A different way of approaching a challenge

To fully understand the philosophy applied in designing our products we must go all the way to the basic beginning, the single note. In doing this, much of this explanation will be rote, but bear with us. The ending is important.

What is a note? A note is defined as a particular number of oscillations per second, known as Hertz. The "A" that is located above "middle C" and is the general standard for tuning, for example, is precisely 440Hz. This is to say that this note oscillates precisely 440 times within the space of exactly one second. If it oscillates any more or less then it is known to be off pitch. And if it wanders too far off pitch, it becomes another note entirely.

Now, if we group several different notes together at the same time we get a chord. Chords are made up of various notes that are harmonious and work well with each other. The exact combination is not so important for our study, for there are countless chords available. But their timing is important. Because the timing of those various notes directly affects the character of that note. For example, a chord played on a guitar will have a slightly different character depending on whether the strings are strummed from top down or bottom up. This adds to the stylistic variety available to the guitarist. A chord played on a piano has a slightly different character. A chord played with great discipline and experience will sound as a whole. That same chord played by an amateur or beginner will sound distinctly different, either blurred or incongruous. It will sound different because each individual note is likely to be initiated at slightly different times, not as a precise initiation of all the notes in that chord at the same point in time.

Let's take those few notes and, instead of playing them all at once, we play them each in a particular series over a given period of time. With this we have the beginning of a melody. And with a melody we have even more room for stylistic expression. While a simple chord can be used in any number of different pieces of music, a specific series of notes defines that piece of music. It is what makes it unique. But what's more, the specific timing of notes makes that piece of music unique. It is not only the specific frequency of those individual notes but their precise arrangement with respect to time that defines the piece.

Neurologists have noted that it is possible to slow down a piece of music (or speed it up) to a point whereby it is no longer recognizable to the listener. This is because our brains operate in such a way as to be constantly transferring short term memory to long term while at the same time comparing what is happening in the present time with what has been heard in the past. So if you were to slow down a familiar piece of music enough that the brain's short term memory will have forgotten the first note in a series, and thus is no longer able to reference it to the most current being played, that piece of music is no longer recognizable as a whole .

In the same way, changing the timing of each note within a piece will drastically affect the melody and very quickly make it unrecognizable. As an example, try this little brain gymnastic. Think of the basic melody associated with the Pink Panther. Got it? Okay, now think of the basic melody from Beethoven's 9^{th} symphony, Ode to Joy. Okay, now try to impose the timing of the notes in the Pink Panther theme on

the musical notes played in Ode to Joy. Difficult isn't it? But it's easy to see very quickly that both, normally very recognizable pieces of music, are now completely unrecognizable.

Okay, you might have picked up by now that we're making a big deal about the timing associated with music. And so far we've been using relatively large variances in timing to establish a foundational point. So what does this have to do with a stereo system or component? Well, not much just yet. But let's zoom in on the music for a bit.

Let's take the famous Texas Blues artist, Stevie Ray Vaughn. He's pretty popular with the audiophile crowd. And let's ask the question of what exactly makes him so recognizable. Is it the Fender Stratocaster guitar that he played? Obviously it is not, since there are literally hundreds of thousands of those in existence. Nor is it the Marshal amp he used, for the same reason. Is it the exact notes that he played and the order with which he played them? Not so much, since countless followers have played the exact same notes and in the same order and end up sounding nothing like SRV. You can take any number of the most talented guitarists in existence and you would still be hard pressed to find one that could play SRV's music and sound just like SRV.

The reason lies in the very tiny and subtle variances in the way he (and any other distinct musician) timed each note. The notes on paper are written as quarters, halves, wholes, and several other distinct and exact references to time. But when SRV actually plays them, they are no longer exact in their timing. They sometimes speed up very subtly. They sometimes slow down very subtly. And sometimes they bend at distinct periods. And what all of these tiny variations add up to is that indescribable element known as Soul! It is why no piece played by two different people will ever sound exactly the same, even if they used exactly the same instrument and on the same day. It is also why the same melody will never sound exactly the same played by the same musician on different days. The tiny variations in timing create a unique fingerprint, if you will, of the way any particular piece of music will establish the emotional content.

Some audiophiles have said that it is impossible for a recorded piece of music to ever have the same emotionally charged affect as that performance was live. We say, with gusto, "Not so!" If a system is not able to effectively transport us to the original event emotionally then we, at CH Acoustic, say that it is not because it is impossible to do but because we still have unidentified timing distortions lingering about. There are many systems that are capable of reproducing a very flat frequency response, as well as moving the requisite volume of air for dynamic impact! This pretty much leaves timing as the culprit.

Okay, so we've gone from very large timing variations to very tiny variations. And while the very large variations in timing are not so much a problem for us some of the smaller timing errors can distort a piece of music to the point where even the distinctive "Soul" of SRV is lost. This is true of even the most expensive and ambitious systems! And if you love music enough, you know you've heard this. Even so, in the grand scheme of things, we're still looking at relatively large variances in timing. So let's step back again and look at it from a different perspective.

In an effort to define "accuracy" in reproduced music, a well-known and well respected speaker designer described what one perceives in a concert hall at a live event. In doing so he described how the

sound of the instruments will be subtly different only a matter of a few feet away from any given location. And this is very true of any music venue. It has to do with the complex way that different frequencies interact with the venue and are either reinforced or diminished in various locations within that venue. From this explanation he then asks the question, “Which is accurate?”, and we are clearly meant to understand that there is not a singular “accurate” representation of the music in that venue.

However, while everything about the example described above is absolutely true, we believe the very premise of the question to be flawed. Because, it is true that a violin, for instance, will sound subtly different dependent both on where the violin is located as well as where are ears are located within that venue. But no matter where you place either, that violin is always going to sound exactly like a violin. It will never be mistaken for a saxophone, no matter where you place it. Sadly though, stereo systems DO have the capacity to distort the sound of a violin to the point of no longer sounding like a violin. And in this case we strongly assert that this cannot, in any way, be considered accurate sound. If a cymbal sounds like tin and not brass, then it is not an accurate representation of a cymbal, regardless of how dynamic it may sound. So if subtle changes in frequency are not responsible for the distorted sound of an instrument, what is? Well, since you’ve made it this far you should have guessed “timing”. But to explain how this works, we must go back to the single note.

Going back to that “A” note described before, we have precisely 440 oscillations per second. And by itself, this basically describes a sine wave, a pure tone with no character at all. And pretty annoying to listen to, we might add. But an instrument playing a note that oscillates at precisely 440Hz does something more than that. It adds a host of other notes to it, notes that are mostly above 440Hz, but also some that are below. We know these to be the harmonics, or overtones, of that note. And this is what defines the sound of each individual musical instrument or voice! Not only the amplitude (relative volume) of each harmonic, but more importantly, their timing! While the subtle amplitude changes of each harmonic will elicit the same changes we hear when we listen to the instrument live, timing distortions do something altogether different. Contrary to popular belief, even though they all seem to emanate from the same location, harmonics arrive at different intervals depending on the style and type of instrument, even when played live. This happens naturally. But stereo systems have the capacity to disrupt these subtleties. And this is why it is not uncommon to wonder at exactly what instrument is being played in a given recording. This is what can make a beautiful brass cymbal sound like clanging tin. It can make the “blat” of a brass saxophone sound like a woodwind. It can make a woodwind sound like a duck! And it can completely destroy the dynamic attack heard in the strike of the hammer on a piano string or the wooden stick on a drum head. In other words, timing distortions will make a stereo system sound like, well, a stereo system!

As if this weren’t bad enough, there are still other areas where timing distortions take us away from perceiving the real event. The sound of the hall, for instance, is completely dependent on subtle timing variations of the direct sound. Properly reproduced, the timing of the signal can recreate for us the size of the venue, the location of each instrument relative to each other. It has encoded in it the instrument location relative to the venue. And it will give us an indication of the size of an instrument. Disrupt the subtle timing encoded in a signal and all of these things will simply disappear! None of this has anything to do with the frequency domain!

So you can see, the time domain in both live and reproduced music is not only important, it is critically important! Without the time domain we have nothing. But, despite the lengthy explanation above, let's really hammer the point home with a very simple demonstration.

Our ears perceive only two things. Seriously! In the infinite world that is sound, our ears are still only able to perceive two things. They perceive the amplitude of air pressure with respect to…..TIME! Our ears don't even perceive frequency directly! It's the brain that decodes the changes in amplitude, with respect to time, that results in frequency perception.

Think about just how awesome that is! Even at a live event, you can have 40 different instruments in 40 different locations on a stage. And you can have them all playing at the same time. Further, you have the absolutely complex harmonics of each instrument defining each individual character. You have the sound of the hall adding its character. And you have the complexity, the soul, of the melody moving throughout. You have all of these things combining into one very complex series of air pressure amplitudes varying with respect to time. You have the ear picking up all of these variations……with respect to time. And then you have the neurological system decoding those variations to a point where, even with our eyes closed, we perceive 40 different instruments, in 40 different locations, in a large hall, playing a complex melody. Amazing, isn't it?

Does this not also explain the very cause of listener fatigue? And I'm not talking about being at the actual event. Nobody gets listener fatigue at the live event! You may get tired from listening if it's too loud. (Or if the band is terrible.) But this is not listener fatigue, not like what we experience in a stereo system. No, the stereo distorts the time domain unlike the live event. With a typical stereo there are millions of tiny but subtly wrong variations in the timing of a signal that your brain must actively, and in real time, correct for. We know live sound instinctively because we live with it every waking hour. It's only when we listen to reproduced sound that our brain must labor.

So now that we've made our point regarding the time domain, it's TIME we distinguish ourselves from the rest of the audiophile cable world.

We, as audiophiles, are conditioned to think of everything in the frequency domain. We do this unconsciously and in many ways. We break the music down into treble, midrange, and bass. We talk about tonal balance and timbre. It's easy to do this because it's very easy to measure frequency and it's very easy to look at a graph and say, "Oh, that system lacks bass extension" because we see a roll-off on the lower end of our graph. But while it's not so easy to measure the time domain, it is every bit as important. In fact, it is probably more important. Even relatively large variations in frequency are a natural occurrence in real life. It is precisely why a live instrument will sound slightly different, and yet perfectly accurate, depending on your proximity to it. Timing variations within sound sources, on the other hand, is not at all natural.

So when it comes to the cabling in a stereo system all of the normal ways to establish and argue effectiveness are inadequate at best, completely wrong at worst. It has very little to do with the argument of copper versus silver, or gold, aluminum, carbon, or what have you. It has very little to do with Teflon, PVC, Air, or cotton. It has little to do with round conductors, square ones or ribbons. It

doesn't have anything to do with one type of shield versus another. None of these parameters exist in a vacuum. They all play a part. But to consider the part they play looking through the lens of the frequency domain completely misses the point. Each of these has a particular impact on the time domain. And taken collectively, have an even larger impact than the sum of the parts.

If you want to shape the sound of your system based on frequency then you have an unlimited supply of contenders. Many of them will unabashedly tell you that they are the best. But they are the best at what? Having a slightly different frequency presentation than the next? Maybe a little more "open" here than there. Maybe the best when used with a certain speaker? They've even graduated to using silly ways to describe their superiority. From "Reference" (which, by definition, should be the…REFERENCE) to "Master Reference" to "Supreme Reference". (We considered marketing our HSSMR technology, "Highest Superiorist Supremest Master Reference", but then decided it was too proprietary.)

You could continue to focus on the frequency domain but you will always end up with a compromised time domain in doing so. How do we know? Because we tested every single combination of materials and geometry and learned how each one corrupts the time domain. And then we designed a cable that minimized the time domain corruption. We still use the purest and best materials to accomplish this. But it's the sum total of our design that accomplishes what no other cable can in the time domain.

So if you want a system that is more realistic in all of the ways this essay has described sound you need to discover how the time domain impacts your system. This was the focus we adopted from the very beginning of our project. It is our defining philosophy. Everything is in service of the time domain. From there, not only does everything else fall into place.

Everything else is just….right.

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