema experience is down to the sound if it is well reproduced. It is not only the dialogue and the sound effects but the emotions transmitted by the soundtrack music. The communicative power of music depends on it being well performed live or its pitch-accurate reproduction. In other words, high fidelity reproduction without distortion of the melody as this is the carrier for the feelings and emotions that the composer intended to communicate. I'm upgrading my CD12, Klimax, Komri system to a fully active configuration and that will have me listening to music even more.

Your company started with electromechanical devices—turntables and speakers—but now makes every part of a home audio system including recordings. Has this changed your views about the relative importance of each audio component?

My view on system hierarchy is still the same; the source comes first. Linn grew out of my interest in music and its accurate reproduction, and it started with a revolutionary product, the Linn Sondek LP12, which changed people's perceptions about the importance of the components in a hi-fi system. It changed their views because these were wrong. They had not understood the basic "garbage in, garbage out" hierarchy of a hi-fi system. They didn't understand that a loudspeaker, as the great Gilbert Briggs pointed out, could only detract from its input signal to a greater or lesser extent. Technology can change overnight but people take much longer.

***"In real music
everything has to be there
in the correct proportion."***

Although I started with a turntable, I didn't underestimate or denigrate the importance of loudspeakers. Indeed my next product was the Isobarik loudspeaker, which was developed to deliver clear undistorted low frequency bass. The dry and extended bass sound of the Isobarik was as necessary for more accurate reproduction as was the ability of the LP12 to retrieve more information from the record groove and it contrasted dramatically with the boom-boom "liquid bass" with which other loudspeaker manufacturers sought to outperform each other.

But my objective from the beginning was to make a complete hi-fi system and so Linn became the first specialist company to do so once we made our own turntables, arms, cartridges, preamps, power amps and loudspeakers.

We recorded our own music and started our record label because my view was that you had to be able to monitor and compare the signal at every stage from capturing the live performance to the result delivered in the listener's home. I could not understand how you could pursue high fidelity if you didn't control the input to products, although I came to realize that sales hype sometimes accounts for more sales success than the truth and many people in the business sought not the most accurate sound with everything in proportion but the most impressive one. They made quantitative judgments rather than qualitative ones. They wanted the most guitar, the most singer, the most bass, and didn't understand that in real music everything had to be there in the correct proportion. It is incredible that so much nonsense is still talked about hi-fi as is the fact that the retailers and many customers are misled and confused by sales hype which is inconsistent with the pursuit of accurate reproduction of recorded or broadcast music.

“People don't automatically appreciate the difference between listening and hearing.”

When Linn became the first company to make a complete system we were criticized and told that nobody could be good at everything and that you must specialize in just one of the component categories in a hi-fi system. My view was that if you were not intimate with all the issues involved in the sound reproduction chain you were unlikely to be able to be as true and accurate as you could be if you had expertise in every aspect of the system. As you can imagine, this approach didn't win me many friends amongst my competitors and was resented most by those amplifier and loudspeaker companies who were primarily interested in having customers spend all their money on amplifiers or loudspeakers with very little regard for source quality. In America in particular this led to the absurdity of people buying very substantial and expensive systems with a simple \$50 changer as their source. It also explains why there was a big focus on reel-to-reel tape recorders in America, when in Europe the focus was more consistently on vinyl.

I have never forgotten what it is like to be a customer and so I try to treat them the way I would wish to be served. My position always was that the customer should get a fair, honest comparison to demonstrate the differences between carefully selected products that all have value in a setup that was representative of what they would have in their home. In other words, the system had to be set up and configured for them with no undriven loudspeakers present in the room and without using comparators whose switching systems masked the differences between source, amplification and playback products. It was also important that the retailers had the competence to teach people how to listen on a qualitative basis and how to trust their own ears and exercise their own judgement.

People don't automatically appreciate the difference between listening and hearing any more than they do the difference between looking and seeing. A fighter pilot, sailor or artist must be taught how to look, just like a musician or an audio engineer has to learn how to listen, so specialist retail staff have to know how to teach customers how to listen.

You now make home theater products and mass storage systems for background music as well as high fidelity audio components. In this iPod age, is convenience more important than quality or is there still a market for superior music reproduction equipment?

Linn makes products for applications where sound quality matters and that clearly applies equally to music, home cinema and multi-room systems, but our target customers are only those who set high standards so we only address the highest quality music formats. We have never, for example, made a cassette deck because the same material was available with better quality on another existing and superior sounding format, the LP. We only did CD once we discovered how important eliminating jitter was and when we could reproduce music from CD above the threshold set by our minimum standard for sound reproduction.

We define this minimum standard as the degree of pitch-accurate sound reproduction above which the system is good enough to seduce you into appreciating and enjoying music you didn't think you could or would enjoy. In other words, a system that is good enough to broaden your taste in music. We believe that the function of a hi-fi system is not to replace live music but to help you explore, discover, experience and enjoy the wide universe of music. Only a system that performs above a certain level of performance is good enough to broaden your taste in music in this way. We know that once a customer buys a Linn system, the longer they have it, the more they appreciate it, the more their taste in music expands and the more prepared they are to invest in its maintenance and development. This is one of the reasons Linn equipment retains so much more value and lasts so much longer than anything else.

It is possible to enjoy music in a genre with which you are already familiar and which you have learned to appreciate, even on a pretty poor system, but that level of sound reproduction is not good enough to help a country music-loving person to enjoy opera or the reverse. A good system will enable listeners to make this magnitude of transition and so expand their taste in many dramatic ways because all music has merit; and when we are exposed to live music, whatever its nature, we are all able to appreciate the merit of the performance and the message of the composer.

Linn only entered the home cinema market when Dolby Digital made it possible to exceed our minimum standard in a multi-channel home movie system. Our computer-based Kivor music servers now allow people to access music from throughout their home through our Knekt system with equivalent performance to our CD players. But we would not make products like that if their sound quality was compromised, and they also must offer value and convenience.

The iPod is a very exciting product, but even if it is used to store uncompressed music, and although what it offers to a listener through headphones might be wonderfully agreeable, it is not a high fidelity source. A good system makes the limitations of the iPod painfully transparent.

This is not a criticism of the iPod. Its convenience and quality are perfectly adequate through headphones especially when you are listening to your own compilations of your own music that you already know and enjoy. Especially for people and music on the move this kind of product has unrivaled appeal, but if you want to listen more seriously, or make love or dance to your music, you still need a superior system that fills a room with high fidelity music and lets people listen together in a more natural way than headphones, no matter how good, can deliver.

The iPod is perfectly acceptable as a convenient source for music-on-the-go and I suspect that people who collect thousands of songs downloaded from the Internet really like music. I'll bet that some of these same people could be interested in better quality reproduction for critical listening. What are your views?

As I said, I applaud the success of the iPod because it is making music on the move more enjoyable by enabling people to listen to a large collection of their own music when they are on the move. As long as young iPod-owning people don't damage their hearing with the distorted sound of discos or from too loud sound through ear-penetrating headphones, then their interest and tastes will be open to the experience of the superior sound that is only available from authentic and precision-engineered sound reproduction components and systems. Digital music downloaded from the Internet also has the potential to expose people to worldwide radio and live performances, and as bandwidth availability and choice expand people will be more and more interested in higher quality sound if only to match the ever more stunning quality of video reproduction which is now being delivered. The big challenge for our business is to gain the opportunity to expose people to the superior sound we can offer and demonstrate its benefits.

Our industry has drifted from its original position advocating high fidelity reproduction to an "anything goes if it makes somebody happy" view. The magazines have supported this new position, which accepts "euphonic colorations," because it allows anyone to be a "designer" and everyone to be a "critic." I believe that's why so many music lovers are dissatisfied with their audio systems. What do you think?

When an industry is new and raw it is quite simple to participate and make performance improvements but as it grows and develops and knowledge is distributed, competition and commoditisation result in consolidation with fewer and fewer participants and the scale of investment, expertise and understanding needed to enter the business or compete increases. For all these reasons fewer and fewer specialist or hobbyist companies can remain in business or at the front line in the industry. That is why some of the survivors are driven backwards rather than forwards and seek to nurture obsolete technologies and tweaks because they are not being able to exploit new technology-led opportunities.

This happens in every modern industry and the result is that few genuine manufacturers are left in our industry who actually conceive, design, engineer, manufacture or indeed originate any significant aspect of their own products to any meaningful extent. Basically it is now often all about marketing so more and more companies start to badge mass-market products made in China or Southeast Asia or repackage mass-market technologies from companies like Sony, Philips or Motorola.

“...many retailers are driven by the market ...rather than any personal values...”

This process means that now most hi-fi companies are implementers who all use the same standard applications, standard configurations of chipsets and demonstration software from the same or similar commodity suppliers. Hype substitutes for the absence of any real added value and so retailers are also confronted with the same commercial pressures. Real prices of the products they sell fall and they are now exposed to competition from mail order, web discounters and from large retail chains. That is one reason some of them seek to maximize their margins rather than first pursuing better quality and value. That is why some try to sell people more snake oil cables and other nonsensical accessories at 60-80 point margins rather than better hi-fi or video components unless they have no choice.

In other words, many retailers are driven by the market and the technology adoption cycle and volumes rather than any personal values or a strategy to identify and serve the most demanding target customer group. This might seem really depressing but it is just the way it is.

Some retailers, when you approach them to sell a product, say “Why should I sell it? Incentivise me to sell your product. You have to make it worth my while,” rather than “Let’s hear or see what it can do.” However, if their customers knew that when they bought something as much as half or even more of the purchase cost was going to the retailer, they might be astounded; and when they discover that despite this the same retailer is unlikely to install or service their products, set them up properly, train their staff or instruct the customer on how to use the system to its full effect or seek extra payments for these services, the customer might become disgusted, and this only diminishes our industry.

Some companies who have their loudspeakers made in the Far East and pretend that they are handcrafted in Utah, England or Tuscany can make very large margins especially if their products are not going to be compared with more authentic competitors. Indeed, many seek to avoid any such comparison. The result is that these suppliers—you cannot really call them manufacturers—can supply their products with 50-60 point retailer margins on credit terms that can extend up to a year or more and/or on a sale or return basis. They buy their retailer’s commitment by paying for his advertising and by lending him large sums of money and/or stock at no interest. In this way they try to monopolize the route to market. In many cases they directly financially incentivise the sales people in the shop and pay them a cash bonus for every sale made.

Linn does not engage in these practices. I recognize that they are common commercial practices and are accepted as fair competition but I feel that any hidden incentive or inducement, because it is not visible to the customer, is inherently dishonest.

Linn does not even lend other manufacturers equipment at exhibitions because we feel that if someone uses our equipment at an exhibition it should not be because we have given or loaned them stuff for nothing but because they have purchased our products out of a genuine interest of making the best sound possible and are honest advocates.

The first rule of commerce has always been “let the buyer beware” but I feel that if customers really understood how loaded the purchase process has become, where their money goes and the hidden inducements involved, they might quite rightly feel betrayed by the retailer especially when the manufacturer almost always gets the blame whenever there is a problem even if it is caused by lack of retailer competence or integrity. The magazines are also equally diverse in their standards although this obviously varies from country to country and between publications and individual businesses’ attitudes and conventions also vary widely. Paradoxically in some countries where all magazine reviews are purchased or where all reviewers earn a fee every time they consider a manufacturer’s product, they exhibit more integrity than in countries where the fact that the reviewer is also a consultant or a manufacturer is not generally understood. It is especially destructive when some reviewers in magazines are straight and aboveboard and others in the same marketplace are anything but. When you read an inexplicably bad or jaundiced review it is always because the company involved does not “play the game” that some live by.

The first rule of commerce has always been “let the buyer beware”; that’s why we tell people to make up their own mind. Customers have to acquire a lot of information and realize that with an important purchase they have to shop around and find the best retailer before they have any chance of finding the best product on demonstration or the best advice and service.

It is also the case that, while customers are very likely to contact a manufacturer whenever they have a problem because the retailer blames the manufacturer or cannot resolve their difficulty, they are unfortunately reluctant to approach the manufacturer prior to purchase. This is a big mistake.

Most people only buy two or three hi-fi systems over a lifetime; typically one when they are young or a student, one when they are in the home and family-building stage of their life, and one when their career is mature and they are approaching retirement. In effect this is likely to mean that most people only have one chance in a lifetime to buy a great hi-fi system.

Choosing a genuine hi-fi system is a really important purchase. It should last and be capable of being developed over a lifetime. People need long-term support and they need to have a strategy for their system and know how to cope with future developments. They need real expertise and service, but a good hi-fi has always cost the price of a family car and a super hi-fi has always cost as much as a super car so you should take all the time and care it needs and deserves. It is not a decision that people should rush into and consumers do not protect themselves by buying a modest system. All they do is miss the opportunity to get what they really wanted. In other words, a system that is good enough to transform their life with music. If a system is not good enough to change your life, it is probably not worth buying. A good system should change the way you live and the way you feel for the better, so you must choose it wisely.

“Most people only have one chance in a lifetime to buy a great hi-fi system.”

In every field of human endeavour there can only be a few serious contenders. Arguably only one company or product can be the best in any category so inevitably prospective customers are faced with 99.9% noise and have to understand that separating the truth from the noise requires a fair bit of commitment, time and effort and that the final judgement that matters is their own. They must listen and make up their own minds and decide for themselves what to believe and what to buy. The bottom line is that magazines and reviewers will not give you your money back; the guidance that the best of them can provide should be and is there to help empower the end-user.

Some manufacturers would like us to believe that their speakers are more important than the source that feeds them. Isn't this like bragging that the colorations of the speakers are so pronounced that they swamp the sound of other components?

I am aware of the fact that some manufacturers believe that their speakers can improve upon their input. They obviously lack credibility. The staggering thing is that some of them sell loudspeakers for up to \$100,000 a pair and some retailers sell them because they can make 60 or more points on the sale. I suppose discriminating customers will realize that such hype and faulty reasoning is flawed, and will not believe anything they say and that such manufacturers and their retailers should be avoided like the plague.

“The making things work bit is not at all well understood. It's called engineering.”

Isn't coloration just a polite word for distortion?

Yes.

I believe that an audio system should accurately reproduce the recording rather than creating euphonic colorations that remind some people of live performances some of the time. What's your position?

My position has always been that we have to be true to what is captured at the source. I believe we have to extract all the information in the groove or in the airwaves or from a cable system or CD. We have to convert all the digital data extracted into information accurately, and pico seconds of jitter (in other words distortion in the time domain) are critical to this process. Linn is an innovative company that produces precision engineered sound and vision components. Our job is about the application of measurement and making things work.

The making things work bit is not at all well understood. It's

called engineering. It is the hard and grueling part of delivering superior performance.

Linn products seem to retain a higher percentage of their value in the used market. Why do think this is?

Typically a Linn product that is 5-10 years old can fetch half of its original cost, whereas many competitive products are below 20% within 2 or 3 years. In other words, when you buy most things if you turned around at the door and went back in and said “how much would you give me for this?” the sales people would hide from you. There are lots of reasons why buying Linn is not like that. Our products are priced honestly. They represent better value. Our customers usually sell our products only when they are going to buy something else from Linn, so they enthrall their prospective customer. There are many people who would like to buy our products new who can't yet afford them so they're out there in the market searching for second-hand products. Our after-sales service is good; when we discontinue a product we are still able to support it for many years to come. That's difficult with modern technology because sometimes the chipsets become obsolete and so on, and so we always discontinue a product when it's still competitive and serviceable. That also contributes to the resale value. All these things are part of our overall strategy of looking after our customers and treating them the way we would like to be treated.

You spent years demonstrating your views at audio shows. How did people respond? Can you tell us about some memorable experiences?

People are always amazed when we demonstrate the benefits of silent repetition, the technique of active listening, which allows them to perceive clearly on a consistent basis any sonic difference no matter how small. People are always appreciative of any learning experience that empowers them and helps them to make sensible decisions. We have always tried to show people how to judge to give them confidence in their own abilities and we want our specialist resellers to explain and demonstrate the hierarchy of a system so that customers know the best way to build a system and how best to optimize its

performance or upgrade and enhance what they have. We also strive to make people think about where they want to eventually end up. If ultimately you want to have music and cinema in every room of your home you might make very different decisions about your initial component and system purchases than if you decide that your dream is that you want the very best sound possible for music only in one room or the best possible cinema in another. As for the most memorable experiences, I'm still saving these up and collecting more.

Do you think that people would respond in the same way today?

People have not changed in this respect and I still find it as interesting and enjoyable as ever to get involved at public exhibitions because human interaction and imaginative exchange are the sources of all learning and pleasure. Ultimately the only thing that I think gives people sustainable pleasure is giving other people pleasure, so I enjoy meeting and interacting with people as much as I ever did, and in our ever more commoditised world people are even more appreciative of authentic products and companies that truly are different and special.

Ivor, thanks for participating in this informative and entertaining interview. It's comforting to hear that you still share my love of music and that the changes we've seen in the world haven't tainted or diminished the satisfaction that it brings us.

We only have five senses and our sense of hearing is at least as important as our vision. The audio industry should be at least as important to people as the video industry. The fact that it is not is our industry's failure and our shame.

In this sense I must confess to being disappointed by the fact that I have had so little impact on our industry despite so much work over so many years; but I still believe that what I do and what my colleagues at Linn together with our best distributors and resellers around the world do is worthwhile and hopefully that our combined efforts help to make the world a slightly better place, and I still wish and hope that I could and that they will achieve and do more. [APJ](#)

Pro-ject RM-9.1 Turntable/Tonearm By Shane Buettner

A lot of products caught my eye at CES 2006, but Pro-ject's RM-9.1 turntable stands out. Talk about a trade show moment. When I asked about the price of this turntable, and Kevin Wolff of Sumiko (Pro-ject's US distributor) replied \$1,500, I immediately asked how much extra for the arm. Nope, \$1,500 for the table and its single-piece, carbon-fiber arm tube. That's a real hot price for a hot-looking piece of kit, and the RM-9.1 jumped to the top of my review wish list.

In March, when Kevin set up the table for me, the RM-9.1 got even more interesting. Sumiko packages the RM-9.1 with its \$799 Blackbird cartridge for a cool \$2,000. With all the options available today in phono stages it's obvious that we're talking about putting together a complete vinyl playback system for under \$3K. Have I got your attention yet?



Pro-ject

Pro-ject as a company is its own compelling story. A Vienna-based audiophile and audio distributor named Heinz Lichtenegger noticed that, with the ascendance to market domination by the CD in the late 1980's, there were few manufacturers offering entry and mid-priced record players. A devout analog man himself, Heinz didn't like seeing audiophiles and music lovers of modest means with nowhere to turn. So he set out to develop and manufacture an entire line of affordable but high quality turntables.

In the Spring of 1990 Heinz managed to find a factory just a few hours away in the Czech Republic that had once not only been used to manufacture audio gear, but had once upon a time actually been a home to the manufacture of turntables!

I was both surprised and impressed to find out that Pro-ject is, in many ways, a mini-SME. And I mean that as a sincere compliment. Pro-ject is a genuine manufacturer, which is distinguished from being an assembler. In addition to manufacturing the tables and arms, and finishing and painting them mostly by hand, Pro-ject hand-winds their AC motors at the factory, in the same area of the factory dedicated to winding motors for model trains!

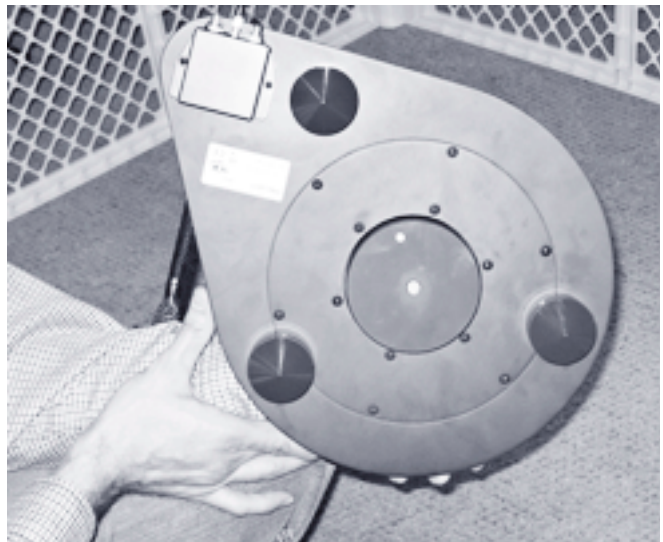
Pro-ject's line today begins with the Debut III, a complete table/arm/Ortofon cartridge combo that retails for \$329 and is available in eight different colors to match your décor, and tops out with the RM-9.1 that I'm reviewing here. A more expensive and ambitious RM-10 is on the way, and in addition, Pro-ject manufactures a number of tables and arm products sold and marketed by Music Hall.

“A complete vinyl playback system for under \$3K!”

Here's a quick story that speaks both to Pro-ject's success and perhaps to whether the vinyl revolution is real or imagined. About two years ago I was in a Magnolia Audio-Video, which is a prominent chain out here on the west coast. Seeing a wall of multicolored Proj-Ject Debut tables I asked the nearest salesman if they were actually selling any of those suckers, and he replied that they sold them out as fast as they could get them in. Hmm. Relaying this to Sumiko's Kevin Wolff I was told that sales of the Debut combo at Magnolia had gone up 40% each of the last two years!

Design and Setup

The RM-9.1 is a mass-isolated table with an MDF plinth and a sandwiched, two-layer acrylic platter that's used with a brass record clamp that slides down over the spindle. The plinth contains a hollow chamber with a steel mass plate centered on the inverted ceramic bearing. The mass plate, well, increases the table's mass and is located proximal to the bearing for maximum energy dissipation. The table is leveled via three well-damped aluminum/sorbothane feet, and is finished in classy lacquered gray.



Inverted bearings are somewhat controversial in some corners, because putting the bearing so close to the playing surface theoretically increases the likelihood of the stylus picking up bearing noise. The quiet, resolved and dynamic playback of VPI's Super Scoutmaster suggests to me that if inverted bearings are inherently problematic, the problems are solvable.

The synchronous AC motor is totally isolated from the chassis; it uses a "wall wart" transformer/power supply, and sits next to the table. Rounded bands connect the motor to the platter, and two different pulleys are provided that switch the platter speed between 33 rpm and 45 rpm playback. Speed is adjusted by manually moving the motor closer to or farther away from the table, which is actually quite easy to set with a strobe disc, and it was reasonably accurate switching between the 33- and 45-rpm speeds.

A step-up accessory for the Pro-ject tables is an outboard power supply for the motor that offers more precise control of platter speed at the push of a button, rather than moving the belt. Appropriately named the Speed Box SE, it sells for \$550.



The 9cc arm features Swiss-made bearings and a conical carbon fiber arm tube that is comprised of a single piece of carbon, with no removable headshell or moving parts for increased rigidity. In a nifty touch, it even features a sharply-cut out piece off the headshell area that works as a cuing device. Antiskate is set with classic string and weight, and a line is included down the middle of the outside of the arm tube for precise VTA adjustment. This is a page out of the SME tone-arm book, and really aids in fast, reliable VTA adjustments. Four different counterweights are available on request, accounting for any conceivable cartridge pairing.

The Blackbird cartridge is a high-output (2.5mV) moving coil with a nude body design, which is the same thing as saying it has no body. It weighs 9.5 grams, and the internal impedance is 135 ohms. The cantilever is boron. One minor beef, unlike Lyra's nude designs, the Sumiko has no provision for a stylus protector. Whoever does the dusting in our listening room needs to just keep the hell away.



Sumiko grabbed a first by making a point of showing off Blackbird's nifty fluted wood box, and claimed that the box had been stress-tested by throwing a bunch of them against a wall—with the cartridges still inside! This story wouldn't be recounted if the cartridges didn't survive unscathed. I'm telling you this because it gave me the same kind of chuckle I got from the Samsonite commercials of the 70s featuring orang-utans throwing the luggage around.

Overall, the level of fit & finish of this table/arm is extraordinary for an imported product in this price range. There's nothing cheap about this table or its workmanship, and everything about it imparts pride of ownership.

Sound

Speed is the first word that comes to mind when I think of listening to the Pro-ject combo. This Pro-ject rig has very tight bass and a lively midrange and an impressively large yet

well focused soundstage. Like the best mass-isolated tables I've heard there's a rhythmic drive to this table that's relentless in the best sense, and a real sense of dynamic swing.

Still shocking to me is that a modest turntable rig like this Pro-ject produces more convincing imaging than many of the megabuck CD playback rigs I've heard. There's a much greater sensation of size, and far more convincing portrayal of the micro-changes in dynamics that occur naturally in music.

“...more convincing imaging than many of the megabuck CD playback rigs...”

Some tables with acrylic platters have a flat, dynamically dead sound to them, but not the RM-9.1. Pure Pleasure's reissue LP of Buddy Guy and Junior Wells' *Going Back To Acoustic* exhibited this with startling drama. The title is true to the session: Guy plays acoustic guitar, Wells wails on the harmonica, and they both share vocals. That's it. Buddy Guy is as expressive a musician and vocalist as there has ever been. He doesn't play the guitar—he transforms it into a pure expression of his manic personality. He moves around, he slides, he slaps. He's just all over the thing. On the RM-9.1, Guy's guitar jumps completely out of the speakers as a living, breathing thing, open and alive in the soundstage. The strings, the body, the hands, they're all present and accounted for. Not as fully realized and utterly convincing as on my reference SME 20 (and of course if it were I'd be really pissed off!), but the musicians still get in the room with you.

Presence is as good a word as any to describe the way music sounds on the RM-9.1. The soundstage opens up, and the music is simply very "there" in the room. There's not a lot of embellishment, and there's very little in the way of additive colorations—no bloated bass, or romanticized, caramel colors of any kind. As mentioned, the bass borders on lean, which might spotlight the midrange just a touch, but in a pleasing way.

The midrange is perhaps just a little forward in an outgoing, engaging way. This combination goes about as far in this direction as it can without inducing any edginess or grit. And I'll temper that by saying that I've heard some of these characteristics in the Blackbird cartridge with other tables, and I believe it's a by-product of the taut bass and not a genuine midrange push. The bass borders on being dry, but benefits somewhat from a full mid-bass presentation that warms things up just enough without detracting from the engagingly forward midrange. Still, overall this isn't a warm, fuzzy sounding table by any stretch.

At \$5,500 for the table, arm and outboard speed controller VPI's Super Scoutmaster is much more expensive than the RM-9.1. But it's a lot closer to this Pro-ject's cost than my reference SME 20/Series V tonearm combo, which retails at almost ten full times its price(!). And yes, the RM-9.1 offers way more than ten percent of the performance!

During my review of the VPI I used it with Lyra's \$750 Dorian cartridge. This combination was smoother, more refined and more tonally even than the Pro-ject/Blackbird rig. There was better retrieval of low-level detail from the VPI rig, but the soundstage and imaging are surprisingly comparable. Both tables have a terrific sensation of speed, rhythm and pace.



The VPI is unequivocally cleaner and more transparent overall, but there's no question that the RM-9.1 acquitted itself quite well at a \$4K handicap in price.

This wasn't my first experience with Sumiko's Blackbird cartridge. While I like this Blackbird a lot, and especially like the price break Sumiko offers in combination with this table, Lyra's Dorian suits my own tastes a little more. I think it's more even tonally, and sounds livelier and yet also more refined and detailed. I should also mention that Lyra's Titan is my reference cartridge, so I'm obviously a fan of the Lyra sound. If you can afford to shell out the extra couple hundred bucks investigate some.

Conclusion

The Pro-ject RM-9.1 offers an amazing return on investment in fit & finish, and follows that up with wonderful sound for the money. The matter-of-fact presentation deftly sidesteps the negative aspects that can sometimes accompany that kind of sound.

***“Wonderful sound
for the money!”***

Not only do I highly recommend this table/arm without reservation or hesitation, I consider it a serious challenge to a number of you out there. With a table like this available for \$1,500, and packaged with a terrific cartridge for \$2,000, the excuses for not having vinyl playback in your system have dwindled down even further. Hell, even with a good phono stage you could buy this rig and a smattering of your favorite recordings on LP and still not top \$3K. What are you waiting for? [APJ](#)

The dCS P8i

By Shane Buettner

*I've done pretty well for myself when it comes to building my audio system, and for the most part it's now comprised of the components I've reviewed and regard as the best available, regardless of price. There is one exception. The best digital playback I've heard in my system, or anywhere else, is the dCS stack I reviewed for **Journal #9**. That system remains the best I've heard in overall clarity and transparency, and as with the best components, my respect and admiration for it only grew with the time I spent with it, which, fortunately for me, turned out to be several months after the review was completed.*

As much as I wanted that stack, its cost was nearly \$20K, which placed it beyond my financial grasp. Not that the P8i is a lot cheaper, but this latest offering from dCS is an all-in-one disc player based on proprietary Ring DAC technology, which was the heart of the digital “separates” system I was so taken by just a few years ago.



At \$14K the P8i CD/SACD player is only a bargain when compared with dCS' top-of-the-line DAC/transport/processor system, which is priced near, gulp, \$40K. While \$14K isn't exactly cheap, it's closer to the realm of reality for those of us without a money tree in the yard, and unlike so many expensive products the dCS does offer technology and engineering that is unique and truly proprietary. As you'll read here, dCS doesn't assemble the “me too” digital products that so many manufacturers do. And as you'll read, dCS has once again redefined my reference for high-end digital sound.

Outside

The P8i is an unassuming and surprisingly heavy box. It's far more utilitarian in the looks department, especially compared to the sci-fi looks of dCS' separate components that stack onto one another in a pyramid-ish shape.

The front panel is finished in silver aluminum with a rather monolithic fascia that's broken up only by a smallish display, a half-dozen small buttons and a rotary control. In an odd touch, the buttons glow red when pushed to play or access a CD and purple when playing/accessing an SACD or CD/SACD hybrid disc.

The rear panel has a removable power cord, and unfortunately the ins and outs are crammed very tightly together in three recessed areas. Not only are the connections physically difficult to manipulate, the labels that tell you what's what are tiny and inconveniently located. As a reviewer I move things around more than a typical consumer would. If you buy one of these, here's to hoping you just connect it once and don't have to go back there again!

In addition to single-ended and balanced outputs, there are digital inputs and outputs on AES/EBU and SPDIF on RCAs. There are also ins and outs for a word clock, which allow using a separate clock for the P8i (which dCS indeed makes as a separate component), or slaving another component to the P8i's word clock. The digital inputs are now currently active (with 44k and 48k signals) in the V1.10 iteration of the P8i's software.

There is also an RS-232 port for updating the P8i's software, and I hope there are already some updates in the works to correct a few of this player's operational quirks!

Inside

As mentioned most companies that manufacture "DACs" build around off-the-shelf DAC chips and digital filters from companies like Burr-Brown, Analog Devices, Crystal, Wolfson, etc.

I don't mean any of this to degrade those companies—better off-the-shelf parts are very sophisticated, very expensive, and have excellent performance. In addition to that, the power supplies and analog circuitry that have to accompany the DAC/filter chips have an extraordinary impact on the product's sound, and the companies that do that the best get the best sound.

The dCS people, though, are very unusual in this market in that they actually designed and patented their own proprietary DAC called the dCS Ring DAC. Rather than a pair or two of chips, the dCS Ring DAC solution is an entire daughter board with an analog output section.

There are things those at dCS will reveal about the Ring DAC and things they keep, shall we say, private. What is known is that the dCS Ring DAC operates at 5-bits/2.8Mhz, which on its surface is very similar to DSD's 1-bit/2.8Mhz system. Different filtering algorithms are used for CD and SACD playback, but essentially a 64x oversampling of 16/44 PCM has to happen in front of the DAC somewhere.

According to dCS, multibit DACs use a resistor associated with a current source for each bit. The higher the bit depth the greater the distortion, or nonlinearity in the DAC, as inaccuracies become inevitable in achieving correctly matched resistor values. One-bit sigma/delta DACs eliminate the resistor matching issue since there's only one bit and therefore one resistor. The linearity is good but high oversampling is required to achieve good signal-to-noise ratios, and then clocking errors, jitter and noise become problems.

Instead of using one resistor per bit, the dCS Ring DAC's five-bit system uses an array of resistors with the same value to reduce clocking errors and nonlinearities. But even then, small variations in the resistors' values would still degrade the performance of the DAC. The dCS Ring DAC uses a proprietary algorithm to vary the number and positions of the resistor arrays from sample to sample, thereby randomizing any errors stemming from the inevitable variations in resistor values. dCS likens its variation of the current sources to a circle, or ring—hence the dCS Ring DAC moniker.



There are four separate digital filter algorithms that can be selected for both SACD and upsampled CD playback, and the user manual offers zip in the way of useful information about their

The dCS claim is that the randomization of errors distributes white noise throughout the quantizing range that's far more benign sonically than the distortions that would occur otherwise. dCS further claims the resulting high linearity and resolution are unsurpassed. In addition to the reference quality sound I've experienced from the dCS components I've heard, John Atkinson (of *Stereophile* magazine) has measured a number of dCS components that use the Ring DAC and they have essentially set a standard in resolution for digital playback components. In other words, dCS seems to be on to something.

The transport is a Philips unit distinguished by being slow as molasses when loading or responding to commands, but it's also notable for sounding excellent in every application in which I've heard it, which must be how it earns its keep.

Features, Functionality and Operation

The P8i, like dCS's separate DAC components, has a volume control and can drive power amplifiers directly, without a line stage/preamplifier. Like the other components I've heard with this capability, the P8i sounds cleaner and sharper in some respects, but also flatter, sterile, and lacking dimension and image depth when driving amplifiers directly.

As counterintuitive as it seems to get better sound by adding a component in the signal chain, I recommend using a preamp to get the best sound from this or any other digital playback system. I've tried a number of the most highly regarded digital source components connected directly into power amps, including those from Wadia, Theta and dCS. I've yet to find one that outperforms the sound I hear when a high-end analog preamp is in the system.

sonic characteristics. dCS suggests that you experiment to find the best one, and thanks for coming. The algorithms are numbered from 1 to 4 with the best time domain performance achieved using Filter 1 for SACDs.

In addition, the P8i offers upsampling of redbook CDs to DSD prior to D-A conversion by the Ring DAC. dCS manufactures a "digital-to-digital" upsampler called a Purcell that does something similar, and I've heard it sound astoundingly good upsampling PCM to DSD with dCS's separates. As you'll read, I was not only underwhelmed with this feature here, I unequivocally believe Redbook PCM sounds better on this player with the upsampling turned off, which actually defaults to what dCS has informed me is a brick wall filter. More on that later.

The P8i defaults to the SACD layer of hybrid CD/SACD discs but can also be switched between the CD and SACD layers with a push of a button on the remote, and the phase can be inverted. The brightness of the display can also be adjusted through the menus via remote control. As a wish list item I'd choose that the P8i include an operation mode allowing someone using an analog line stage to lock the volume and balance controls and prevent them from being inadvertently misadjusted. My 15-month old son loves to press any buttons he can get his little fingers on, so I always checked the P8i to make sure the volume and balance controls were properly zeroed-out before use. Maybe a future software update will make my wish come true.

The remote is big and heavy, which is appropriate in the fit & finish savvy world of hi-fi. Like all good reviewers, the first thing I wished to do with the dCS was power it up and play a disc on repeat to warm it up. This revealed a seeming gaffe in operation in that there is no repeat button on the P8i's remote. I contacted Audiophile Systems Ltd, dCS' US distribu-

tor, and was informed that a very common universal remote's repeat button would work, which it did. The P8i indeed has repeat capability, it simply appears that they forgot to put it on the P8i's own remote! According to dCS the repeat mode was not forgotten. They claim the US is the only market that covets this feature. Hmm.

Performance

I used this player with Aesthetix's Callisto preamplifier, and entirely with my Vandersteen Model 5A speakers. In addition to Audioquest's Sky interconnect and Kilimanjaro speaker wires, I used Alpha-Core's AG-1 Center Stage speaker wire in three-foot runs and their Triode Quartz TQ2 silver interconnect. For AC cords I use a combination of AudioQuest NRG-5 and Richard Gray's Power Company HighTension Wires. The only power line conditioners in my system are by Richard Gray's Power Company.

When the P8i first came in it wasn't blowing my skirt up compared to my reference Ayre C-5xe. It sounded good, and there was resolution there, but my first reaction was, "This player costs twice as much as my Ayre?" All it needed was a few days to break in and, man, did things change!

Regular readers know that my musical tastes are diverse, and that I'm just as likely to play The Flaming Lips as Beethoven and Mendelssohn. But one day, after the dCS player had been in my system for around a week, I needed to hear the RCA Living Stereo SACD of Beethoven's Violin Concerto in D (CRCA 61391, Boston Symphony Orchestra with Jascha Heifetz on violin, Charles Munch conducting). I thought a few minutes would do me, and I could check in on the player while I was at it. Thirty-something minutes later I was still in my chair trying to assimilate what I'd heard. (Let me add that the RCA Living Stereo hybrid CD/SACDs are widely available for about \$10-\$12. Pristine LPs' pressing might sound better, but there's no better sonic bang for the buck than these discs, and they're way easier to find.)

This player's abilities came into sharp focus here, along with the Boston Symphony Orchestra's performance, circa 1955. I could

go on and on about all the minute low-level details I heard, but minutiae doesn't do justice to the overall drama of the performance I experienced, or to the simple fact that I heard the instruments and the performance and forgot I was listening to my stereo. The strings had warmth and air, but were also sharp and crisp. I could hear murmurs and muffled coughs from the audience, and when Heifetz was spotlighted on the stage, I could

feel the gentle sawing action of his bow, gauge the speed and pressure of it, and I could hear the body of the instrument creak and groan with the action of his playing.

This is certainly startling, but what really separated this listening experience from others the most is that the natural sense of air and space from the hall, decades ago, was alive and charging the air in my room, making the hairs on my arms and neck stand at attention. While individual instruments were as completely and convincingly drawn in three-dimensional space as I've heard from digital, it was the way that the P8i captured the swelling of the orchestra during the busier passages that mesmerized me. I could feel its dynamic power building as though the air in my listening room were expanding and contracting with it. Although the music was clearly breathing in my room in a way that digital almost never does, I was positively breathless!

This was as close as I've felt to attending a live performance while still at home, and this single piece of music played back on the P8i stands among the two or three most transcendent,

***“...a whole, believable
and utterly convincing and
coherent sonic tapestry...”***

attitude adjusting listening experiences I've had in my years in audio. I was just swept away. Aesthetix's mighty Callisto preamp had something to do with this as well, for no preamp I've heard is as adept at dramatically recreating the recording



that, up to now, I've associated only with vinyl playback. Music is more meaningful through this player due to the retrieval of every ounce of nuance and expression in the recorded performance.

What's scarier still is how close the P8i can

space. But the Callisto still needed to get all that information from the P8i in order to relay it faithfully to me.

No matter what recordings I played, musical information and low-level detail simply poured out of the P8i. Hitting my favorite SACDs, I consistently heard the kind of detail and transparency I haven't heard since I last had a dCS stack on hand.

Whether it was the Rolling Stones collection or Peter Gabriel or Ray Brown, the P8i revealed details that had remained hidden with other fine players. The P8i is in a distinctly different league than anything else I've heard with SACDs.

As sensational as the P8i's sound is, what's even more impressive is that it accomplishes all of this without the noticeable sins of technicolored addition or spotlighting subtraction. This player is among the most full-bodied, naturally textured and organic sounding I've heard, which is especially shocking with CDs. Only Wadia's 861SE compares, and while I didn't have the chance to compare them directly, my memory indicates that the dCS resolves more real detail, and on top of that the 861SE doesn't play SACDs.

While the sheer amount of low-level detail that's revealed is certainly astonishing, what's more impressive is that the P8i's resolution never detracts from the seamlessness of the entire musical picture. No matter how many instruments are in the band or how complex the passages get, everything is not only there, focused in space, it's integrated into a whole, believable and utterly convincing and coherent sonic tapestry

make CDs and SACDs sound in terms of relaxed, natural detail, and yet it doesn't accomplish this by merely making the SACDs sound lower in resolution or softer. When you switch from CD to SACD, whether it's two layers on the same disc or separate discs, you can hear the lid come off the music with the SACDs very clearly. There's more of everything, but especially air and

transparency. But by the same token, CDs are as highly resolved as I've ever heard, and yet more relaxed and easy on the ears as well.

Comparing digital to analog is a cliché but let's face it, that's what we're looking for. Analog is still the best sound there is, so that's our standard. Where the dCS earns that comparison with both CDs and SACDs is in the unmistakably natural way that music flows out of this player. There's nothing clipped or edgy, forward, bright or etched about it, and yet there's simply an astonishing amount of pure musical detail and a nearly see-through kind of transparency.

These are unmistakably similar terms to those I'd use to describe what makes vinyl record playback sound special, and why it puts such an immediate emotional hook in discerning listeners.

Now, what's also striking here is that I preferred the P8i's CD playback without the DSD upsampling feature engaged, which, as dCS informs me, means a steep-slope brick wall filter is engaged. I've been more or less on-record in stating that I pre-

fer gentler slope filters for their more natural and involving sound and better imaging. So, what's happening here?

“I preferred the P8i's CD playback without the upsampling feature engaged”

I can't say I know, other than this: when I engaged upsampling on the P8i I felt the sound softened and lost a degree of organization in imaging. It simply sounded a hair cloudier and less focused to me, regardless of my own dogma. The cool thing is that it's user-selectable, and if you audition or buy a P8i, which I highly recommend on both counts, you can try it for yourself and see if you agree. Choices are good!

You may have noticed that I haven't yet discussed the tonal balance of this player, but that in and of itself is a clue. There's nothing to discuss. At no time did the P8i reveal itself to have a tonal signature of its own. It's as impartial a judge as I've heard, with neither too much nor too little of any part of the frequency spectrum. Only dCS' own separates may have better upper frequency extension, and I'm not sure anything out there has more inner detail and natural texture in the midrange.

In fact, my Ayre C-5xe actually sounds just a bit fat in the mid- and upper-bass in comparison. But the real story is simply that the dCS pulls much more musical information off of the discs and is really in another league in terms of ease and natural warmth and soul, which is saying something given that the Ayre is certainly excellent in all regards with all formats. And let's not forget that the dCS is more than twice as expensive, and doesn't play DVD-A discs. It should be the better player for that kind of jack, which it certainly is, and in some very meaningful, communicative ways.

How does this all-in-one player stack up to my memory of the dCS separates I reviewed a few years back? As transparent as the P8i is, I'm not sure if it's quite as see-through as the

Verdi/Delius combo was. But I'm also not sure that the separates have as much ease and soul either, and I'm dead certain I prefer the P8i's performance with CDs. The Verdi/Delius combo had dizzying resolution to be sure, but I also heard just a touch of an analytical or sterile sound from it that I don't hear with the P8i. To be fair, as time went on with the separates, I came to appreciate them more and more, and they eventually made anything else sound colored in comparison.

That last bit makes me wonder. The P8i player isn't soft or indistinct compared to anything else, but it is just a hair fuzzy compared to my memory of the Verdi/Delius duo. (John Atkinson measured this player in *Stereophile* and found the power supply a little "dirtier" than he wanted it to be. Could that be the culprit?) Although this is extremely subtle, over time would I be more bothered by that? Well, I'd love to spend that kind of time with this player and find out!

Conclusion

What else can I say, except that dCS has again rocked my world and redefined my perception of the performance potential of digital audio. To be sure, \$14K is a hell of a lot of money for a disc player, but since I haven't heard anything better I can't complain too much. In fact, the only digital playback system I've heard that's even comparable is a dCS separates system.

For those of you out there who can't afford this player, I feel ya. I don't think I can either. But if I fall into some discretionary funds anytime soon, you can bet I'll be on the phone to dCS's distributor in a heartbeat. If I could afford this player I'd spend my own money to own it and live happily ever after. I certainly recommend this player but beyond that, the word that best describes my feelings for the P8i is lust. [APJ](#)

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Initial Audio System Assembly

by Richard Hardesty

*Suppose you have nothing—no components at all—and you want to assemble a satisfying audio system. Will you get the best possible performance for your money by spending a little less on speakers and a little more on the components that drive the speakers? Probably. Will you actually do this and allocate your resources as recommended in this **Journal**? Probably not. Are you doomed to disappointment because you invested a disproportionate amount on speakers? Not necessarily. In fact, there may be some advantages to getting the speakers you really want first.*

Spending too Much on Speakers

Speakers are often the focal point of an audio system. They can be big and impressive and most people are more emotionally involved with them than with other audio components. Many designs are available and some sound strikingly different—from each other and from real music. Use caution. Speakers that create stylized or exaggerated sound probably won't be satisfying in the long term. On the other hand, accurate speakers can deliver lasting listening enjoyment and provide a good basis for evaluating other components.

“Great speakers can't make great sound at the end of a flawed audio system.”

Novices believe that speakers are the most important audio component and there is no denying that they are very important to the sound we hear. Most people spend a disproportionate sum on speakers when assembling their first system—I know I did. Don't fret, this doesn't ensure disappointment in the long term. Try to get accurate transducers and avoid sound that's “like nothing you've heard before.” If the speakers you buy are better than the other components in your initial audio system that problem can be fixed. Remember, you're just making a purchase not a lifelong commitment.

Logic versus Emotions

Try not to let your emotions overcome logical thought as you choose your first audio components. Your speakers can only reproduce the signal that the system feeds into them and if that signal is flawed the sound will be flawed. Speakers are the last



in a series of three major sections of an audio system. Those sections are: source components, amplification components, and speakers. And they should be considered in this order because that's the way the signal flows. Considering the system in three sections is the best way to get the most for your money and the best way to assemble a system that will provide musical satisfaction for a long time.

The source component(s) sets the limit for the resolution of the entire system. If the information is not retrieved from the recording it's gone forever. The amplification components can only lose some of this information and/or add noise and distortion. Better amplification components will do less damage to the signal. Speakers reproduce what's left of the recorded information after it has traveled through all the other components in your system, or what has become of the information after it has been corrupted by the other components.

Great speakers can't make great sound at the end of a flawed audio system but you can be enjoying music while you learn about the other components and make improvements to the rest of your system. In fact choosing your speakers first may offer some advantages.

Possible Advantages to Choosing Speakers First

The sensitivity of the speakers will establish the power requirements for the amplifier and starting with the speakers you will use for a long time allows you to do lots of experimentation with placement and room treatment. Speaker placement establishes the length of cables, which will be important when (and if) you add expensive cables to the system.

If the speakers you choose have average sensitivity, you'll probably need an amplifier with at least 100 watts per channel. Twice as much power will probably be better. Speakers with

high sensitivity will require less power and those with lower sensitivity will require more. These are "ball park" figures which will vary depending on the size and reverberation time of your room, the type of music you listen to and how loud you play it. Reverberation time can have an impact on power requirements. When you add absorptive materials to eliminate troublesome reflections, supportive reflections will also be reduced. If you make the room too "dead" it may start to sound confined and unnatural and will probably become an uncomfortable place to converse. You'll have to put far more energy into a room that has been excessively damped to achieve the same sound levels. Amplifier and speaker strain will be increased. Distortion will increase as these components are taxed to and sometimes beyond their limits.

Before you can effectively evaluate the differences between other audio components you'll have to experiment with speaker placement and room acoustics. These experiments will cost little or nothing and will provide an invaluable resource of knowledge that can't be attained in any other way.

Once the components are assembled into a system and positioned for the best sound (and hopefully the shortest cables) you'll know the required cable lengths. There will be more about cables in **Journal #16** but for now remember this: all cables degrade the signal and most cables are costly. Shorter cables sound better and cost less. For better sound at lower cost arrange your components as close together as practical. It doesn't get much simpler than that.

Assembling a complete though perhaps imperfect audio system will allow you to insert upgraded components into a system you are familiar with for evaluation. This will spare you the cost of "snake-oil" accessories that don't really improve the sound.

The Ideal Way

The best way to start would be to divide your budget about evenly between source components, amplification components and speakers. I have demonstrated this fact to hundreds of customers with direct comparisons.



When I was selling audio products, I always demonstrated the differences between expensive source or amplification components using inexpensive speakers because the demonstration was so much more powerful. This proved to be successful for me and for many of my customers, who achieved higher levels of satisfaction because they learned to allocate their budgets more effectively.

Listening comparisons can't be done in print so you'll have to learn this for yourself. Remember this simple logic: If you put a better signal into the system you'll hear better sound from even modest speakers. Better speakers can't reproduce a signal that's not there but they can faithfully reproduce flaws introduced by preceding components like added distortion and noise.

“Divide your budget about evenly between source components, amplification components, and speakers.”

If you can find a dealer who will demonstrate this concept for you I'm sure you will be convinced. I suggest using an excellent but inexpensive speaker system, like one of the entry-level Thiel or Vandersteen models (I used Vandersteen Model 2s for my demonstrations). Have your dealer demonstrate the audible differences between a \$2,500 turntable system or CD player and a \$10,000 turntable system or CD player using these modestly priced speakers. Compare a \$400 amplifier to a \$4,000 amplifier and become aware that you can hear the difference through modest speakers. It's axiomatic: put a better signal in and get better sound out.

For best results you'll want a source component that retrieves all the recorded information and adds nothing; amplification components that amplify all the signal, right down to the smallest details, and add nothing; and speakers that reproduce all the signal and nothing else. Get as close to these ideals as

your budget allows. Don't try to “tune” with accessories yet. Any deviation from neutrality at this point will have you chasing your tail.

Source Components

If you buy speakers first—and most people do—don't despair. Compare source components using the speakers you've chosen and buy the best source component(s) you can afford. The dealer probably won't demonstrate your \$4,000 speakers with a \$200 CD player but you should hear that combination before buying. Remember, you'll listen at home with the components you actually purchased, not the best models the dealer sells. If you can't afford (or justify) the best product the dealer sells compare and find the point of diminishing returns for you.

The point of diminishing returns will change as you gather experience but it can be simply described. With all audio components, you'll have to pay increasingly more for increasing less improvement. There will be a point, or knee in the curve,



where you'll hear that more expensive components sound better but the improvements they provide won't seem to be worth the added expense. Find the knee of practicality for you at this time and listen to music at home on the components you choose until you become aware of shortcomings.

Amplification Components

Buy an amplifier that is sufficiently powerful to drive your new speakers, and save money here if you must. Amplification components are extremely important to long-term satisfaction but the differences between competing designs are subtle and novices probably won't understand what all the fuss is about until they attain some listening sophistication. There are plenty of serviceable but inexpensive amplifiers available. Save money on your amplification components until you develop the discernment necessary to choose the products you can live with for years to come.

Don't skimp on power. In the early days smaller amplifiers sounded better than more powerful models. Parts have improved and high-powered amplifiers today provide comparable sound to tiny models that will be overdriven more often during normal listening. When an amplifier is overdriven, the average level of distortion goes way up. Amplifier clipping is the most common cause of speaker damage.

Yes, you read that right. You are more likely to cause speaker damage with an amplifier that is too small than with one that is too large. The bigger amplifier is also more likely to sound cleaner (average distortion will be reduced as clipping time is reduced) and more dynamic (instantaneous peaks will be louder).

Speakers

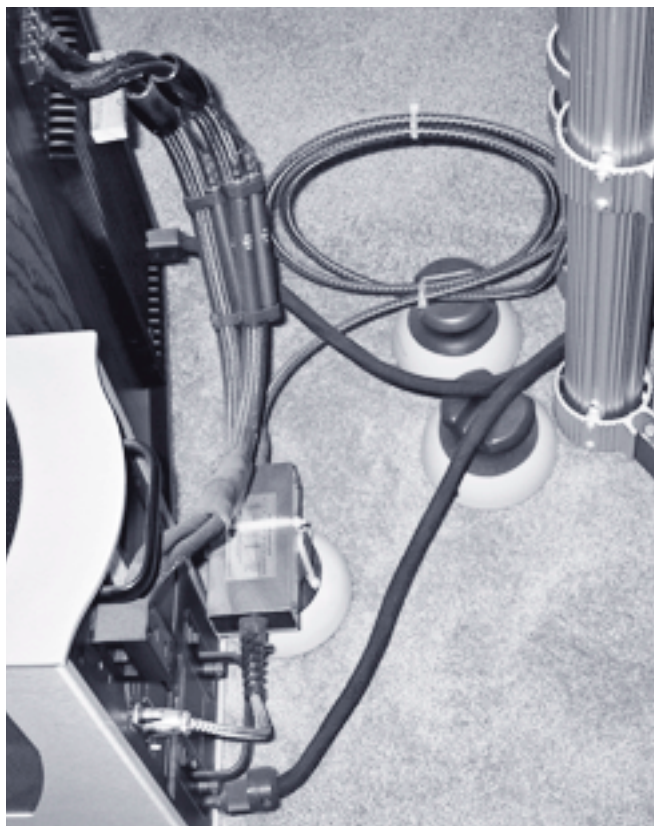
Speakers receive the signal last but you can't hear that signal until the speakers convert electricity into mechanical motion. It is naïve to expect that the speakers can reproduce a signal that doesn't come down the cable from the other components but it's also unrealistic to expect that poor speakers can deliver good sound. This **Journal** has been emphasizing the idea that



speakers can't reproduce information that was not retrieved from the recording by the source component but don't use this fact to underestimate the value of good loudspeakers. They certainly can—and often do—create rather than reproduce information. If the speakers create information they'll deliver sounds that weren't on the recording. Sounds that aren't on the recording are distortion.

“Don't buy expensive cables, power cords or power-line conditioners, or other accessories when you're starting out.”

The best speakers reproduce every nuance of the signal they are provided while adding virtually no sound of their own. The concept of “too much information” is false if the information is



real. Unfortunately, it's fashionable today for speakers to have a "characteristic sound" and I strongly advise that you don't choose speakers with a sound of their own. If you start with colored speakers you'll be chasing your tail trying to build an accurate system as you continually add components with complementary colorations in an attempt to get back to neutral sound.

Where to Save

I can tell you from experience that the point of diminishing returns is higher with source components than with amplifiers and speakers. Try not to save too much money on source components. Save instead by avoiding accessories which will simply confuse the issue as you attempt to assemble the most accurate and transparent system you can afford.

Don't buy expensive cables, power cords or power-line conditioners, or other accessories when you're starting out. While some of these products can (subtly) improve an audio system that already includes excellent basic components, none can make a silk purse out of a sow's ear and most only change the sound rather than improve it.

Be extremely careful! The high profits earned by accessory sales will tempt retailers and reviewers to present these products as far more than they actually are. A \$400 amp with a \$1,600 power cord will not perform as well as a \$2,000 amp, no matter what they say. Buy the better amp first and then try the power cord at home, in a system you're familiar with, to see if it actually makes an audible improvement or if it just changes the sound.

Even accessories that simply change sound can be used to adjust the nuances of a system that is essentially correct, but you've got a long way to go before your system is assembled and adjusted to sound as good as it can—without the subtle "seasoning" that accessories can provide. Save your money until you acquire good basic components and adjust the system and the room to the best level you can afford. [APJ](http://www.audioperfectionist.com)

How to Upgrade an Existing Audio System

by Richard Hardesty

If you have a functioning, listenable audio system you can create a completely satisfying “dream system” with careful systematic improvements. You can be enjoying music throughout this upgrade process while acquiring irreplaceable knowledge about acoustics and your own tastes. Since you’ll never be without music for more than short periods the improvements can be spread over time to make them financially painless. You can probably achieve the state of the art in music reproduction for much less than you think. My suggestions include the following caveats: use your brain before your checkbook; don’t believe performance claims that can’t be demonstrated—always demand proof; concentrate on demonstrable performance and ignore prestige; insist on good value.

Common sense alone can help you save lots of money. If a claim sounds too good to be true it probably is and you don’t have to take anybody’s word for anything. Because you already have a working audio system, you can try incorporating or substituting any component(s) to hear for yourself whether there is an audible difference. Be sure to evaluate the change to determine whether it’s an improvement in quality or just a change. Don’t buy anything that doesn’t make your system sound better.

“Common sense alone can help you save lots of money.”

Some will try to convince you that a high-end audio system costs two- to three-times as much as it actually does. That’s because they want to sell you carriage-trade products or they want to sell advertising to the manufacturers of carriage-trade products. Be skeptical, particularly of those who try to pull the wool over your eyes (or ears).

For the uninitiated, “products for the carriage trade” is a way to describe a class of components that cost far more than they should and often don’t perform at the highest levels. Carriage-trade prod-

ucts have high price tags in order to provide the illusion of high performance. Purveyors of carriage-trade products—and that includes most reviewers for audio magazines—might try to make you feel like a pauper because you can’t afford, or are simply too smart to



buy, these products. Ignore them and the overpriced components they recommend! Demand performance improvements that you can hear. Make sure any improvement is worth the money it costs, unless you’re very rich.

“Make sure any improvement is worth the money it costs.”

Even if you divide their estimates by three, a no-compromise system still represents a substantial investment. You can expend a little more effort and save lots of cash by examining your existing system and upgrading it systematically. Your cash expenditures can be spread out over time to minimize the financial impact. You can insert a component you’re considering into your existing system (or a system just like it at your dealer’s showroom) to determine if the new item really offers an audible benefit. If you have a working audio system here’s how to get the most for your money as this system is upgraded.

Analyze the System

Divide the system into three sections for consideration: source components, amplification components, and speakers. Carefully consider these sections to determine if the performance of each one is equivalent to the others. Consider the sound quality and the allotted investment of each section when compared to the others. If one section isn’t up-to-speed with the others that’s where to start your upgrade.



Consider the individual components within each major section and look for shortcomings in terms of performance. Maybe you have a perfectly good turntable that could deliver better performance with a new cartridge or a better tonearm. Perhaps your cartridge and tonearm are first class and could be moved to a better turntable for improved performance.

Maybe your amplifier is significantly better than your preamp. Perhaps your speakers could be upgraded to the latest version for a nominal fee, or maybe they simply need to be replaced.

Upgrade any Weak Components

If one section is not performing up to the standards of the rest of the system your course is clear. Upgrade or replace the weak component(s) first. You may be able to improve a section of your system by upgrading rather than replacing an individual component.

Many high-end manufacturers offer an upgrade path that allows earlier models to be converted into the latest versions. If you have a Mark I version of an amp or preamp, for instance, you may be able to upgrade to a Mark II version for a nominal fee. These upgrades are usually (but not always) a good investment and you can hear the difference before investing by comparing your existing component to the latest and greatest version in your dealer's showroom, or at home if you can get the dealer to loan you the newer version. If the new one doesn't sound better to you, be skeptical of anyone who tries to convince you otherwise. It's going in your house and it has to satisfy you. Make sure you can hear a positive benefit and make sure that audible benefit is worth the money.

If no upgraded version of your existing component is available, sell it or trade it for a new and improved model. Make sure to listen and

compare the old component to the new contender before parting with the old one. Sometimes the newer piece is simply not enough better to justify the cost. Age is far less significant than audible performance.

Level the Playing Field

If your total investment is heavily biased toward one section of the system, try to balance that investment so that all sections receive equal consideration. I know this is highly subjective but if you feel



that you have shortchanged one or two sections, upgrade to balance your investment across the entire system.

Pride of ownership is a legitimate factor but try to concentrate on performance. Your pride won't last long if you don't enjoy listening to the new component(s) as much as the old one(s).

Don't be afraid of making a mistake. If a new purchase turns out to be unsatisfactory, list it with Audiogon and try again, armed with your new knowledge. Audio components are inanimate objects. They can't get mad at you and they don't sue for alimony.

Start at the Beginning

If all your current components are performing at about the same level, you'll get more bang for your upgrading buck by starting at the beginning and working down the signal path. This may seem repetitive but sometimes facts must be restated in order to be heard and accepted. Bear with me as I reiterate the high points one more time.



The source components set the limit of resolution for the entire system. A better source component will retrieve more information from the recording. Putting a better signal into the system will result in better sound reproduction. The audible improvement achieved by upgrading your source component first will probably be greater than the improvements you'll hear from better amplification components or speakers.

Amplification components come next in the signal path and the preamp precedes the

amplifier. It's hard to choose between an amplifier and a preamp because you need both to preserve the signal and drive the speakers. I would probably give them equal weight in terms of importance even though the preamp comes first. I'm glad that I know exactly what I want from each one and I'm sure you will learn what pleases you with the experience gained from these comparisons.

Speakers are limited by the quality of the signal that makes it through all the other components but they're very important in their own right. Don't expect the speakers to be magical components that create rather than reproduce sound—even though some dealers and speaker manufacturers will try to convince you otherwise. Even if your other components deliver a perfect signal to your speakers, don't expect great sound unless the speakers can accurately reproduce the signal the other components send them.

Don't Waste Money on Accessories (yet)

No accessory can make a silk purse out of a sow's ear. The best accessories can deliver only subtle improvements and most can just season the sound with very slight changes. Accessories usually can't make the signal better but may improve the overall result by compensating for minor errors or deviations from neutrality that occurred elsewhere.

Cables are a special case. Truly transparent and neutral cables can be classified as components. Cables with a sound of their own should be considered accessories. There will be more about cables and accessories in **Journal #16** but for now I'd recommend that you start with inexpensive cables and purchase high-end cables only after careful evaluation in your system. Buy the best components you can afford and experiment with speaker placement and room treatment before attempting to fine-tune the system with accessories.

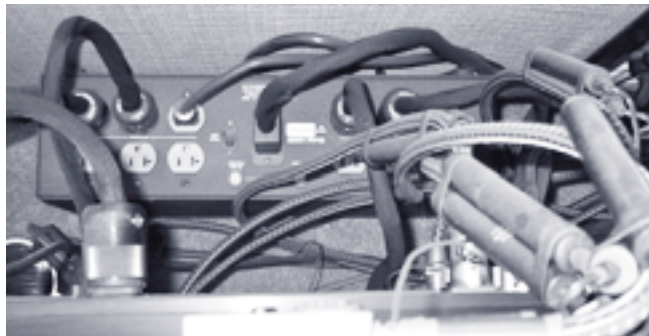
When You're Done, Accessorize

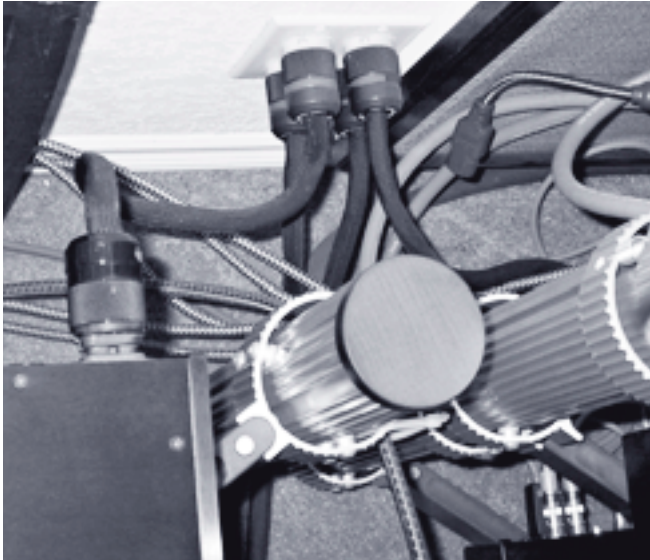
After you have assembled the very best components you can afford (or justify) and tweaked the system and the acoustics of your listening room to provide the best possible performance from these components, try some of the accessories that have been offered. Don't ignore your common sense.

If you can define a problem, like power line noise, an accessory that corrects the problem may provide a real improvement for you. If there is no clearly definable problem don't fix it.

“If there is no clearly definable problem don't fix it.”

Don't accept any claim that can't be demonstrated. Don't necessarily believe that an accessory that makes a positive change in someone else's system will work the same way in your home. Products that affect AC power are a good example. The power in your home and the power at a friend's home or in a dealer's showroom are not necessarily the same or even similar.





I wouldn't buy any gizmo without trying it in my own system in my own home and proving for myself that it makes an audible improvement. If you stick to this rule you'll save a fortune because most accessories simply don't improve sound and many actually make things sound worse. Sometimes much worse. I know because I've evaluated hundreds of accessories. Very few remain in my audio system.

Cables can make a huge difference but the marketplace is a veritable minefield of hype and confusion. Choose cables only after careful evaluation in your own system. Any other method is like playing Russian roulette.

Be Reasonable

If you have three SACDs and 300 CDs you should be somewhat more concerned about standard "redbook" CD performance. If you want access to the world's musical library you should be concerned about redbook CD performance. If you want to hear what your system is capable of you'll want to listen to vinyl records because they can deliver the best sound.

You don't need to have duplicate copies of your entire music collection. Collect the music that produces the greatest emotional response on vinyl. Make digital copies of this music for casual listening at home or in the car. I'll tell you how in **Journal #16**. [!\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

Don't Forget Acoustics

by Richard Hardesty

The room in which your audio system resides will have a major impact on the sound you hear. Those who sell room-treatment products or services will try to convince you that achieving good room acoustics involves solving a series of a complex problems. Fortunately, that's usually not the case. Common sense will help you resolve most of the acoustic dilemmas you are likely to encounter in domestic listening rooms. Here are some basic rules to follow:

Choose or Create a Comfortable Listening Room

A room that is a comfortable place to sit and converse will probably be a good room in which to listen to music. An ideal room will be lively but not overly reverberant. If the room is too "dead" (the opposite of lively) it will feel claustrophobic and sound smaller than it is. If the room is too reverberant it will feel cold and the sound will be confused and less intelligible.

If the speakers and the listeners are positioned well away from the room boundaries the negative impact of the room will be greatly diminished. The near-anechoic room model popularized by home theater designers makes a very poor music-listening environment.

Diffusion is Usually Preferable to Absorption

Room surfaces that create sonic reflections at random angles are generally preferable to surfaces that absorb reflections. Trying to absorb all reflective energy, like many home theater designers suggest, makes the room sound dead and unnatural. A nearly dead room works okay when you are listening to sound effects where everything, including the ambient cues, is created artificially. The same room becomes a filter when you are trying to hear ambient sounds that were captured on a great recording.

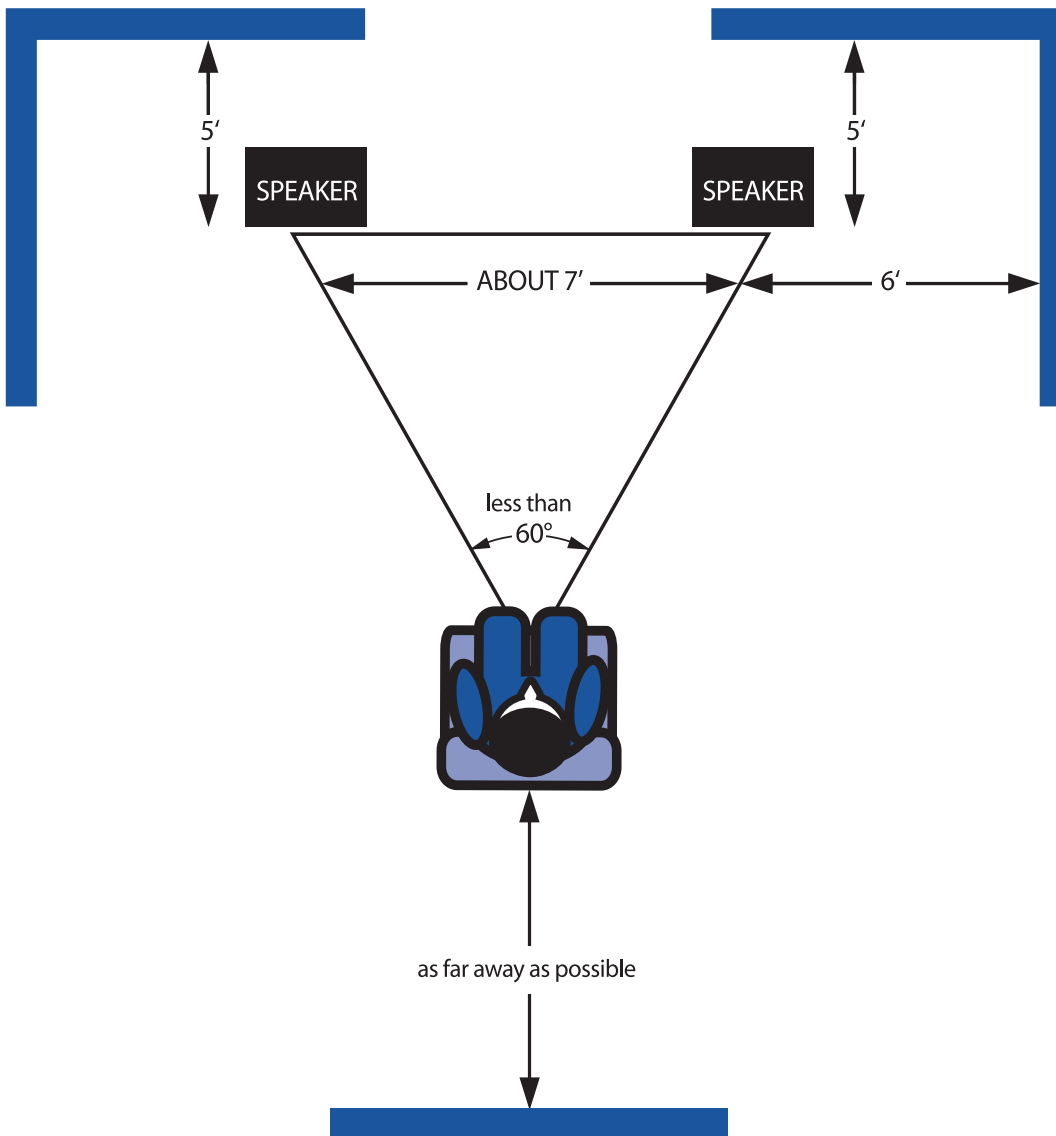
Excessive absorption requires that additional power be introduced into the room to create the same sound level. Additional power means more distortion and less dynamic contrast.

Position the Speakers and the Listeners as far from the Room Boundaries as Practical

As the speakers and the listeners get farther from the room boundaries, the sound from the speakers becomes more prominent and the sound from the room becomes less prominent.

Create a Symmetrical Environment Beside and Behind the Speakers

In my experience, the environment beside and behind the speakers is more important than the environment in the rest of the room. Symmetry is highly desirable for the best imaging.



This illustration is a starting point only

Reflected energy that originates from near the speakers is usually the most problematic; it will be attenuated less because of shorter paths to the listeners and it will come from a direction that is close to the source of direct sound from the speakers. Reflected energy from other boundaries will be attenuated more because of greater path lengths and will appear to come from directions that are substantially different from the direct sound. Your brain will work less as it interprets this reflected energy as room sound, separating it from the desired direct sound.

Everything you hear is a combination of direct sound from the speakers and reflected sound from the walls, ceiling and floor. You want a balance that favors the speakers, which are (presumably) producing the sound you want to hear, and which attenuates and delays the reflected energy from the room boundaries.

Carpet will minimize the directional aspect of “floor bounce” (reflected energy from the floor) and the side walls aren’t nearly as great a problem as the “experts” want you to think they are.

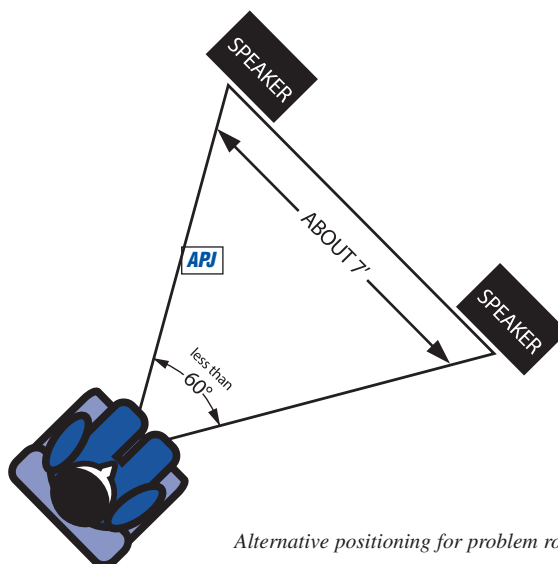
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Don't Position the Speakers Too Far Apart and Don't Sit Too Far Away

People tend to position their speakers too far apart and sit too far away from the speakers. Image specificity is diminished when the speakers are spread too wide and the farther you sit from the speakers the greater the room's involvement in the sonic balance between direct and reflected sound.

Speakers should never be farther apart than they are away from the listeners (creating an equilateral triangle) and usually they should be substantially closer together than they are away from the listeners (at less than a 60-degree included angle as viewed from the listening chair).

I recommend that critical listeners sit as close to the speakers and as far away from the room boundaries as practical. You may need to be at least eight feet from a large speaker in order for the sound from multiple drive elements to coalesce properly. Use the minimum acceptable listening distance for the best sound.



Alternative positioning for problem room.

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