Issue 28
The first year of Copper saw the mag start from scratch and grow to 9,000 subscribers through steady, consistent growth. While it's not the circulation of People magazine, you won't find any Kardashians here (other than in my occasional off-topic rants). We have grown steadily, and I think our content has steadily improved, as well.

The next few issues will introduce several new contributors, both columnists and feature contributors. I think you’ll be surprised and pleased by the names you’ll see, and the topics they write about.

We lead off the first issue of Copper's second year with Industry News about some major moves in the audio biz; amongst our regulars, Dan Schwartz continues minimalist musings with a piece about Philip Glass; Professor Schenbeck takes a queasy look at Schoenberg; Richard Murison writes about a place where no one can hear you scream, mostly (and no, it's not space); Duncan Taylor writes about Ayo Awosika, a striking young jazz singer; and I write about cut-and-paste business, and finish my interview with John Bau of Spica. Woody Woodward is on vacation (boo, hiss), but will return to Copper soon.

In this issue's features, Jim Smith writes about topics picked by Copper readers; Duncan's back again with Part 2 of his DIY subwoofer project; and as usual, we wrap with another In My Room reader system and a Parting Shot from Publisher Paul McGowan.

See you next issue!

Cheers, Leebs.
It is not pretty, any of it.

But its maker, Arnold Schoenberg (1874–1951), found its making necessary. By reinventing the language of Western music, he hoped to extend the heritage of Brahms and Wagner for a new generation. He knew he would be misunderstood, reviled, or—worst of all!—ignored. He accepted the first two possibilities and in the course of a long, productive career rendered the third impossible. His supporters called him the Emancipator of Dissonance. “Nobody wanted to be, someone had to be,” he said, “so I let it be me.” Why?

I can answer this by citing eight key Schoenberg works—five now, three later. Even if you never develop a taste for them, you need to know they exist, because Schoenberg may have been the single most influential composer of the 20th century. (His onetime pupil John Cage, equally reviled and equally important, is the only other musician commonly chosen for that “honor.”)

My attitude toward Schoenberg roughly parallels that of American composer John Adams (b. 1947). He and I are the same age, we both had Schoenberg forced upon us at university, and we both developed love/hate fixations as a result. Adams, however, became a super-creative West Coast musical figure in his own right. He overcame Schoenberg with unusual vigor. I’m going to let his story stand in for mine. Read it, especially if the name Schoenberg means nothing to you. To get a sense of the person behind the music, you could also skim a wide-ranging interview with his daughter Nuria. Or try this more basic biography.
Schoenberg began by imitating Wagner, Strauss, and Brahms. That’s typical: young composers often learn by doing, working from contemporary models before developing a personal style. For Schoenberg, born in humble circumstances, this method took on added significance. He couldn’t afford years in conservatory, classes in counterpoint and orchestration, formal study with older masters. According to one perceptive biographer,

_He was in all essentials self-taught. Fortune had endowed him not only with prodigious musical aptitude but with the intellectual energy and force of personality to ensure that it triumphed. . . . He [felt that] he never profited from what he was taught unless he had already discovered it for himself. . . . His approach to composition remained exploratory; he saw life as synonymous with change._ (O. W. Neighbour, _New Grove_ 1980)

In the late 1890s Schoenberg undertook a one-movement symphonic poem for string sextet, _Verklärte Nacht_, inspired by Richard Dehmel’s verse. He did not actually set the poetry’s violently emotional text; the music can be enjoyed and “understood” without reference to it. A slow introduction in D minor leads to an anguished sonata structure:

After a forceful transition to another sonata structure, we hear warmer, more positive sounds. The coda is one of the most attractive passages in Schoenberg’s early work:

It all hangs together, revealing Schoenberg’s genius for design, his sure way with themes that double as psychological signifiers and formal guideposts. Above, we heard parts of a recent recording curated by Robert Craft for Naxos featuring cellist Fred Sherry and violinist Leila Josefowicz. These are top-notch performances, strongly recommended. (Schoenberg eventually created a string-orchestra version of _Verklärte Nacht_. My longtime preference there is a 1974 recording from Karajan and the Berliner Philharmoniker.)

Onward: _Gurrelieder_ (c1901–1911), a vast cantata of sorts, was Schoenberg’s most ambitious early effort. It is riddled with glorious moments, but it seems overlong, perhaps because we already know this song (it’s Wagnerian, with elements of Strauss and Debussy added like paint thinner). We know these tropes (Fatal Attraction, Death and Transfiguration, God Defied, Nature Deified, singing animals, ghostly hoofbeats in the night). It’s _Freischütz_. It’s _Tristan_ and _Götterdämmerung_. It’s _Zarathustra_. It’s _Carmen_ and _Salome_. Schoenberg was still learning by doing, not yet ready to challenge all that Romantic convention. Before long he would literally change his tune.

Stokowski rediscovered _Gurrelieder_ in the 1930s, and since then the work has never lacked supporters, nor has it suffered neglect as a recording project. Latest is Edward Gardner’s offering from Chandos, which offers the Bergen Philharmonic, a starry vocal cast, and several choirs. Ralph Couzens’ high-res engineering may not provide the last ounce of transparency, but this is not music meant to be transparent. Listen to the chaotic polyphony of the male choirs in full cry:

_Greetings, O King, here at Gurre’s shores!_
_Now we charge across the island._
_Holla! Our arrows fly from unstrung bows, with hollow eyes and hands of bone . . ._

The Song of the Wood Dove and the C-major “sunrise” finale help offset the ecstatic but doom-laden slog through Waldemar’s Forbidden Love. Plus, you’ll probably never hear a better performance than the one organized by Mr. Gardner. Here’s mezzo-soprano Anna Larsson as the Wood Dove:
Doves of Gurre! Sorrow plagues me . . .
Come! Listen!
Tove is dead! Night rests upon her eyes,
that were the king’s day!

By 1908 and String Quartet No. 2, Schoenberg had begun actively flexing new creative muscles. Later he would write, “The task of the creator consists in establishing laws, and not in following laws.” In the course of the quartet’s four movements the music moves from being rooted in a traditional tonal center (F-sharp minor) to a condition of “atonality,” i.e., avoidance of melodies or harmonies that suggest any key whatsoever. A soprano joins the quartet for its last two movements. Here is a portion of the fourth:

I breathe the air of another planet.
Through the darkness, faces now seem fainter . . .
Trees and paths I loved grow pale. (Stefan George)

Schoenberg’s personal life was a shambles when he wrote this. At one point his wife Mathilde left him; numerous aspects of the music refer to the anguish he felt at their separation. When she returned, he dedicated the quartet to her.

Our clip features the Asasello-Quartett and soprano Eva Resch. It’s from a superb complete set of Schoenberg’s string quartets on Genuin. That recording captures so well the AQ’s gorgeous sound and utter control that I found myself listening to three of the four quartets at a single sitting. (Otherwise unthinkable, really.)

If Quartet No. 2 hints at Schoenberg’s future, Pierrot lunaire spells it out. The story of Pierrot, Schoenberg’s most famous/notorious contribution to 20th-century New Music, has been told many times. (Here’s an excellent short account; scroll down to Phillip Huscher’s notes.) Its 1912 premiere in Berlin had an impact equal to the 1913 premiere of Stravinsky’s Le Sacre du printemps in Paris. Both works shattered people’s perceptions of what music ought to sound like, of what it could say. Interesting tidbit: Stravinsky actually met Schoenberg and heard Pierrot in Berlin a month or so after its first performance. He was blown away.

You don’t need to know much about the music before you hear it. The poetry, by Albert Giraud, evokes dreamlike states of mind, “from nightmarish madness, pain, and decadence to romance, poignancy, and genuine wit” (Huscher again). Just don’t look for literal meaning.

Here is the Chicago Symphony performance for which Huscher wrote those notes:

http://www.youtube.com/watch?v=bd2cBUJmDr8

We’ll come back to Pierrot (in “Three More Uneasy Pieces,” perhaps?). In the meantime, consider getting hold of a recent DVD documentary in which Mitsuko Uchida, Clemens Hagen, Anthony McGill and others reflect on Schoenberg’s masterpiece while rehearsing for a Pierrot performance at the Salzburg Festival. (Their performance is included on the DVD.) Witnessing these artists’ skill and commitment helped me change my mind about this music. Maybe it’ll help you too.
As a callow child way back in the early '60's, I became obsessed with two closely-related themes: seeing the unseen, and buried treasure. The first part may have had its roots in Superman's X-ray vision, allied to a fascination with microscopy which was likely fueled by another comic book story, "Worlds Within Worlds", which I saw reprinted in 1963's Strange Tales Annual #2. In that story, a scientist developed increasingly powerful microscopic imaging which revealed that drops of water contained entire civilizations of sentient beings. Throw in Superman's bottled city of Kandor and the Roger Corman potboiler, X: The Man with the X-Ray Eyes, which also appeared in '63---and I was warped for life. I knew that there was stuff out there, just beyond my field of view.
The fact that my mother managed antiques shows in those pre-Roadshow days meant that I spent a lot of time in dusty junkshops and bookshops, where I learned to scan the tops of shelves for hidden treasures. I also knew far more about the difference between cut glass and pressed glass, the various hallmarks associated with RS Prussia, and how to tell a lithograph from a reproduction—than any small child really should. I also scrutinized pocket change for the 1909 S-VDB pennies that I knew would inevitably appear. Sadly, they did not.

Years later as a less-callow youth in the late '70s and early '80s, I became fascinated with Kohlberg Kravis Roberts—these days known as KKR. For those who are blissfully unaware of such things, KKR was one of the first major private equity firms of the modern era, specializing in mergers and acquisitions. Put simply, they would raise funds and buy and smoosh together companies that offered the possibility of synergy (to use a favorite bit of biz buzzspeak): y’know, "the whole is greater than the sum of the parts". That thing.

The other part of their business was in a way just the opposite: they would buy companies they viewed as undervalued, then dismantle them and sell off the parts. Sometimes that dismantling worked; sometimes not.

Key to all these seemingly disparate fields is the idea of vision—and not just in the ophthalmological sense. We lionize business pioneers as visionaries, implying that they can literally see that which
does not yet exist: a trait which, in other circumstances, would likely land one in a detox unit. We find the term "visionary" applied to genuine world-changers like Ford, Jobs, and Gates, but also in a sadly-diminished form applied to those who just do things a little differently: "Bob was a visionary who saw that the x-14 op amp could be replaced by an IC with massive savings in parts and labor, costs."

Yeah, no. Not every competent professional is a freaking visionary. And don't get me started on the diminution of the word "hero".

"So, Leebs---you're 500 words in here, what're you getting at? What's this got to do with audio?"

Good question. It has everything to do with the business of audio, and nothing to do with the art and science of it.

Most audio industry veterans are fatalists. I'm a cynic, not a fatalist---probably due to stubbornness more than to any positive character trait. Here's the thing: while we've heard for decades that the sky is falling, audio is a dying field, yadda yadda---it keeps going. It may not be the home entertainment leader it once was, but it keeps going. Pragmatic contrarians like Paul McGowan say, "the old customers may be dying off---but we keep getting new ones to take their place."

Private equity people like the aforementioned KKR are the supposed visionaries of the finance world. They see value where others do not, and see ways to extract the value of lost causes, value that eludes the scrutiny of others. As mentioned in Industry News this issue (and others), those guys keep buying up assets in the audio biz.

Why do you think that is? Are they suckers? Or are we blind to the worth of our own little kingdom?

I would suggest that the latter is more likely. Rather than killing off venerable audio companies, these investors have done a great deal to nurture dozens of brands.

Yes, there have been murders amongst the acquisitions---Snell comes readily to mind---but for the most part, purchases or investments by capital groups have done a lot to stabilize the audio industry, and bring needed business savvy to many businesses which were tech-savvy but not brilliant at business. And like it or not, it doesn't matter how technically brilliant a company is if they can't keep their doors open. The old racing aphorism, "to finish first, one must first finish" certainly applies here.

Perhaps we need to look at our realm with fresh eyes: if you weren't a dyed-in-the-wool audio geek, what companies would you notice? I'll bet that will have more to do with marketing than with technical expertise. I know from decades of sometimes-painful experience that technowizards rarely understand marketing, and are one of the few remaining groups that believe the whole "if you build a better mousetrap..." thing. Few folks are that naive these days.

So---looking at it as an objective businessperson or a disinterested consumer: what audio companies would you be inclined to support, and perhaps even invest in? Why?

I'll be interested to read your ideas.
Let me describe something I was very fortunate to be able to try one time, but which very few of us will get the opportunity to experience. I am talking of entering a professional anechoic chamber.

An anechoic chamber is a room specially designed for the purpose of conducting carefully calibrated acoustic measurements. In normal rooms, any sound generated anywhere within the room will travel rapidly to all other parts of the room by bouncing off the walls (including the ceilings and floors). Therefore, if we attempt to measure the sound in a room we very quickly find that it is impossible to distinguish between sounds which originate directly from the source and those which have travelled via multiple bounces off the room boundaries. This is important, because these multiple signal paths cause the signal to be reinforced, cancelled out, or anything in between, thereby rendering many forms of measurement entirely useless.

The solution is to create a room in which sound waves, when they hit one of the walls (or floors, or ceilings), are instantly and totally absorbed and none of it is reflected back into the room. Such a room generates no echoes, and is therefore termed ‘anechoic’. These are particularly useful for designing things like microphones and loudspeakers, and enable detailed and accurate measurements to be performed in a way that would be virtually impossible otherwise. You’d think that every loudspeaker manufacturer would have one, but they don’t. They all wish they did, but most of them can’t afford such a preposterously expensive luxury. The best they can hope to do is rent time in somebody else’s (most likely in a university, or institutional research center).
What is particularly instructive is to get somebody to step into an anechoic chamber for the first time, and ask them to sing a song or play an acoustic instrument. You can bet your mortgage that they will stop singing or playing within less than a second. What they hear are sounds so alien to them – such a departure from their expectations – that they can’t help but stop abruptly. It only works first time, because once you know what is going to happen you aren’t so taken aback.

The sound of a voice or an instrument in an anechoic chamber is just so unlike anything you have ever heard before that it stops you dead in your tracks. Same goes for a loudspeaker playing in an anechoic chamber. It will exhibit an unappealingly dry sound, devoid of all character, expression, depth, or life. An anechoic chamber is a profoundly unnatural environment.

And yet, the sound of a voice or acoustic instrument in an anechoic chamber is the most accurate representation of that sound. It is precisely what that voice or instrument actually sounds like. Only the sounds travelling directly from the source to the listener will reach the listener. All other sounds will be totally absorbed as soon as they hit any of the walls. This is as accurate as it gets.

Outside of the anechoic chamber, the sound you hear is the sound of that instrument playing in a given room. The difference between what you hear inside the chamber and outside is the contribution of the room to the sound. That contribution is colossal, and is fundamental to how we perceive the sound. The magnitude of the difference serves to ram home the point that everything we hear every day is the product of the various sound sources modified by the environments in which we both exist. The same orchestra, for example, playing in two different concert halls often sounds like two different orchestras.

This is important to grasp, because it serves to illustrate the futility of one of the holy grails of the audio industry – or more precisely of many of the critics who presume to influence the industry as to what it should be doing. This particular sacrament requires that the goal of a high-end audio system is to recreate the sound of the original instrument. A very noble aim, wouldn’t you think? But the actual sound of the original instrument is the desiccated sound from the anechoic chamber, and that is not what your typical recording engineers attempt to capture. All they can ever hope to capture is the sound of the original instrument played in the original location. [Now that is not entirely fair. Many recording engineers are aware of these limitations, if not necessarily in those terms, and preferentially employ techniques intended to mitigate the effects. But that only serves to further complicate the issue.]

This presents us with two separate philosophical problems. First, how are we to know what the original performance actually did sound like in the original location? Unless we were there at the time, we can’t. Second, our loudspeakers are located in their own separate and different acoustic environment. If ‘simply’ reproducing the musical instruments themselves in our own listening environment is challenging enough, it is a different challenge entirely to reproduce the complete audio environment of one room inside an entirely different room. For example, consider recording a violin in an anechoic chamber, and then trying to reproduce the sound of that anechoic chamber in your own listening room. Take it from me, without an anechoic chamber of your own, it is not possible to come even close.

As far as tonality is concerned there cannot be practical absolutes. While the broad brush strokes of tonal color are provided of course by the instrument itself, the fine details are dominated by the acoustics of the room. So when it comes to judging sound reproduction there can be no such thing as Harry Pearson’s much vaunted “Absolute Sound”. There are no absolute points of reference other than an anechoic chamber, and nobody would want to listen to anything that sounded like that.
C: Doubling back to the period when you got started in the ’70’s and ’80’s, there was a lot of emphasis placed upon loudspeakers that were accurate in the time domain—I’m thinking of Ed Long and others—there’s always been confusion over something that was accurate in frequency response versus something that’s accurate in phase. I’m just not sure how you’d state what your goals were Spica. How would you define them [the goals of your designs]?

JB: That’s a good question, and there’s not an easy answer, because speakers are such a bag of worms...especially, trying to do a phase-align. We can make a visual analogy. Let’s pretend that sound is a fruit pie. The speaker's job is to deliver that pie intact to the listener's ears. A multi-way speaker system divides that pie into as many pieces as it has drivers [or crossover points], and needs to deliver those pieces as if the pie had never been cut.

Let’s say you have a two-way system, so the pie is in two separate pieces. If woofer and tweeter are
mounted on a flat baffle, the pieces won't be delivered at the same time. There's no way to fool the listener that it's really one pie! The crossover also modifies the delivery time further. That's a simple analogy for what my job was, as a designer.

C: It's a challenge.

JB: It turns out that if you have more than one driver, more than one source that you're trying to sum, you can only sum that at one point in space....That's just one example of how if you break down the event and understand what it takes to pull off this magic, it's kind of like visual holography in that everything has to be set up in the right place, or the phase differences don't work. The image is not created.

This whole thing about accurate time domain being different from accurate frequency domain and tonal response being different from the imaging—that's all BS. They're all the same...but you have to pay attention to the timing parameters. The closer you get to one, the more the others fall into place...but you have to optimize them all simultaneously.

C: When you think in terms of speakers that place emphasis on absolute phase, there are other companies that started about the same time you did: Thiel, Vandersteen. And yet, you've never stuck to single-order crossovers like they did. You had a completely different way of going about it.

JB: That's because a single-order crossover is good in theory, for electronics—but it's not good acoustically, because of this whole thing about the crossover overlap. With a 6 dB per octave crossover—AKA a first-order—you've got two drivers that are contributing to the final wavefront over a four-octave range!

Number one, the drivers that you can buy are incapable of doing that...so you've got to design a crossover that will enable them to do that. The fact that tweeters take a nose-dive at around 800 to 1000 Hertz just throws the viability of a pure first-order crossover out the window immediately.

One of the things that I brought into the picture from a design point of view—and I don't know that anybody else was doing—was that I modeled the complete system AND each element of the system as electronic circuits (including time delay), created target functions for each part based on the actual responses of the drivers against what the computer said it needed to be, and then optimized the crossover and baffle design to achieve that. I wasn't married to any particular theory, or using book formulas.

So: okay. Let's figure out what does it take in order to get it to sum to unity magnitude and phase over this crossover region?

C: I think there's a difference there from your approach to that of Jim or Richard. They tended to approach things from a purely theoretical viewpoint of, "this is what I want to do—now I've got to somehow produce drivers that will function that way." It could be argued that they never really quite got there.

JB: Yes, first order systems are the Mecca of most speaker designers. I can guarantee you they never got there. It's impossible. You still can't get there. And on the way, you'll find other serious problems have been created [by first-order lobing error].

[To some extent] we were all in over our heads with that stuff. I certainly was. When I first got exposed to...AES magazines that had all of Richard Heyser's papers on Time-Delay Spectrometry...[I read them] for months before they started to soak in...because I wasn't a mathematician, I wasn't an engineer. I didn't have any training.
A lot of people would say that even with that intensive level of absorption, Heyser's papers still wouldn't be crystal-clear. There's been a bit of a backlash in recent years amongst math-minded folks, saying that Heyser was all wrong...

JB: Based on my experience, I totally disagree.

C: And I would expect you to, as one whose designs embodied his principles more than any speakers I'm aware of.

JB: He didn't even start out applying this [TDS] to speaker systems. He was doing work for NASA, tracking underwater systems and systems in space, wanting to get accurate phase measurements and realized that he had to deal with the signal-path delay. Eventually, the light went on in his head--and just as a hobby, in his basement using old beat-up equipment that he modified in order to get it to work the way that he needed it to, figured out how to do it, and applied it to speakers. He did papers and they sat around for ten or more years before anyone realized what he'd done.

C: Big picture: if you were able to do it all over again----you probably wouldn't do it, would you? Knowing how much trouble it would be...

JB: I wouldn't, definitely. It's impossible for me at this point.

C: Nonetheless, I'd be interested in having you look around at what's out there today...there is kind of a peculiar revival of two-channel things, perhaps pushed along by personal listening and the headphone drive, coupled with the revival in vinyl, as well. We pretty much missed a generation...maybe two...in terms of markets for two-channel audio.

I'd be really intrigued to see what you could come up with these days for $1000 or $2000---but I know that's not going to happen.

JB: Yeah, it's not. I hit a burn-out point in music. This path started for me when I was like 11 or 12 years old as a singer and then musician and songwriter and then recording engineer and that's where my big interface with the equipment happened---so I transitioned from being a musician and recording engineer into the speaker part, and that was to fulfill a specific need. I had a need to be filled that I couldn't fill any other way. Part of it also was, as you said, back in the late '70's there was great interest in this whole time-aligned stuff... even if you were pursuing that general classification of speakers, there were three or four different ways of exploring it.

Time-aligned was not phase alignment---it was just aligning voice coils! (laughs)

C: In its most basic methods, yeah.

JB: And the speaker that [Ed Long] did most of his work with was an Altec-Lansing driver with a concentric horn where the cone was part of the horn? I was like....

C: Sounds like a 604 or a 605.

JB: It was a 604E. You've got it. I heard them. I went to a studio and heard them, and thought, "I wouldn't want to record or mix on those", although they were better than the stock ones.... my first job back then was sorting out, what do I pursue? Time alignment? Phase alignment? Impulse response? KEF had this whole thing...they got major funding from the BBC to pursue digital implementation of Heyser's work, via impulse response. So they bought this $100,000 Hewlett-Packard mainframe computer and some really smart guys, and they figured out how to do what Heyser was doing with swept-sine, doing it with impulse response. That was the paper that really got
me into it.

We had a KEF dealer in Albuquerque, so I was reading their papers and then going down to hear what they'd created on the basis of what they had learned...and they weren't phase-aligned. They figured out how to do it right, and then they did it wrong, in production...using fourth-order networks for a high-pass function, the phase characteristics were just a bloody mess, and they found out they weren't phase-coherent or minimum-phase at all!

But they did all the hard work and research for me.

C: That would've been the 104 or 105?

JB: The 105 was the one I was thinking of. They never published the phase response of the complete system. They never showed you the impulse response of the system. All they showed you were their lovely computer-derived transfer functions and the various responses of the drivers...and I think that's when Linkwitz-Riley really came into vogue. And that's still popular...and if you're interested in uniform power response, that's a good road to go down. If you're interested in acoustic holography...It's a mess.

Some of these principles also apply to electronics---specifically the power supplies.

C: Okay. How so?

JB: It turns out that the phase response of the power supply is just as important as the phase response of the drivers. That's where this whole event starts---in the power supply.

I was injured on a tennis court about eight years ago, and kind of disabled for a number of months...and so I decided to reopen my audio hobby and inquiry, and ended up doing some power supply research that resulted in a patent. Then when I was done with it, that was around the time that I was totally burned out on audio, so I just dropped it.

Anyway: the phase response of the power supply and the dynamic behavior of the power supply are really, really important. It's not just enough to have a linear-phase speaker. You also need everything else in the chain [to have linear phase].

C: John, I appreciate your time. If you ever feel the urge to write about your past work, or what could still be done in speakers, I'd certainly be interested in taking a look at it. It's been a pleasure talking with you, John. Thanks so much for your time.

JB: Thank you, Bill. I've enjoyed it immensely.

[Just a reminder: almost anything you care to know about Spica can be found on the Spica Speaker Enthusiast website. It's an amazing resource, and props to John Allen, the site's creator.--Ed.]
Sound United Announces Acquisition of D+M Group

[Who are the heavy hitters in the audio biz today? It could be argued that they're the PE groups---private equity. We've seen McIntosh move from Quadrivio to a consortium of French PE groups, and here we see the companies of D+M---owned by Bain Capital, Mitt Romney's old company---being bought by Charlesbank Capital Partners to become part of their Sound United group. Oddly, both Bain and Charlesbank are based in Boston, once the major incubator of American audio companies.--Ed.]

VISTA, Calif., March 1, 2017 -- Sound United LLC, parent company to Polk Audio, Definitive Technology, and Polk BOOM, today announced it has completed the acquisition of the D+M Group, owner of the Denon, HEOS by Denon, Marantz, and Boston Acoustics brands. The D+M Group is the largest supplier of audio/video receivers worldwide and a leader in wireless multi-room audio. Sound United is the largest supplier of loudspeakers in North America and a leading supplier of sound bars and wireless music systems. The combined company will be known as Sound United, which will own and operate some of the most prestigious brands in the consumer audio space, providing synergy opportunities for the existing core businesses, while also unlocking the potential to expand the product portfolio and market reach. The sale was finalized on February 28, 2017 and the terms of the sale were not disclosed.

Kevin Duffy, CEO of Sound United, will serve as CEO of the combined company moving forward. "Sound United and the D+M Group employees share a culture of innovation and customer focus. We plan to leverage those core values in the combined company in order to offer consumers and our channel partners a breadth of complementary products while expanding our investments in technology development and marketing," said Duffy. "We welcome the addition of the D+M team and are excited to work together to ensure that this strategic combination capitalizes on its global leadership position while also ensuring that each of our individual brands continues to be highly differentiated in the marketplace. Our existing customers and channel partners will benefit from the enhanced breadth and depth of the combined product portfolio, while our strategic suppliers should be well-positioned to expand with us as we grow."

D+M Group CEO Jim Caudill, who will continue as an advisor to the consolidated company, added, "This transaction is a testament to D+M Group's employees and exceptional brands and all that
we've accomplished in the audio industry. By joining Sound United, we expect to deliver tremendous value to our customers through access to Sound United's aspirational speaker brands including Polk Audio and Definitive Technology. We believe that this transaction will drive compelling opportunities for our employees, customers, and suppliers, and are looking forward to ensuring the success of the new organization."

Sound United is a division of DEI Holdings, a portfolio company of Boston-based private equity firm Charlesbank Capital Partners, LLC. Charlesbank acquired DEI Holdings in 2011. "We are delighted to support the expansion of Sound United and to help bring together two leading companies in their respective categories," said Ryan Carroll, a Charlesbank Managing Director. "We look forward to a successful integration building on the cultural similarities, talent, and best practices of these two companies and to a stronger future as one entity."

Pagemill Partners, a division of Duff & Phelps, acted as financial advisor to D+M Holdings. Goodwin Procter acted as legal counsel to Sound United, and Davis Polk & Wardwell acted as legal counsel to D+M Holdings. For more information on Sound United, please visit www.soundunited.com. To learn more about the D+M Group, visit www.dmglobal.com/home.

**About Sound United** Sound United, a division of DEI Holdings, curates a diverse portfolio of audio brands including Polk Audio, an audio brand with more than 40 years of pioneering high-quality personal audio; Definitive Technology, a 25-year veteran in the high-end experience home audio space; and Polk BOOM, a portable audio brand targeting the youthful action-sports oriented consumer. To learn more about Sound United and its brands, visit www.soundunited.com.

**About D+M Group** D+M Group is a global company dedicated to enhancing life through inspired sound solutions delivered anytime, anywhere. With a strong belief that "Performance is everything," D+M is focused on innovation to meet the needs of customers in an increasingly digital world. Serving the consumer markets, D+M Group brands include Boston Acoustics®, Denon®, and Marantz®. D+M Group has approximately 900 employees worldwide, with products and services marketed in more than 45 countries.

All product and brand names with a trademark symbol are trademarks or registered trademarks of D+M Holdings, Inc. or its subsidiaries, except Bluetooth which is a registered trademark of Bluetooth SIG, Inc.; Auro-3D which is a registered trademark of Auro Technologies NV; AirPlay which is a registered trademark of Apple Inc.; Dolby Atmos which is a registered trademark of Dolby Laboratories, Inc; and DTS:X which is a trademark of DTS, Inc.

**About Charlesbank Capital Partner** Based in Boston and New York, Charlesbank Capital Partners is a middle-market private equity investment firm managing more than $3.5 billion of capital. Charlesbank focuses on management-led buyouts and growth capital financings, generally investing in companies with enterprise values of $150 million to $1 billion, and also engages in opportunistic credit investments. The firm seeks to partner with strong management teams to build companies with sustainable competitive advantage and excellent prospects for growth. For more information, please visit www.charlesbank.com

###

**Control4 Acquires Triad Speakers, a Pioneer in High-End**
Audio Technology and Speaker Design

[To those who focus only upon our little audiophile world, these names may be unfamiliar---but this is a big freakin' deal. Control4 is a smart house/home automation company with around 5,000 dealers. Triad is a speaker brand well known to customer installers and home integrators, and has about 500 dealers. Given the rise of Sonos, Alexa, and other multi-room solutions in audio, more companies will be moving into that market. This seems like a logical, smart match to me, FWIW. --- Ed.]

SALT LAKE CITY, February 28, 2017---(BUSINESS WIRE)---Control4 Corporation (NASDAQ: CTRL), a leading global provider of smart home solutions, today announced the acquisition of Triad Speakers, Inc., a leader in advanced audio technology with best-in-class, customizable speaker-solutions.

“Entertainment is integral to the connected home and our Control4 dealers are designing end-to-end experiences for family room entertainment, home theaters, and indoor and outdoor multi-room music for their customers,” said Martin Plaehn, Control4 Chairman and CEO. “The acquisition of Triad brings proven premium-acoustics experience and innovation to our company, enabling us to immediately deepen our entertainment offering and develop new integrated-audio experiences for the future.”

Triad’s 30-year heritage of delivering exceptional audio solutions is rooted in its unwavering attention to audio design and detail, its uncompromising focus on the quality of the listening experience, and the specialty customization of its products. Triad manufactures a comprehensive range of high-quality, built-to-order premium audio speakers to meet the discerning demands of homeowners – for home theaters, family rooms, whole-home or multi-room audio, as well as for outdoor environments. The company’s focus on elegant design integration has been delivering customized audio experiences that feature beautiful sound while enhancing a home’s décor. The acquisition of Triad is a strategic addition to the Control4 entertainment portfolio, which includes the fully programmable Control4® EA-series controllers with native high-resolution streaming music services, its family of multi-room audio matrix switches and amplifiers, and its family of ultra-HD 4K video matrix switches with audio down-mixing capabilities.

“At Triad, high-quality audio, custom design, and seamless integration have been the standards that we will continue delivering to our dealers and their end customers,” said Larry Pexton, founder and CEO of Triad. “Becoming part of the Control4 family enables us to expose our engineering expertise to those homeowners in the broader market of home automation and entertainment who are passionate about their listening experience.”

Effective immediately, all Triad dealers in North America are now able – for the first time – to place their product orders and customization requests via a brand new online dealer portal. Control4 and Pakedge dealers may also order Triad solutions online, starting today. In the coming weeks, the Triad dealer portal will also include technical training information and additional marketing resources.

Nearly the entire Triad team will be joining Control4, including founder Larry Pexton, as well as the Triad’s R&D, manufacturing, and custom-services employees, all of whom will continue operating from Triad’s existing facility in Portland, Oregon.

Total consideration for the acquisition of Triad consisted of $9.6 million in cash. Triad generated approximately $9 million in revenue in 2016. Control4 plans to invest in the operations of the
business during 2017 in order to push adoption of these products through its larger sales channels.
As a result, Control4 anticipates that the acquisition will be net income neutral in 2017, after
adjusting for acquisition related expenses. Control4 will provide guidance for the second quarter and
update its annual guidance to include the operations of Triad at its next earnings call.

About Control4 [NASDAQ: CTRL] is a leading global provider of automation and networking systems
for homes and businesses, offering personalized control of lighting, music, video, comfort, security,
communications, and more into a unified smart-home system that enhances the daily lives of its
consumers. Control4 unlocks the potential of connected devices, making networks more robust,
entertainment systems easier to use, homes more comfortable and energy efficient, and families
more secure. Today, every home and business needs automation horsepower and a high-
performance network to manage the increasing number of connected devices. The Control4 platform
interoprates with more than 10,000 third-party consumer electronics products, ensuring that an
ever-expanding ecosystem of devices will work together. Leveraging a distribution channel that
includes over 3,900 custom integrators, retailers, and distributors in 91 countries that are
authorized to sell the full-line of Control4 products, with over 1,100 additional dealers and
distributors that are authorized to sell our Pakedge-branded networking solutions only, Control4 is
delivering intelligent solutions for consumers, major consumer electronics companies, hotels, and
businesses around the world.

####
Your questions - My answers

Following up from Copper #26, where readers were asked to pick from a list of popular topics, we will start off with our reply to reader LMH, who picked two:

**How to know when you’ve gone too far with room treatments**

If you have modified your room with acoustic treatments, listen to the sound of the voices of people that you know well. Have the person talk to you from a point as near to the speakers as is practical. You should be in the listening seat. You should test from every speaker, but especially the fronts in a multichannel installation. *If a live voice that you know intimately sounds dead and lifeless, you’ve probably gone too far in your acoustic treatment regime.*

Another test is to have someone sit in a nearby seat in the listening area. Run the same test. How does their voice sound? If it’s dead and lifeless, you *definitely* have gone too far.

Ask two or three people to speak from the speaker area at the same time (one left, one center, one right). Can you follow them easily? If not, the room may be too lively.

I find that if a room has acoustics that make conversation feel unnatural (either too lively and reflective or too dead and lifeless), listening to music will not be as effective as it might be in the very same room.

If you’ve ever noticed the acoustics in theaters, you can recognize the effect. Theaters are designed...
to maximize vocal articulation. They almost always make unsatisfactory places to listen to music concerts. If you have a multichannel system, this is especially important, as some combo rooms end up with a poor environment for listening to music with maximum impact.

**The Top Three most important places for room treatments**

This observation comes from over three decades of experience and hundreds (if not thousands) of successful critical installations.

You definitely want to address the first horizontal reflection from each front speaker. I’m assuming that in most installations that there is a nearby wall or other object(s) that can reflect sound from the side of your speaker.

It’s not so much for correction of tonal balance (although it may be required if your speakers have uneven frequency response off axis), but it’s mostly to prevent smearing of the sound. The slightly late arrival of reflected sound will muddy your overall sound and affect your imaging.

Think of a stone dropped into a pool. The waves are like sound waves. If you drop a stone simultaneously near the edge of the pool, those waves will merge with and affect the original waves.

Some audiophiles are surprised to find that with proper room treatments, including absorption, recorded reverberation will be increased, not diminished! For example, the sound of a choir singing a cappella in a large space will sound more spacious when you absorb the unwanted speaker/room reflections than it would if played in a live room without treatment. That’s because unwanted room reflections are smearing and even covering the sound of the subtleties of recorded ambience, spaciousness, and acoustic delay.

So my top three are:

1. The side walls where the sound reflects from the speaker and then arrives at your ear.
2. The area behind the listening seat.
3. As many corners as possible.

Note: With panel & open baffle speakers, you will probably need to absorb some of the anti-phase wave-front before it can interfere with your sound. *Dispersing* this reflected sound is a popular, though questionable practice. Yes, you can ask why… :)

Regardless of the type of speaker, if you determine that a secondary reflection from the opposite channel speaker is capable of reflecting off the wall at your seat, I’d consider addressing it as well. However, when that is possible, you are somewhat likely to be sitting too far from your speakers.

There are two other places where room treatments can help, but they may not be WAF friendly:

1. The first reflection on the ceiling from each speaker to your ear.
2. If you have bare floors, the first reflection on the floor from each speaker to your ear. Of course, carpet or area rugs can take care of the floor-bounce issue in the mid and high frequencies.

*Reader Hoytamundo requested:*

*Why you shouldn’t consider speaker placement final until you’ve discovered the correct AC polarity for all components*
Incorrect AC polarity from just one component can make your system sound harsher than it should. Since I assume that some of you already know this, and that you probably know how to correct it, here is one thing you may not have considered: Components with incorrect AC polarity will of course look for a ground path. Where do they share the ground?

Usually, it’s on the shield side of connectors and interconnects. Since this shield is common to both channels, it can present a slightly “grungy” center fill that you may not notice until it’s been eradicated.

If you have carefully voiced your speakers for a precise stereo image, and then you correct the AC polarity, you may get a slight “hole in the middle” effect when the artificial center fill (mono) information is removed. With some systems, I’ve found that I needed to bring the speakers an inch or two closer together to correct for what had been a false center fill.

Try it and see what you think.

**AC polarity test**

As mentioned above, if you have the AC polarity inverted in any leg of your system vs. another - or at any component - it will likely harm your overall sound. (Note – this is about North American electrical systems. I have no idea about European or Asian systems.)

Usually the AC polarity will be inverted when an AC line is pulled from the opposite side of the AC panel. But that’s pretty easily fixed by reversing the hot and return side of the outlet.

The issue that can make for more sonic issues occurs when, for various reasons, occasionally a component will appear to be wired with the hot side reversed. A qualified electrician can accomplish this task rather quickly.

Once you’ve discovered what is incorrect, you can begin to address it. This process takes a while, because you have to completely disconnect all cables that are attached to any other components while you run the test. Plus, some have a delayed turn on which, for some reason, may occasionally appear to be a different AC polarity than in standby.

In a somewhat complicated system (say 6 or more AC-powered devices), chances are that at least one or more will turn out to be inverted.

You’ll need to have a 3–2 prong AC adaptor (aka “cheater plug”). You should get one that will let you reverse its orientation. Most adaptors have a larger negative-side probe that will prevent reversing it. So you either have to find an adaptor with the two prongs the same size, or you’ll need to file down the larger prong slightly, so the new adaptor can be reversed.

You will need a portable volt/ohm meter (aka multimeter) for this application. You do not need an elaborate meter – an inexpensive unit will be fine.

One set of instructions that’s especially useful regarding the use of a multimeter for checking AC polarity is on Galen Carol’s [website](http://www.galen-carol.com/).
I should mention that I’ve occasionally done the AC polarity test by ear. But it’s tedious, and it’s definitely time consuming. Do yourself a favor and get some device that will quickly measure the difference in ground potential.

Note, these answers are edited versions of topics from *Get Better Sound* and the companion *Quarter Notes* newsletters.

*If you would like to submit a topic for discussion, you can find the list from Copper # 26 [here](www.getbettersound.com). You can also read Jim’s work at his website. www.getbettersound.com*
My current system has evolved during the past year and although a humble vintage set up, I'm rapt with its performance.

The one constant has been my Philips HS 510Q turntable. I upgraded from a solid performing Dual CV20 to the irresistible Teac A-9 integrated amp and matching T-9 tuner. I was drawn to its 1980s styling and with 60 watts per channel, it drives my three-way KEF C40 speakers beautifully.

I'd love to add the matching cassette deck to add to the stack.
Unfortunately, aren’t the ones who make you happy; no. They’re instead the ones who make you feel the most. Shivering edges, and scars and staves. Sad pain and pangs. Captivation and beauty. Storms and shadows and worry and yearning. Sweetness and weakness and Greyfriar’s surrender. They hurt you into the abyss. They taste like hope.

— Sharon Driscoll
PS Audio is nestled up against the foothills of the Rocky Mountains in Colorado. The state flower is the Columbine, which come in many colors and styles. The classic pictured here---they are special flowers and provide one of the many joys hiking in Colorado's pristine wilderness areas.