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Happy St. Pat’s!

By Bill Leebens | Issue 54

Welcome to Copper #54!

Beannachtai Na Feile Padraig Oraibh! —which is allegedly, “St. Patrick’s Day Blessing Upon You!” in Gaelic. My middle name’s Moore, and I am of Irish heritage, but I can’t vouch for the accuracy of the translation. Yet.

March did indeed come in like a lion in many parts of the country— I hope you’re digging out, and have power. It’s a little tough to read Copper without power of some sort!

John Seetoo concludes his interview with Bobby Pulhemus, who recorded on Audio Fidelity as “Bobby Palomino”, lead guitarist of The Teemates. Next issue we’ll have John’s interview with a far better known Audio Fidelity artist—and I think you’ll enjoy it. Galen Gareis is back, continuing his series on cable design with a piece on XLR design.

Professor Schenbeck leads off the regular columns with selections of violin + orchestra; Dan Schwartz writes about Godley & Creme, who recorded a number of amazing albums with 10cc and as a duo, and broke new ground in usic videos and musical instruments; Richard Murison takes a look at the taboo subject of powered speakers; Jay Jay French says “hell, yeah” to EQ; Roy Hall sleeps through another cultural event; Anne E. Johnson brings us indie singer/producer/artist Be Steadwell…and I’m a little smitten; Woody Woodward concludes his two-parter on rockabilly; Industry News brings news about Spotify, and the death of a well-known figure; and I write about differentiation, and how speakers exhale. Anne is back with a survey of madrigal recordings in Something Old/Something New—and you may be surprised by some of the composers who have written madrigals.

Copper #54 wraps up with a classic cartoon from Charles Rodrigues that continues my discussion of speakers—sort of. Our virtual back cover is a Parting Shot of the Italian coast by Paul McGowan.

Erin Go Bragh! —and we’ll see you next issue.

Cheers, Leeb
Our story begins with Beethoven. (What else is new?) His Violin Concerto (1806) especially, because it’s the poster child for Modern Concertos in so many ways. First, he wrote it for a singular virtuoso, Franz Clement, whose playing, according to a contemporary, was “not the marked, bold, strong playing [of] the Rode–Viotti School” but rather something “indescribably delicate, neat and elegant.” Clement’s fastidious technical style did not preclude circus tricks: on the same program as the Beethoven concerto, he played variations of his own on a violin turned upside down. Nevertheless when you hear the concerto, you’ll get that Beethoven drew upon Clement’s personal style. It’s mostly sweet and elegant, even though Mozart it isn’t.

Second, Beethoven’s concerto enacts the same experiments in form he was making with other music then, e.g., Symphonies No. 3, 4, and 5; Piano Concerto No. 4; and the Op. 59 “Razumovsky” Quartets. Like his fourth symphony and piano concerto, the Violin Concerto was one of the quietly radical works he turned out in those years. Listen to the opening:

The rhythmic call initiated by the timpani at the outset becomes the most important structural
motto in the entire work, permeating it nearly as much as the notorious three-shorts-and-a-long motif does in Symphony No. 5. Beethoven borrowed the trick of turning a simple accompanimental device into a significant formal element from his old teacher Haydn. But the power with which he invests it here is very much his own.

At the 1’00″ mark you hear the motto in its noisy four-beat version, quickly followed by a rhythmically reshaped variant, four-shorts-and-a-long. The motto’s increasingly emphatic presentation suggests that performers should prioritize rhythm—especially an unflagging, energetic primary pulse—in their interpretations. It’s one of the ways in which Isabelle Faust’s recording with the late Claudio Abbado (Harmonia Mundi HMC 902105) stands out. Another is her use of an authentic Beethoven cadenza with timpani, albeit one he wrote years later for a piano transcription of this concerto:

So, to recap: (1) violin concertos are often built around the skills of particular performers; (2) a modern concerto can also draw upon structural innovations that go well beyond the standard dialogue format of soloist vs. orchestra.

To these two points we should add a third: beginning with Berlioz’s Harold in Italy, a concerto may also reference Romantic narrative inclinations, e.g., personal histories and/or feelings and experiences nicked from literary sources; also geography, meaning landscape and/or cultural tourism.

A few years after the premiere of the Symphonie fantastique, Berlioz was approached by Niccolò Paganini, the most famous violin virtuoso of his or any other time, with the request for a concerto. Paganini had acquired a Stradivarius viola, a marvelous instrument for which he felt no suitable music existed, so he turned to a celebrated newcomer for something to set the world aflame. According to the composer,

_I tried therefore to [write] a solo for viola, but one which involved the orchestra. . . . I was sure that Paganini . . . would know how to keep the viola in the forefront. . . . But when he saw all the rests in the viola part . . . he exclaimed: “This will not do; I am silent for too much of the time; I need to be playing continuously.”_

So Berlioz and Paganini parted ways, with Berlioz determined to write a sort of symphony with viola obbligato,

__a series of orchestral scenes, in which the solo viola would be involved as a more or less active participant . . . . By placing it among the poetic memories formed from my wanderings in the Abruzzi, I wanted to make the viola a kind of melancholy dreamer in the manner of Byron’s Childe-Harold.__
(Colin Davis’s slower-paced but more voluptuous reading with violist Nobuko Imai is also available on YouTube.)

In spite of Paganini’s rejection, a significant number of 20th- and 21st-century concertos have seized upon Berlioz’s more flexible view of the genre. They rely heavily on landscape and memoir, a choice that often leaves purely musical, abstract structural concerns à la Beethoven behind. As a result, the soloist’s role can be irretrievably altered.

My own touchstone in this regard is Alban Berg’s Violin Concerto “To the Memory of an Angel” (1935). You could hardly ask for a more personal work, even though Berg masked the autobiographical content in various dense structural techniques. (You could say he was Beethovenesque in his constructivism, except that Beethoven wanted you to hear the structures. Berg? Not so much.) The music utilizes serial technique—a tone row built from ascending thirds, of which four of the first seven pitches, G, D, A, and E, correspond to the open strings of the violin, and the last four comprise motto notes of the old German hymn “Es ist genug!” (“It is enough!”) Berg begins the concerto with those open-string pitches; after that, faint patterns are heard suggesting (at least to me) fragments of a Requiem, and those lead into an Allegretto that surreptitiously introduces a Carinthian folk song (at 10’07” in the clip below) alluding to Berg’s own first love, a kitchen maid in his parents’ household whom he impregnated when he was a teenager. (They named the child Albine.)

There’s more. The work took shape as a memorial to Manon Gropius, 18-year-old daughter of Alma Mahler Gropius and her second husband, architect Walter Gropius. Berg had been quite close to Manon, a polio victim, and as he worked feverishly on the concerto, he fell ill and increasingly believed it would serve as a requiem for his own life. Moreover, he had been involved for years in a passionate love affair with Hanna Fuchs-Robettin, wife of a Prague paper manufacturer and sister to novelist Franz Werfel, Alma’s lover and next husband. Woven throughout the concerto are secret references, numerological and otherwise, to Berg and Hanna. The concerto ends by quoting Bach’s very chromatic setting of “Es ist genug!”:

I know much of this because of Michael Steinberg, whose notes condense and clarify not only the basic music-theory data but also recent scholarship pointing us back toward Hanna, Mitzi the kitchen maid, Berg’s number-mania, and his other tics and obsessions. Above, we’re hearing Faust and Abbado again; he had urged her to pair Beethoven and Berg in their 2010 performances and recording, an unusual but rewarding choice. It’s a live recording with one or two fluff-ups but remarkable energy.

Several 20th-century violin concertos show clear debts either to Beethoven the structuralist or Berlioz and Berg the storytellers. A good place to start is with Benjamin Britten’s Violin Concerto Op. 15, written in North America between 1938 and ’39. Its genesis actually dates from 1936, when he attended the International Society for Contemporary Music’s festival in
Barcelona. That ISCM event saw the world premiere of Berg’s concerto, conducted by Hermann Scherchen because the scheduled conductor, Anton von Webern, was overcome by grief at his friend Berg’s recent death and unable to carry on. Britten himself had harbored a fierce desire a few years earlier to study with Berg, but had been thwarted by a conservative faculty member at the Royal College who advised his parents against it.

In any case Britten performed his Suite for Violin and Piano Op. 6 at ISCM with Spanish violin virtuoso Antonio Brosa, and their friendship led him to promise Brosa “a major concerto.” The resulting work begins with a percussion motto that subsequently underpins much of the first movement’s music:

So, Beethoven! But Britten’s experience in Barcelona, then seething with the partisan unrest that led to the Spanish Civil War, provided a more complex emotional impetus for the music. Consider, for example, the strings’ initial response—vague, apprehensive—to that percussion motto. Later the violinist returns to claim the motto herself, as the orchestra transforms the lyrical first theme into a dance of death, tinged with menace and melancholy.

A hyperactive scherzo follows, although nothing in it equals the first movement’s blend of fear and longing: not yet thirty, Britten was not ready to attempt Mahlerian irony. The composer did, however, reverse the standard fast-slow-fast disposition of the concerto’s three movements; this allowed him to imbue its outer portions with more gravity, yet deprive the middle movement of its moderating role. The finale takes the ambitious form of a passacaglia with nine variations. “A major concerto” indeed.

We have been listening to Arabella Steinbacher’s new recording of the Britten and Hindemith violin concertos (Pentatone PTC 5186 625). Both the hi-res recording and the performances, with Vladimir Jurowski leading the Berlin Radio Symphony, are excellent. And the Hindemith concerto (1939) echoes Beethoven in its percussive opening:

Hindemith doesn’t follow through structurally, though. He had other models in mind—above all, the concerti grossi of Bach, Vivaldi, and Handel, with their polyphonic excursions and rich thematic diversity. Like Britten, Hindemith wrote his concerto in exile. You’d never guess that from the music, which is hearty, vivacious, and “learned.” No trace of Berliozian memoir here, no hint the composer had been hounded out of Nazi Germany as a “cultural Bolshevik.”

We’ll give the modern influence of Berlioz and Berg more attention in a few weeks. Next: “Daughters, Part 2.”
A couple issues back, discussing the NAMM convention, I mentioned Kevin Godley and Lol Creme in the context of their invention: The Gizmo. I thought I might write a bit about them and their musical adventure.

They came to attention as members of 10cc – which, if you know the derivation of that band’s name, will clue you into something about them and their records. They left the band in order to make the epic, the awesomely huge, 3-record set called Consequences.

Consequences is a cross between a radio play, a 10cc record (minus the obvious pop hits), and a progressive album. The opening track sounds very much like an early Genesis album, with Gizmotron guitar substituting for Mellotron. I encourage looking around this site, which ought to tell you whether or not you’d find the album worth looking for. It’s also a really terrific advertisement for my board: it was recorded on two Helios consoles, at Strawberry Sound (10CC’s studio) and the Manor (Richard Branson’s studio).

An essay shows up on Roon when you bring up their 2nd record, L, that’s dismisses them and it as too clever by half, the English Zappa. It’s not a very wrong comparison, but I found Zappa to generally be too “prurient” for my taste, for want of a better term. For a man who was as nice as he was (he was one of the most genuine and decent people in Hollywood), and who was an intellectual giant, he seemed to get a kick out of snickering lyrics. Not these guys.
There’s plenty of sarcasm in these lyrics, and quite a bit of sneering too. But sneering at different things: British things, in a way. It’s fair to say you won’t be brought to tears by their lyrics, but they might make you think (like “Hit Factory/Business is Business” from L). And of course:

I’d like to know you better
And maybe take you home
I’d like to meet your father
But really not tonight
We’ll be stopping off at Dayvilles
For pistachio and beer
It’s the flavor of the month but
You’re my flavor of the year
I could eat
Sandwiches of you
You could eat
Sandwiches of me
Oh my papa
He will not approve
He won’t like your car
Or the way that you conduct yourself
In public
Your move.
Shame, shame on you
I want to keep this friendship platonic
I respect the fact that you’re waiting
For Mister Right
Am I wrong?
Let’s pull over
Please let’s pull over
And discuss the ramifications
Of a lasting and complex relationship
Like mature and responsible people do
Am I getting through?
I could eat
Sandwiches of you
You could eat
Sandwiches of me
I could eat
Sandwiches of you
You could eat
Sandwiches of me

Tres romantic! OK, it’s not Lennon, Joni Mitchell or Leonard Cohen, but it’s still pretty cool.
And pretty damn original. On the other hand, there’s “Punchbag”:

If I brought a note to school
That said my days were numbered
They’d leave me
Numb and bleeding
Or strangle me with jump-leads
Momma, momma, momma,
In my world
The birds don’t sing
The bells don’t ring
The bicycle bells, the bicycle bells
Momma, momma, momma, Help me!
I wish I could blend
Into the background
I’ve no excuses for my lack of guts
Lack of guts
What is it about me
That draws attention?
Fourth form atrocities
Punchbag
Come and get it Socrates
Got to hit back
Get down on your knees
Ready for the polythene bag
I’ve never been a natural
At physical things
I’ve never been good at cross-country running
Since the first football hit me in the ear
Like a frozen cannonball
And the knees buckled
And stayed bent
And the laughs came
And the nerve went
And “Dirty Jew”
Was written on the blackboard
Fourth form atrocities
Punchbag
Come and get it Socrates
Got to hit back
Get down on your knees
Ready for the polythene
Ready for the polythene
Ready for the polythene
Bag treatment
Running through the corridors
Far too many obstacles
Bursting, bursting
Bursting for the crap I know
They'll never let me have
Fourth form punchbag
Oh God I wish that I was
Thicker than I am
And thinner than I am
Oh God I wish that I had
Normal ears
And clearer skin
I’m praying for the day
When handsome’s out
And ugly’s in
Fourth form punchbag
Fourth form punchbag
To Jesus I pray
For strength to survive
Your Christian soldiers
Smell blood
I torture myself in private
To prepare me for the pain
I talk to myself in public
On the buses and the train
My father just ignores it
’Cos it goes against the grain
Momma, momma, momma, Help me!
Fourth form punchbag
Fourth form punchbag
Booming round the corridors
Like guadiumus igitur
Fourth form punchbag
Fourth form punchbag
Can
I
Please
Get
Up
Now
No
When?
But I have to admit, I agree with the Roon essayist that they hit their stride on the next record: *Freeze Frame*. The way that “Random Brainwave” crescendos into “I Pity Inanimate Objects”, it always leaves me a little breathless. And the latter tune’s technique of generating the vocal melody from a keyboard-controlled Eventide Harmonizer — well, I never thought of that; it’s ingenious. In many respects, what used to be the first side of the LP, the first four tunes, are the most successful of all their work. “Get Well Soon”, which wrapped up the LP, besides featuring one of the Fabs on background vocals, sings about Radio Luxembourg — at the time, an English pirate radio station — in a fever dream. There are four additional songs on the Japanese SHM-CD, but they do seem like an afterthought.

Their 4th album, *Ismism* (October ’81), actually has just about the only white rap I think is any good, on the song “Snack Attack”. The album as a whole anticipates the whole English dance funk thing, with rap-esque vocals all over it. “Ready for Ralph” brings to mind Blondie’s “Rapture”. It also shows them to be mining the same rich vein at the same time that Peter Gabriel did on his 3rd album, and Talking Heads did on *Remain In Light*.

The last album I’ve heard of Godley & Creme’s is *Bird of Prey* from 1983. It’s quite a bit more ordinary — the vocals are still incredibly strong (particularly “Golden Boy”) but the compositions and arrangements are more conventional.

By now you’ll know if you should investigate their music or not. There is a 6th album I haven’t heard, called “Goodbye Blue Sky” (’88), so I’ve got something to look forward to as well.
There’s a term that both guides and haunts any human involved in marketing or selling not just audio, but...well, anything, really: **differentiation**. How is what I do/make/sell different from what everyone else does/makes/sells?

When human beings make something—whether it’s a blog entry, a skyscraper, a car, or a bit of hi-fi kit—choices are made. Choices **must** be made in order to create something new, something unique, something different. Even if choices are not consciously made, they will be made unconsciously—thus revealing the thoughts and priorities of the designer.

In product design, the things that are left out are every bit as important as those that are included. Mark Rolston, head of industrial design firm [argodesign](#) and formerly of Apple collaborator [frogdesign](#), has said, "The most fundamental thing about Apple that’s interesting to me, is that they’re just as smart about what they don’t do. Great products can be made more
beautiful by omitting things.”

The desire to be all things to all people often results in products that perform acceptably at a broad range of tasks, but excel at few: a ‘95 Camry, say. Such products quietly and unobtrusively do their job and do it well, but rarely inspire passion. We expect our cars or our washing machines to work, without complaint; we rarely pay attention to such appliances until they break.

That Camry is designed to carry 4 or 5 passengers and their stuff in all kinds of weather over most kinds of terrain. The weight and expense of air-conditioning, a heater, extra seats, soundproofing, and on and on, results in a general purpose vehicle that will not be a drag racer or a winner at road racing, but it suits most people’s needs. That said, it’s fitting that the Camry pictured is in beige—the car itself almost defines “beige”, something inconspicuous and inoffensive.

Meh. It’ll get you almost anywhere, but you won’t remember the experience of driving it.

But if all you want is to road-race or go like hell, much of the weight and complication of cars like the Camry is just a hindrance. Eliminate that stuff, spend more dollars and attention on the engine, chassis, and aerodynamics, and you’ll arrive at something like the classic Lotus Eleven racer. Designer Colin Chapman and aerodynamicist Colin Chapman had an 1100 CC engine—that’s only 67 cubic inches, folks—to propel this thing. So, lightness was paramount: the Eleven weighed as little as 908 pounds—412kg, give or take—allowing a slightly-tweaked Eleven driven by Stirling Moss to go 143 mph. The Eleven won class victories at Le Mans, Sebring, and other major courses. The spare design apparently has struck a chord with many
who have seen it or driven it, as sixty years after its introduction, Eleven replicas are still produced in the UK by Westfield.

A racecar, pure and simple: ounces are pared away, even the weight of paint! Aerodynamics are maximized, no comfort features to speak of. As purposeful as a scalpel.

There are of course parallels in the audio world. Back in the ’70s when I started selling hi-fi, the bulk of the market was in receivers. Like the Camry, those receivers were designed to do a broad range of tasks. They had to adjust to a variety of inputs and outputs, and accept the commands of possibly-abusive owners. Those of us who aspired to better (or at least snootier) gear derisively referred to those receivers as having a high “KPD Factor”—Knobs Per Dollar factor. As with the Camry, all those features come with a cost: dollars or real-estate that might be devoted to a bigger power supply, better componentry, and so on.
A classic Marantz receiver: 15 buttons, 7 knobs, several meters and a variety of inputs and outputs. An impressive piece of engineering, but not the ultimate performer.

There are homebrewed audio creations with hardwired single inputs, and those are about as stripped as you can get—the audio equivalents of the Eleven. Those have a limited range of applicability or domestic acceptability, being more like lab gear than home audio. The next step is in the straight-line-with-gain school of design (which JayJay French rails against in his column in this issue): no tone controls, the very minimum in control circuitry. All the money goes (one hopes!) into improved guts: the power supply, switches, components. This Conrad-Johnson 2 preamp is an example of the minimalist school.
Conrad-Johnson Classic 2 Preamp: gain control, input selector, on-off. Period.

Inevitably, there will be potential customers who will view something like the C-J pre and say, “but it won’t let me do x or y or z.” A patient salesperson will lead the customer: “This isn’t what you need if you want to do that. If you want to do that, you’ll need this other model. But THIS is not THAT.”

In most aspects of life, expectations are at the root of discontent. Expecting a straight-line preamp to do the job of a Max KPD receiver will cause disappointment, and the same would likely be true of the reverse. Clarifying one’s needs and recognizing that this is not that may be a step on the path to enlightenment.

...Or not. Hey, I have to live up to the “Cynic” title occasionally. ;->
In every corner of life there are guilty secrets, ancient truths that are never discussed, arcane knowledge that must be kept hidden, heresies that must never be spoken. And every now and then someone decides that the time has come to bring one of these things back out in the open; that the world has surely grown wiser and sufficiently mature to be able to re-consider such matters in an informed and dispassionate manner. But in the end they are always beaten back, bruised and battered, to lick their wounds and ruminate on the irrationality and perfidy of their fellow man. Thus it always was, and ever shall be.

We have our own share of dark secrets in the world of audiophilia. Things we mostly know to be truths, yet we conspire to consign them to the darkest corners, lest they disturb our carefully nurtured equilibrium. Including what, for many, may be the most profound wisdom of all, the thing whose name may not be spoken. The active loudspeaker.

There. I’ve said it [... looks furtively over shoulder ...].

An active loudspeaker is simply a speaker with its own amplifier(s), which are typically (but not necessarily) built-in. There can be many reasons for doing this, which include:

- Matching of the amplifier characteristics to the loudspeaker’s needs, and being able to optimizing them without concern for compatibility issues when using it with another manufacturer’s product.
- Being able to use an active instead of a passive crossover.
- Simplicity for the consumer, who no longer needs separate amplifiers, preamplifiers, and all the cables and cords that connect them together.
The first of these reasons – designing dedicated amplifier(s) specific to the loudspeaker – is one that exercises much debate among audiophiles. It is all due to the nature of the status quo. We are accustomed to buying our speakers, amplifiers, and even the connecting cables, according to the specific sonic properties of each. We understand that a special part of curating a very personal system is being able to fine-tune our amplifier and speaker selections according to our needs and desires. We have become accustomed to this paradigm, and have developed not just a degree of comfort with it, but a certain expectation that this is how it should be. Yet at the same time, as a community, we tend to acknowledge certain truisms. That manufacturer A’s amplifiers tend to be a good match with manufacturer B’s speakers. Or conversely, that manufacturer C’s amplifiers are usually a bad match with manufacturer D’s speakers. In any case, we understand that identifying and developing system synergy is an important part of the process, and moreover, we have come to expect that we should be in control of that bit ourselves. And maybe we fear we are giving up something vital when we allow the manufacturer to make those choices for us.

But manufacturers are doing that all the time. Whether they are designing speakers or amplifiers, they are making choices that govern how the product sounds, and are usually making those choices with the aim of making it sound as good as they possibly can, even if their different results each end up with their own unique sound signatures. How often do we read about how this amplifier has great bass, but that amplifier has a better top end? Meanwhile this third amplifier has the sweetest midrange. This just cries out for someone to wire the first of these to the woofer, the second to the tweeter, and the third to the midrange. Such an ad hoc approach may not in practice deliver the desired synergies straight out of the box, and I am not familiar with any results that may have been obtained by anyone actually going out and trying it. But as a guiding principle for a design philosophy, I think it has a lot going for it.

Already, anybody who uses modern high-end subwoofers in their system is dipping a toe in the active speaker pond, because those subwoofers can be counted on to contain class-D amplifiers tightly optimized for use in that very specific application. In fact these amplifiers will have been so tightly optimized that I guarantee if you were to strip them out of the subwoofer and use them to power the rest of your full-range system it would sound like crap. Or, at best, crap with awesome bass.

Additionally, besides the frequency content, the requirements for driving the three frequency ranges would be different. For one thing, there is less energy in the treble, and so the tweeter amplifier would not need as much power as the bass amplifier. You could even use entirely different amplifier topologies for the three drivers – for example, a Class-D for the bass, a SET for the midrange, and a pure Class-A JFET for the treble (although, for clarity, I am not attempting to advocate such a jumbled configuration). You could use drive units with different efficiencies, and compensate for those in the gains of the associated amplifiers, or use drive units with radically different impedances (although modern loudspeaker designers seem content to adopt a totally cavalier approach to both impedance and efficiency these days, given the inherent robustness and power delivery of most modern amplifier designs). The point is,
many of the design constraints passive loudspeaker designers are obligated to adhere to might no longer apply in an active design.

The use of an active crossover is probably the single most important design tool available to the active speaker designer, although it is likely that consumers will ultimately pay it the same attention they do to passive crossover design in conventional loudspeakers - *i.e.* virtually none. The technical reasons are quite simple to state, but would require a lot of discussion to do it full justice, and I don’t have room for that here. Basically, a normal loudspeaker crossover network operates in the low-impedance environment of the loudspeaker itself - nominally 8Ω - whereas an active crossover will work in whatever high-impedance environment the designer prefers. Low-impedance crossovers require enormous values of capacitance and inductance, and low values of resistance. Such components can be prohibitively expensive (even by high-end audio standards) when chosen solely on their sonic merits, whereas a high-impedance crossover can be constructed using component values that can be easily and inexpensively sourced even on the basis of audiophile grade quality. This alone can mean that just moving from a conventional low-impedance passive crossover to a high-impedance active crossover can result in major sonic gains, regardless of the impact of the amplifiers themselves.

But component quality is not the only advantage of active crossovers. By moving to an active crossover, we can expand our design horizons dramatically, and consider crossover architectures that would be either impractical or prohibitively expensive to implement passively, or that would be sonically compromised by the components that were used. This affords us opportunities to correct for flaws that we might otherwise be forced to accept as part of our final design compromise. Crossover behavior is such an underappreciated aspect of the loudspeaker design art, as it impacts not just the nominal frequency response of the speaker, but also the phase response, and by extension aspects of the polar dispersion pattern which is a key factor governing how the speaker will end up sounding in your actual room.

Yet more design freedom is introduced if we implement the crossover in the digital domain. Digital crossovers allow us to access performance regimes that would be either out-of-the-question in an analog circuit, or would require a complex implementation that might in and of itself introduce unacceptable sonic compromises. Digital crossovers have the advantage that, if done correctly, their performance is exact and deterministic, and they don’t suffer anything analogous to the real-world sonic signatures of analog capacitors and inductors. However, digital crossovers require that the incoming signal be in the digital domain, or be converted to the digital domain, and many consumers will want to take issue with that. At the end of the day, it is something else that wannabe active loudspeaker designers are just going to have to juggle with. For what it’s worth, my own expectation is that a statement-grade active loudspeaker based on a digital crossover will be able to correct for so many of the design limitations of a conventional passive loudspeaker that it would be an impossible product to dismiss out of hand. Even so, some people can be relied upon to do just that.

Unlike the technical arguments around active loudspeakers, which on the whole are fairly objective, gauging the market response is a different and harder thing. You are asking the
customer to dispense entirely with his amplifier – and maybe even with more of his audio food chain, depending on just far you want to go down the integration path. I would contend that, if the designer does his job properly, he can present a product to the customer whose performance would make a sufficiently compelling argument in its favor. And I would also contend that customers would be willing to purchase such a product – particularly if it is skillfully positioned.

The economics of active loudspeakers will also come into play. Since they integrate an amplifier with a loudspeaker, there will perhaps be some sort of expectation of a cost benefit that would inherently arise. But in general, that isn’t going to be the case. There will still be as much electronic gear in an active speaker as a passive one – and probably more, given that there will be multiple amplifiers (and multiple DACs in a digital design). The business model will also come into play, since the traditional markup on loudspeakers tends to be larger than that on electronics. All these factors will conspire to ensure that an active loudspeaker is not going to be cheaper than a nominally equivalent passive speaker/amplifier combo, all else being equal. This will give rise to a significant marketing challenge, because customers will look at an active loudspeaker and just see a loudspeaker. And a loudspeaker-sized price point will pop unbidden into their heads. Even if they understand at an intellectual level that it also contains a bunch of seriously high-end amplifiers.

But customer acceptance is not the biggest problem we face. No, the problem is more insidious. As things stand, life is tough for high-end audio dealers. A decent stereo no longer holds the 
cachet
 it once did, and new customers are increasingly difficult to attract. Then there’s the internet effect, where people come into the store ‘knowing’ more about a product they’ve never heard than the salesman who has been selling it for years. It’s tough out there. So dealers are generally not at all receptive to anything that looks like it is going to rock their boats. And active loudspeakers can really rock the HMS Status Quo. What the dealer fears is that active loudspeakers effectively remove from the market the customer who wants to upgrade his system component by component. This has always been the lifeblood of the dealer – the customer who comes in to upgrade his amplifier one year and his speakers the next – and the customer he sells an active loudspeaker to isn’t going to be doing that any more. So dealer resistance is probably going to be the biggest obstacle a potential active loudspeaker manufacturers will face – followed closely by established amplifier manufacturers who won’t want to see their dealers selling a competitive line of active loudspeakers.

But maybe I’m wrong. Maybe active and passive loudspeakers can co-exist after all. Dynaudio are now happily selling a mixture of both active and passive speakers, and doing a fair job of positioning their product range. [And their active speakers are all digital.] PMC sells a nice range of active speakers that they position as rather industrial-looking studio monitors. Meridian have made high-end active loudspeakers for as long as I can remember, and their latest flagship offering, the DSP8000 Special Edition, is also a digital model. And B&W’s absurdly expensive (but absurdly gorgeous) Nautilus has only ever been sold with an external active crossover for use in a (4-way) active configuration where the customer supplies his own amplifiers. So active loudspeakers are out there, although they still aren’t making anything
remotely like a splash. But it’s a situation I’d be keeping an eye on.
We Don’t Need No Education...We Don’t Need No Tone Controls...

By Jay Jay French | Issue 54

Well, you will soon see that I disagree with that opening title but before I get into the next audio controversy let me wrap up the 3-part audio gear history columns.

After reading so many replies I first have to thank you for your interest in this exercise. Secondly, The lists that some of you provided were amazing and actually started to erode some of the plaque around my cerebral cortex to the point where I started to remember even more stuff I owned, like a Klyne 7A preamp and a Krell PAM 3 preamp.

Also, to answer one reader, It’s not like I had this stuff and strictly traded, sold and replaced then bought other stuff. A lot of it stayed on for indeterminate time periods until I found the right owner-deal to make sense of the switches.

In any case, so many of you also climbed that ladder. I shouldn’t be surprised but I am for this reason: The readers of Copper are those who have that history and still find joy in all of this.
It is a great community and I’m proud to be a part of it.

And now….get out your Hazmat suits because I’m about to wade into the debate about tone controls/equalizers and our systems.

This whole exercise started when one of my closest friends (Ira) was driving me crazy about how his system was sounding. I always thought his room was a disaster and told him over and over again, that until he gets the room acoustics right he will truly be chasing his tail. Nothing that a rug and a decent equalizer wouldn’t cure.

He wouldn’t listen and decided it was his interconnects, then his speaker cables, then his power cords.

I have lots of stuff and Ira, who, for a short time, had dreams of opening a speaker company (he and a partner actually manufactured a 2 way speaker under the Siren Audio banner) , also had lots of connections (no pun intended) in the high-end audio community.

The two of us had tons of interconnects, speaker cables and power cords, and Ira changed out his stuff constantly.

I will say that, because we live in NYC, it is true that the sound does change in our systems during the day and night as the voltage swings (bigly!), as well as all the AC hash & noise that comes through everything, especially high-end systems. The more transparent the system, the more you hear it change.

Having said that, I thought that all this work without doing some simple acoustical treatment was a waste of time—except that, if he really wanted to get a handle on this, I knew that an equalizer or tone controls would have solved lots of the problems. I also knew that when I suggested that an EQ could solve some issues, Ira would look at me like I had two heads.

I mean, really? Seriously, how could I suggest something so out of touch with real audiophiles. The idea of any kind of tone controls in hi-ghend audio had been, until recently, relegated to the dustbin of Neanderthal observations.

The dogma, created and enforced by writers of The Absolute Sound and Stereophile, has been seared into the minds of many of us. How could we, mere mortals, want to mess with the pristine final result of the records that we all hold dear? Why would we ever question the end result of The Weavers or Harry Belafonte at Carnegie Hall or the soundtrack to Casino Royale or Dark Side of the Moon or Tea for the Tillerman.

No, No, No. We, the end user, have no right to mess with those perfectly recorded, mixed & mastered masterpieces.

“The sound of acoustic instruments in real space”: That is the definition, made famous by HP, that has ruled the upper echelons of the high-end audio experience that has been delivered
by the audio gods and made the exercise of placing these albums (and many others) so delicately on our turntables, only to be played back untouched by anything other then our “Straight Wire with Gain” preamp and amplifier as well as our speakers, the absolute golden rule of the high-end audio listening experience.

I’m here to say that not only is this is, by all logic, utter nonsense, but by denying your right to alter the sound by using either tone controls or an equalizer, you are allowing anywhere from say 6 to as many as 20 or more different people along the recording, producing, mixing and mastering chain to make that decision for you.

You my dear friends, are the end user, and by all rights you also have the last say as to the way you hear what you hear.

Myth: The absolute sound is attained by gear (uncompromised by tone controls-my words) that creates “The sound of acoustic instruments in real space.”

BS.

This is how it really is:

The closest you will ever get to the sound of the instrument or voice actually recorded is what the producer and engineer hear at the recording console through the monitor speakers that they are listening to.

It is technically impossible to get any closer—with the very rare exception being direct to disc recordings.

This means that 99.99% of all recorded music goes through the following process:

First an engineer has to find a microphone (s), with all of its inherent character and limitations, to put in front of the instrument/amplifier/vocalist, then that sound runs through some pretty crappy very very long cables into a control room, then it passes through a mixing console (with all sorts of crappy wire, with dozens of faders and tone controls, equalizers, limiters and compressors, then that sound passes through to an amplifier and then to mostly but not always cheap lamp cord (speaker wire) from a hardware store which is then connected to some of the worst-sounding speakers (these speakers are considered “excruciatingly revealing” for the purposes of deep analysis), and then the producer finally hears the sound and decides what combination of tones (after lots of tweaks and processing) sounds the most authentic to them.

Don’t write me back that some producer whose interview you read says that he uses audiophile cables and audiophile gear. That statistic is 1 in a 10,000....maybe..and your record collection has maybe a half dozen albums that are actual audiophile grade in terms of gear all the way through the entire recording process.

And please, don’t send me an email that tells me that “it’s the music that matters”. I know it is.
That doesn’t mean that you shouldn’t know how it actually is created.

The Beatles (my favorite band) are not an audiophile demo band. And, of course, it doesn’t matter.

But: it does in its own way, when you consider why we buy what we buy and how we describe the thrill of listening to music on our respective systems. As much as I love the music, I don’t use the Beatles, Stones, Zep, ZZ Top, Cream, etc. to demo my system.

Of course I listen to everything on my reference system and I enjoy it all, but when friends come over and oogle at my gear and ask why in the hell it costs so much, I mostly use my favorite small ensemble blues, folk and jazz albums and it blows their minds.

But I digress.....

Once the recording portion is finished, the tape (or hard drive) is mixed through yet another set of gear manned by more engineers and mixer specialists. Yet another set of people that think what they hear is what you should hear, who then make more decisions using another set of limiters, compressors and equalizers.

After that, the “mixed” finished tape or hard drive is sent to a mastering lab, where another bunch of people with yet another set of compressors, limiters and EQ’s have to decide if the music sounds uniform in both volume and tone— and then, for vinyl, the RIAA curve has to be added in to make sure that the bass is cut down as the record nears the end groove so the needle doesn’t jump out of the groove.

Get it?

Many, many people make decisions about what they think sounds correct. The fact that some records sound amazing is a happy confluence of circumstances, given all the ways the final recording could get screwed up due to all these factors I just mentioned.

Oh yeah...really wanna cry? Check this out:

If it’s vinyl then there is yet the entire process of cutting the pressing master “lacquer” that actually, after a 5 step process, goes from the “Lacquer” to a “Father” to a “Mother” to a “ Stamper” to the vinyl that you buy.

Think about this...

Ever wonder why some pressings of the same album bought around the same time period sound different?.

Because a popular album gets about 5,000 disks per stamper before they throw the stamper away.
Number 1-100 of that run will definitely sound better and quieter than a copy pressed at the 4,500 -5,000 number. You, the consumer, have no idea what you are buying.

And so, my friends this is my case for tone controls and or EQ’s in the home audio world.

My number one argument for why one would or should have some kind of EQ or tone controls is this:

Even if the very best ears recorded, mixed, and mastered the record, these pros have one tool—maybe the most important tool—that i’m sure 99% of you don’t have:

A perfectly-tuned listening room.

In an acoustically tuned room, one can hear the tonal subtleties and balance that we, the end buyer, can’t hear in our less than perfect rooms.

The only way one can correct for the lack of a great listening environment, short of spending multi thousands for the equivalent of an anechoic sound chamber, is the use of EQ or tone controls.

There are many sins that we, the end user can solve by having that choice.

“Why can’t we, the end user use tools to “correct” what we may hear as things that could be improved, at least to our ears, and make the home listening experience better for us!”

I am not Peter Aczel, the famous audio curmudgeon who published *The Audio Critic*.

I am not from the school of “If it measures the same then it sounds the same”.

What I am is someone who has been on both sides, and knows what really goes on behind the scenes. I just want to bring some thought into this conversation.

You may then ask:

“Okay, I get it, but who makes the kind of gear, and at what price, that will allow me that kind of control that won’t add yet another layer of cables and controls that may add more haze making the matter worse?”

Fair question.

But first, there is a cable company selling a reference speaker cable for $80k.

*$80,000 !!!!!*

It’s attached to a very large and heavy box full of control knobs which are TONE CONTROLS.
The review that accompanies the advertising of this cable raves about this being the greatest cable ever created..

**It’s a freakin’ equalizer!!!**

This, my friends, is madness at the last stop of the *High-end audio idiocy train line.*

There are way, way, way less expensive ways to improve the inconsistencies of both the records that you buy and the room you are listening in.

I believe that in the next year, high end companies will start to realize that the consumer will want more options and will make products to address this issue.

We, the end user have the right to hear how we want to hear it and I believe that the addition of high quality tone controls/EQ’s are the answer.

After all, aren’t we sick of hearing that high-end (and totally overpriced) interconnects and speaker cables are actually “tone controls”? Or “seasoning”?

We spend way too much on wire (freakin’ wire!) to attain what could be attained, way cheaper, by high quality tone controls or equalizers.

If I read one more “rave” review in a high end audio magazine of a brand new “legendary” Japanese reissue of an integrated amplifier that is now totally updated where the reviewer adds something like “*and what really is cool is that they kept the tone controls, which can really come in handy!*”

**Well.. I think you get the point.**

Oh yeah.....Ira.

Well, he changed his speakers to a pair that works better in his room, but he is finally open to the idea of room correction now through an equalizer. We are looking into the choices now. Your thoughts and experiences are welcome.

By the way: I will be going to the Munich High End show May 10-13 with Ken Kessler. If any of you are going send me an email:

frenchmgmt@gmail.com

PPS:

The recent publicity surrounding the reported bankruptcy of the Gibson Guitar company really hits home, as not only do I play Gibson/Epiphone guitar but I had a personal line of guitars manufactured by them.
Here is a link to my one-on-one interview I did last week with Henry Juszkiewicz, chairman of Gibson, in which I get into depth about what is really going on.
“For every action, there is an equal and opposite reaction.” For engineers, Newton’s Third Law of Motion is both blessing and curse. In audio, the law is primarily of concern in transducers—elements in which there is physical motion. Of transducers, that “equal and opposite reaction” is most critical in loudspeakers.

Aside from ionic units or the occasional bending-wave driver, all loudspeaker drivers move back and forth to produce the pressure wave we hear as sound. The bigger the driver, the more evident this will be, with large woofers exhibiting the greatest driver excursion. The forward motion—the speaker’s direct radiation—is the primary source of what we hear in reproduced sound. How we handle the out-of-phase rear wave is the subject of this piece.

The title is intended as a double entendre (and a clean one, at that): meticulous design of
loudspeakers is indeed exhausting for the designer, and the way in which is the rear radiation is dealt with, is akin to the exhaust system of a car’s engine. —I know, I know: if you have to explain a joke, it’s not a very good joke.

I’ve previously written at length about Edgar Villchur’s development of the acoustic suspension speaker enclosure. Such enclosures are sealed boxes, and thus do not vent the rear radiation. Today we’ll look at some enclosures that do vent the rear radiation: **bass-reflex (or ported) enclosures, acoustic transmission lines, and tuned (or tapered) quarter-wave pipes.** We’ve also covered rear-loaded horns previously, and may return to that subject again. Open-baffle loudspeakers are a whole ‘nother kettle of fish which we’ll look into in the future.

So what’s a port? Think of a porthole: a ported loudspeaker enclosure has a hole, generally but not always round like a porthole. The idea is to create a Helmholtz resonator: the acoustical capacitance of the enclosure volume resonates with the air-mass contained in the port volume. If the volumes are properly chosen, the low-frequency cut-off is extended downward, and the phase of the rear radiation will be shifted so that it emanates from the port in phase with the loudspeakers’ front radiation.

Back in the day—the early experiments of Western Electric, Harry Olsen at RCA, and others—design of vented enclosures was pretty much try-and-see. In the ‘60s and ‘70s two Aussies, Neville Thiele and Richard Small, were able to reduce the design of vented enclosures to a series of mathematical “alignments” which simplified the designs, and made it much more likely to achieve a good result. (A variant of ported enclosures utilizes a passive radiator—basically a cone driver with surround/suspension but no drive mechanism—to couple the rear radiation to the outside air.)

This AES oral history interview with Thiele provides some insights into his work:

Another type of vented enclosure, rather more complex to design and build compared to a standard bass-reflex enclosure, is generally called an acoustic transmission line (or simply “transmission line”) due to its similarity to the characteristics of an electrical transmission line. The first example I can find of speaker loading similar to what we call an acoustic transmission line was used by mainstream radio manufacturer Stromberg-Carlson, starting in the late 1930s. The method is described in this [patent](#) by Roy S. Anderson, which was assigned to Stromberg-Carlson. The language is the usual can’t-see-the-forest-for-the-trees verbiage of a formal patent, but the gist is that the rear radiation of the cone loudspeaker is “for the most part, absorbed in a sound damping, circuitous passageway.”
In the postwar era, the acoustic transmission line was first named by the English engineer A.R. Bailey, who defined the form and described its design in a 1965 paper in *Wireless World.* (Use the link, then scroll down to page 483). As the length of the line is determined by a quarter-wavelength of the woofer’s resonant frequency, transmission lines are generally not small. Production of transmission line speakers was largely limited to British companies (including the Cambridge model shown in the header pic) and the UK market until American audio entrepreneur Irving M. “Bud” Fried cofounded IMF Electronics in England, whose transmission-line monitors and quasi-monitors Fried sold worldwide. Given the complexity and precision required to build transmission lines—including precisely measuring and placing lambswool damping material—the type has generally been limited to higher price categories.
In the late '70s, Fried, with his new US-based company Fried Loudspeakers, addressed both the size requirements of transmission line enclosures and the increasing popularity and imaging capabilities of mini-monitors such as the LS3/5A with his Model H system, consisting of a coffin-sized dual-channel woofer enclosure and two small satellite speakers, each containing mid-range and tweeter units. Fried used the term “subwoofer” to describe the bass enclosure, crossing over to the satellites between 50-100 Hz.; it’s the first use of the term I’m aware of.

The Fried Model H system.

These days a number of speaker manufacturers are still devoted to transmission lines, most notably the British pro-monitor company PMC and the small American manufacturer Alta Audio, which utilizes transmission line variants in everything from a small speaker using a single, full-range driver to massive multi-way floorstanders.

Similar to transmission lines but simpler in design and construction are tuned (or tapered) quarter-wave pipes. Like the transmission line, the TQWP feeds the back radiation of the driver into a quarter-wavelength line—but unlike the transmission line, the TQWP doesn’t have the driver at the very end of the line, but generally affixes it somewhere along the middle. First described by pioneering English audio designer P.G.A.H. Voigt (also known as founder of Lowther drivers and designer of the tractrix horn geometry), TQWP have largely been the domain of DIYers, aside from several models made by UK speaker company Castle—perhaps explained by Castle’s status as one of very few loudspeaker companies which still builds its own cabinets. TQWP are easier to build than a transmission line, but still more complex than an acoustic suspension enclosure or most bass-reflex enclosures.
A straightforward TQWP, also known as a Tapered Quarter-Wave Tube (TQWT), or Voigt Pipe.

In the century or so since its birth, the moving coil loudspeaker has been packed into an incredible variety of frameworks, enclosures, boxes, panels—you name it. For the most part, though, 90% of the speakers we see are simple acoustic suspension or bass-reflex designs. I’m glad to see a few diehard manufacturers still making use of the more exotic transmission lines. It’ll be interesting to see what variant and hybrid enclosures appear in the future.
“You’re going to see that wee, fat conceited bastard?” said the owner. “Why?”

On one of my many trips to London to visit a hi-fi show and some of my suppliers, I decided to see some theater in the West End. London theater in the year 2000 was relatively inexpensive, and if you went to a matinee performance you could find great seats at a reasonable cost. Before leaving New York, I heard a review of a one-man show about Charles Dickens. As a child, I read a fair amount of Dickens and was curious about the man himself. It starred Simon Callow, a British actor and director (known to most as the chubby, bearded gay guy in *Four Weddings and a Funeral*).

I had flown into Heathrow Airport the day before, and decided to go around 11am on Saturday morning to buy a ticket. Having purchased a great seat, center row, dress circle (mezzanine), I decided to have lunch and a pint of beer. I found a pub very close to the theater and ordered some food. The barman had a strong Scottish accent and I asked him if he came from Glasgow, my hometown. “Call me a bastard but don’t call me a Glaswegian,” he sneered. “I’m from Ayr and don’t you fucking forget it.”

We hit it off immediately and after I ordered lunch we started to chat. He told me his life story and I told him mine, and when he asked me “What brings you here today?”, I told him about the play, and that’s when he started on about Simon Callow.

He said, “You see that poster across the road?”

He was referring to a blow up of the actor dressed as Dickens on the wall of the theater.

“Well every day before the performance that wee arrogant man struts down the road, stops in front of his picture and with his arms on his waist, preens himself like a peacock.”

As if on cue, Mr. Callow came walking down the street, stopped in front of the poster and did exactly that.
“See what I mean?” he laughed.

By this time I was on my third pint of beer, and ordered a fourth and one for my new best friend. By the time I left the bar, I was somewhat drunk. The theater wasn’t very full but the seat was perfect. It was in the front row overlooking the stage. The performance started and I have to admit, that the “wee arrogant man” was very good and believable as Charles Dickens. I was enjoying myself when I felt someone slapping my head. I turned to the person who had hit me, and he pointed down to the stage where Simon Callow, with his arms on his waist, was looking up at me, smiling. Probably because of the beer and jet lag, I had fallen asleep and my snoring had stopped the show. When he saw that I was awake, he looked straight ahead and said, “Now where was I...” and continued his performance. After that embarrassing moment I still had great difficulty staying awake so, as discreetly as I could, I left my seat and slunk out of the theater.
Be Steadwell

By Anne E. Johnson | Issue 54

Every time she opens her mouth to sing, Washington, DC-based singer/songwriter Be Steadwell exudes calm and strength. As devoted to political activism as she is to music, she has a growing fanbase that looks to her for leadership and courage, not to mention a way to put into words all the ridiculous things that love can do to a human life and heart.

While her background is in the deep-rooted America genres of jazz and folk, Steadwell is very much a musician of this moment in history. She records everything at her computer, relying on a looper and sometimes a beatbox to provide layers of accompaniment and texture. And when she wants to share her music – her YouTube channel has thousands of followers – she recreates the recording process in front of the camera, using her digital tools to manipulate and multiply her live voice track all over again.

Her first album came out in 2013 and displays a feature common among self-produced indie newbies: The thing is massive. Just the list of 23 tracks on Queer Pop Mixtape, many of them over four minutes long, is enough to scare away potential listeners who might reasonably fear an inverse ratio of quantity to quality. That fear is unfounded in this case.

“Bones” is a work of devastating beauty. Through searching, poetic language and the lowest register of her voice, Steadwell seems to evoke the experience of a woman on a slave ship, who ends up as “bones in the ocean.” Besides muted multiples of her own voice, the track uses only piano.

It’s the perfect introduction to the originality of this songwriter so thoroughly steeped in the digital aspect of music, since it’s utterly opposite from our preconceptions of the word
“digital.” Frankly, it’s the opposite of pop (even if Steadwell labels her own music “queer pop”): There’s no rhythm track, and she sings with a large range of dynamics. Steadwell is everything you don’t expect her to be.

Only Steadwell’s voice, multitracked in African-sounding polyrhythms, provides accompaniment for “Heart of the Pessimist.” It’s a study in contrast, as the sharp-edged backing underlies a lyric about heartbreak. Sophisticated internal almost-rhymes take advantage of repeating sounds (“You stole my heart like a high-stakes heist.”) These are not your average pop-quality lyrics. The song begins at 1:06 on this video:

There’s grim humor born of frustration in “Black Girls Who Can’t Dance,” a song about breaking the mainstream media’s stereotypes defining black woman. She lists all the (suprising to some) things they can be, like “black girls who read books / black girls who write books.” Although this tune uses beatbox and borrows rhythmic techniques from rap, it presents the material in a spacious way that shows the songwriter thinking even as she protests. The song begins at 1:30:

In all her subsequent albums, Steadwell has avoided the overwhelming song-avalanche of Queer Pop Mixtape. Two of her releases have only seven songs each, the result of writing one song per day for a week. The first Songaday (2014) includes the track “Greens.” A lot of her lyrics are about sex. This one is about gardening, but, well, yeah…it’s about sex. And it’s funny and joyous, buoyant with a soft-jazz vibe:

Pardon the sound and video quality of this next link, but it’s worth taking a look. It’s easy to imagine Steadwell always sitting alone in her room, creating songs by herself. I mean, who else does she need, really? But this fan-made video shows a different side of her music-making. In this live performance of “Greens,” the harmony she had originally pre-recorded with layers of her own voice is now sung by friends onstage with her. It’s heartening to know she has the flexibility to turn an electronic creation into a social experience:

And speaking of acoustic music-making, in 2015 Steadwell released Note – Acoustic Love
Songs (2015). The track “Witch” uses acoustic guitar and a jagged, wordless vocalise as accompaniment to a song about unhealthy romantic obsession. The chorus, describing the first appearance of the lurid love interest, manages to weave into silky musical cloth just what it’s like for another being to inhabit and subdue your brain, body, and soul.

Unhappy love seems to be a lifelong theme for Steadwell. Jaded: Dark Love Songs is a 2016 exploration of that subject. With “Netflix,” she creates a hilarious, self-deprecating dirge to the world of dating and the way real experience is somehow always less glamorous than it ought to be (“Sex is elusive on a good night/ Netflix is f––ing up my sex life”).

Musically speaking, this song – and the video of its recreation – is a textbook demonstration of looper mastery. The only other person I’ve ever seen handle a looper this well live is Imogen Heap. Steadwell uses her big vocal range, her expressive dynamics, and her sense of humor to make the looper into her own private orchestration machine:

The theme continues with Steadwell’s latest album, Breakup Songs. From a lesser artist, the determined focus on relationship disappointments would have started to grate long ago. But Steadwell usually manages to find a deeper and wider meaning to the bruises on her heart.

“Climbing PoeTree - How I Taste” combines elements of R&B and Latin rap to create a daringly sexy celebration of loneliness. It can’t be easy for an artist when being single is her most powerful muse, but it sure is a boon to Steadwell’s fans.
During the 1960’s rockabilly was mainly heard on the nostalgia tours. Wanda Jackson, the ‘First Lady of Rockabilly’ had a hit in 1960 with ‘Let’s Have a Party’ a remake of an earlier Elvis hit, but eventually had more success with her country songs in the 60’s and settled there. That decade was tough on cats. Charlie Feathers, who’d had a string of hits in the 50’s, didn’t record an album during the 60’s, next releasing in 1974 when artists like Dave Edmunds and Nick Lowe were bringing the genre back. The style continued to influence all bands coming up in the 60’s but rock had turned and left the ducktail behind.

But all things return. In 1970 Dave Edmunds resurrected an old Dave Bartholomew/Pearl King song from the 50’s and had a world-wide hit that started bringing the cow back home.

Edmunds hooked up with Nick Lowe and formed Rockpile. During the next few years rockabilly became a ‘new’ sensation. In 1976 a 22 year old kid working as a data entry clerk for an accounting firm put together some songs, writing at night at his work place so he wouldn’t disturb his young family. After work as well he went to a studio to record these songs. Nick Lowe had heard of Elvis Costello playing around town and writing songs for other acts, and he agreed to produce the album that cost 1000 quid and took about 24 hours of recording time. From the 1977 release My Aim Is True, ‘Mystery Dance’.
The rest of the album is pretty much part of New Wave but this is straight up rockabilly. And the picture on the album. Kid was definitely channeling Buddy Holly. I think this first was Costello’s best album, but it didn’t do well enough for him to quit his day job. Amazing.

Basically from 1975 to 1979, especially in London, rockabilly was getting New Life.

In 1979 a band from Massapequa, NY started building a following on the punk circuit playing with bands like The Cramps that were forging another sound from rockbilly to be termed psychobilly. More on that later. This band’s influence came straight from guys like Eddie Cochran and Gene Vincent, right down to the Teddy Boy image. They had trouble breaking out and heard about a new Teddy Boy revival happening in London (of course). They moved to the UK and got the attention of Dave EDMunds who brought them into the studio. With Lee Rocker on the double bass, Slim Jim Phantom on a classic 50’s stripped down kit, and Brian Setzer on that Gretsch, playing what Guitar World magazine rated No. 92 on their 1998 100 Best Guitar Solos. God I sound like Casey Kasem.

The Stray Cats became probably the most commercially successful of the revival rockabilly acts.

From the same album, “Rock This Town”, which the Rock and Roll Hall of Fame has listed as one of the songs that shaped rock and roll. Those guys at the RRHF. This is a song shaped by rock and roll. By the way, you clowns still don’t have Jethro Tull in the hall. Idiots.

Now. As much as I loved the Stray Cats music and style, let’s face it. They were the most commercially successful because they were the most vanilla of the lot. Rock and roll’s trademark was always metered by how much yer parents hated the shit. If I wanted to get my kids to stop listening to something, I would embrace it, and it would disappear from the house. Rock and roll needs to be something that scares the crap out of mom and dad or it ain’t rock and roll. The rockabilly revival of the 70’s and 80’s morphed into a trash and burn rockabilly style that had many names, including trashabilly and gothabilly, and the most enduring name was mentioned in a Johnny Cash song “One Piece At A Time” written by Wayne Kemp which became a Top 10 Country hit in 1976. “Red Rider this is the Cottonmouth in his psychobilly Cadillac”.

Now we back in the scary weeds. The Cramps were pioneers of the punk/psychobilly sound which had come out of the NY scene revolving around CBGB’s. Featuring Lux Interior and his wife/guitar player Poison Ivy, This is ‘Garbageman’ which was on a Cramps compilation album with one of my favorite album names, Bad Music For Bad People.
Ok, dat shit’s funny I don’t care who you are.

_The Cramps_ were dark on some level but mostly were hilarious and innovative. Like Punk. Never figured out how Lux kept those damn leather pants up.

If I attempt to talk about psychobilly without mentioning _The Meteors_ one of you knuckleheads will get on a pony and start shooting. These guys were definitely a huge part of the genre and stayed that way until, well, now. They were formed in 1980 and recently in 2016 released an album _The Power of 3_. This next is from a 1988 video, ‘Rawhide’, with Paul Fenech riding a horse with a guitar in one hand.

Rockabilly and by default psychobilly had roots in and used the western and country themes of fast cars, slow women, and whiskey. Originally I was going to do a column on my favorite rockabilly band but there was so much great material the column became two and included as many influences on these next guys that I could muster.

Around 2006 I was playing in a rockabilly band in LA with my son Dean and his buddy from the Musician’s Institute named Charlie Faupiano. I hadn’t been in a band in 25 years having raised a family and all. But Charlie and Dean needed a bass player and I had gotten a job running operations for a factory in Corona which moved me out to LACA, so I got drafted. Charlie and Dean turned me on to what had been happening since the olden times when I was playing the _Stray Cats_ and Elvis Costello stuff in a New Wave power trio in the early 80’s. Charlie had a red Gretsch and could play anybody and anything. Truly amazing. But he had a red Gretsch because at the time what he loved with passion was the billy goin on. They gave me a CD of the tunes they wanted to play and I fell in love all over again.

More damn fun then you can have with more than two people.

The guy who really stuck out on the CD was Charlie’s guitar hero, Jim Heath. Heath had played around bands in and after high school around Corpus Christi but eventually settled down with a member of his first band after college and started raising the obligatory Texas family. In 1985 an old roommate blew through town and regaled Heath with stories about the punk and rockabilly subculture that was happening in Austin. Wife must’ve loved that. Heath went with him to a Dallas nightclub, The Bijou. Here’s how shit comes around. The band was _The Cramps_ and the top of Jim’s head came clean off. He’d kept up his guitar playing and by now was a true blazer. So he formed a band as Reverend Horton Heat, shortening his last name. The wife left with the kid and the dog and the rest just happened.
Three pieces, and they sound just like this live. Jimbo Wallace doing that great slap bass joined the Rev in 1989 and together create on stage what is in my humble opinion the most fun you can have on three legs.

This is the first song I heard on that CD.

I was hooked.

Also on the CD.

Shiver Me Timbers.

There are boatloads of live vid’s of the Rev all over the net thingy and I recommend them, but really go see them live. Check out their website. The tour schedule is insane still, and if they aren’t coming near you in the next year you live in Indonesia.

I told you about the country influence on all these rockabilly guys. This song always makes me cry.

I was actually done with this column but during edit I found a recording from an early Rev session where the thing fell apart from the start. I’d heard it once but lost track of it. Bear with me. This is cool.

Dean, Charlie and I met Heath and Jimbo at an outdoor concert in San Luis Obispo and someone should ask me to tell that story.

Most of the material for these last two columns came from wet dreams at summer camp, but I do want to shout out to Dan McCauley at PS Audio who turned me on to The Cramps.
“Madrigal” is one of those words that showed up in European music under vague circumstances, then stuck around long enough to change its meaning a few times. Most of us think of a madrigal as an a cappella vocal work in Italian or English from the late 16th or early 17th century. Here are a few recordings that show what else it can be.

Take, for example, the Madrigali et symfonie, Op. 2, by Biagio Marini (1594-1663), an accomplished Italian composer who worked in the musical capitals of Italy and was a colleague of the great Monteverdi. He’s hardly a household name, but in his own day the courtiers with money thought he was one of the best. To Marini, “madrigali et symfonie” would have basically meant “vocal and instrumental works.”

A 2017 recording of this 1618 collection, on the Tactus label, is by the Italian baroque ensemble Musicali Affetti and the vocal group RossoPorpora. By Marini’s time, the Renaissance was waning, thanks largely to Monteverdi’s innovative strides in making voices and instruments interact and letting textual meaning guide his writing for voice. Marini was clearly good at his job: he kept abreast of the latest trends and used them in his own compositions.
“Perché fuggi tra’ salci” has just one person singing, soprano Alicia Amo (showing off some deft baroque ornaments!), accompanied by harpsichord and viola da gamba. But why is this a madrigal? Because Marini says it is. By the early 17th century, a madrigal was pretty much whatever you wanted it to be. A new genre, opera, had been around for almost 30 years, so both composers and audiences were getting used to dramatic solo singing with accompaniment.

Yet, thanks to the persistent success of madrigals in the previous few generations, the term still garnered respect; publishers in particular were determined to milk the madrigal cash cow until it was dry. “Madrigals” like this one (not to mention Monteverdi’s spectacularly theatrical Eighth Book of Madrigals: Songs of Love and War) show that the word was losing its specific meaning and being swallowed up by the concept of aria:

The Renaissance madrigal tradition did not evaporate in a day, however. Or even in a decade. In “Se nel sereno viso,” Marini employs techniques that had been common since Franco-Flemish composers working in Italy had invented what most of us think of as “madrigals”: Five-voice polyphony with rhythmically free phrasing, and (more recent, and thanks to Monteverdi) the generous application of dissonance to express the meaning of the text:

Some people believe the term “madrigale” is an Italian coinage combining “matrix” (womb) and “canto” (song) to refer to a simple song. Some believe it’s from “mater” (mother) and “lingua” (language), meaning a song in the mother tongue as opposed to Latin. Everyone agrees that the word showed up by the early 14th century, which is why these late medieval pieces that originally used this label are now known as trecento madrigals. They’re quite different from the well-known Renaissance genre.

So, let’s plunge back in time – not just back in history for the type of music, but also back two decades for the recording — and have a listen to music from the Rossi Codex, one of the best surviving sources for 14th-century secular songs. Ensemble Micrologus, an Italian group that has been digging up and revivifying little-known early music since 1984, made the Opus 111 album D’Amor cantando: ballate e madrigali veneti (Singing of love: Venetian ballads and madrigals) in 1995.

The compositional style is called Italian Ars nova, with its focus on a) secular vocal music in the vernacular language and b) putting the melody in the highest voice. The tunes called “madrigali” usually had two vocal lines with instrumental counterpoint. The stanzas would be followed by a contrasting chorus or “ritornello” (yes, the same word that became popular among Baroque composers three centuries later to describe a recurring refrain in instrumental music).
“Su la rivera” starts with two shawms, predecessors to the oboe. When the one singer comes in, he performs the upper written line, while the shawms read and improvise around the written lower counterpoint. In this period, using an instrument to stand in for a vocal line was far more common than writing pieces specifically for instruments to play.

On the other hand, Micrologus recorded “Lavàndose la mane” with no instruments, but two women singers. The vocalists’ perfect intonation focuses the open fifths and unisons, making the two voices seem more like one. Typical of the Italian Ars nova, the upper voice strikes the ear as the melody; that seems normal to us today, but back then the standard approach was to let a middle voice (called a “tenor” – from Latin “to hold” — because it held the melody) sing the main musical material, and then counterpoint would be built above and below it.

Much as I love hanging out in the Middle Ages, let’s pilot this time machine forward a few hundred years to find out how our own era defines the genre in question. Consider the recording Madrigals (Tzadik Records, 2016), which features works so labeled by American composer John Zorn (b. 1953). They’re scored for six female voices, unaccompanied, so you’d expect them to be Neo-Renaissance. In fact, they seem more like a deconstruction of the very concept of madrigal.

From Book I comes the “Epipsychideon.” The title translates to “About a little soul,” and perhaps refers to the famed Percy Shelley poem. In Renaissance madrigals, a revered poem would provide the text for a madrigal. Zorn has taken the title but not the text, leaving the piece itself almost wordless. And the most obvious historical allusion reaches way back to the time of the trecento madrigals in the 14th century: The distinctive technique called hocket was named after the Latin word for “hiccups” because different voices toss single notes of a musical line back and forth to each other. Zorn exacerabates this acoustical strangeness by also having the line make big leaps in pitch as it gets passed around:

Zorn is certainly not the only modern composer to write new works in tribute to this old genre. Here are the King’s Singers performing one of the Nonsense Madrigals by György Ligeti (Sony Classical). These witty, bizarre bonbons, composed in the late 1980s through early ’90s, conjure up the spirit of the English madrigal of the late 16th and early 17th centuries (Thomas Morley and Thomas Weelkes, for example).
It looks like the term “madrigal” is here to stay and will never stop inspiring composers to use it however they see fit.
Spotify Files for IPO; Tower Records Founder Dies

By Bill Leebens | Issue 54

Back in Copper #36, we looked at the financial state of Spotify. The short story was that the number of users had grown tremendously over the preceding year, and that trend has continued: Spotify reports that as of December, 2017, the service had 159 million users. Elsewhere, they list 71 million paid users and 92 million unpaid—which adds up to 163 million, but who’s counting?

The revenue has also grown, to $5B in 2017, up 39% from 2016. At the same time, however, losses also grew, to $1.5B. Our previous piece mentioned the possibility of an IPO by the end of 2017. That didn’t happen—perhaps delayed by the disappointing financial reports—but on February 28th, the company filed a Form F-1 with the Securities and Exchange Commission, indicating the company’s intent to perform an IPO “as soon as practicable after this registration statement is declared effective.”

Companies that have never made a profit going public is far from new, as this piece indicates. It also points out that the peak of such offerings was at the peak of the dot-com bubble; might we be in the midst of another bubble?

Spotify’s IPO is unusual in that it is a direct listing. Unlike most IPOs, a direct listing doesn’t sell shares before trading begins, with pre-trade values established by underwriters. In Spotify’s case, holders of existing shares are free to sell their shares at whatever price the market will
bear, as soon as trading opens. Current shareholders are free to sell their shares whenever they like at or following the opening; traditional IPOs have “lock-up” agreements preventing early sales by insiders.

The company, which has recently been valued at $20B by private investors, will not issue new shares to raise capital. It will allow new investors to buy existing shares in what had been a privately-held company.

It will be interesting to see how this goes. Copper will keep a close watch on events as they occur.

An important figure in the growth of the American music industry passed away March 4th. Russ Solomon, the founder of Tower Records, was 92. Starting in Sacramento in 1960, the chain began to boom following the opening of a San Francisco store in 1968.

At its peak, the chain had nearly 200 stores in 15 countries. Tower differed from most chain record stores in that Solomon insisted that each store, being uniquely aware of local trends and preferences, would order its own inventory. In order to make that work, the stores had to hire staff who not only had encyclopedic knowledge of music, but were intimately involved in local music scenes, as well. One such salesman/expert in New York was the late audio reviewer Wes Phillips.

Those traits, allied with inventories of as many as 125,000 different records, allowed Tower to transcend the status of “just a store” and become local gathering spots for musicians and music lovers. Followers were often fervently loyal: Elton John famously went into a Tower Records store somewhere every week; actor Colin Hanks spent seven years making the documentary All Things Must Pass about the chain. Solomon was extensively interviewed for the film, and was featured in it.

Unable to compete with the download culture, Tower filed for bankruptcy in 2004, with the last store closing in 2006. In Tower’s hometown of Sacramento, the Tower Records Project works to archive and document the history of the chain—so it could be said that the history of Tower Records will outlive both the chain and its founder, Russ Solomon.
[After the advent of the British invasion, pioneering audiophile label Audio Fidelity took a crack at the teen market with a NY rock band, The Teemates. Part 1 of John Seetoo’s interview with singer/guitarist Bobby Pulhemus, who went by the stage name of Bobby Palomino, appeared in Copper #53. It’s a story that is both sad and fascinating as it describes the hard life and managerial manipulation of the band. Audio Fidelity doesn’t come into play much in this story, but it’s still a valuable portrayal of the music biz in the early ’60s—Ed.]

J.S.: How did the Teemates wind up getting signed to Audio Fidelity?
B.P.: A label was interested in us but Joe responded by telling us a record deal had been made with Audio Fidelity. Members of the band were not (involved) with the signing of the record contract with Audio Fidelity. I still have no idea how the contract was negotiated and never really cared to find out. For me, a record was a record, be it the Lark label, Telstar, or RCA...

J.S.: How did you feel about becoming one of the first rock groups on a label best known for stereo jazz, Bossa Nova, ethnic music, and sound effects?

B.P.: Again, a record was a record. I never possessed the musical acumen of any distinction of music I listened to other than I liked it or did not like something about a particular record. Stereo was a far off distant planet to me. As far as the musicians who also were on the label, I was a selfish SOB. As long as I was on a recording, who cared who else was on the label? The sound effects were another story. Back then, we rock bands played through straight out tube amplifiers. There were volume, bass and treble knobs. But we did learn the secret of turning our guitars towards the amplification giving out a sound what is known today as Gain. For us, it was withering Feedback. It was this effect that my former friend, Jimi Hendrix, used to full advantage. At the time, we did not comprehend the mysteries one could produce in a recording studio, so after the record was produced, I soon learned that the engineer and producer of the recorded tracks used a great deal of echo, especially on the vocals.

J.S.: What were your favorite Teemates record releases of that era and what do you recall about the recording sessions?

B.P.: By far, our original recording of ‘No More Tomorrows’. Shefsky only wrote the lyrics for that song. I created the music highly influenced by the British group, The Searchers. Both Richie and I were the creators of our originals with the exception of “Nightfall”, which Shefsky himself composed using music which I considered not really original at all. None of us enjoyed the lyrics of songs he presented to us, but went along with the game solely in pursuit of a record contract. After all, if bands like The Trashmen could make a hit out of a one word song about a bird or The Gentrys, “Keep On Dancing”, why not us?

I am, however, grateful today that we remained in service to Shefsky’s tunes, as it forced us to not only create music but to compose very original intros to what one would have thought a lost cause in musical ability. ‘Moving Out’, for example, was just a mere copy of the chords from the Isley brothers ‘Shout”. A bit of tinkering with the intro made it palatable to become what is now considered one of the Teemates’ most enduring and legendary recordings.

J.S.: What were the studio facilities like, and were you happy with the setup, or would you have done things differently?
B.P.: I would much rather have recorded our album (LP) Live. I had never been in a recording studio before, other than the Ampex reel to reel set up Shefsky had in his basement. The studio itself was operated by Bell Sound Studios located at the time on 54th Street between 9th and 10th Avenue. A large room supplied with corked closed booth enclosures with an outstanding microphone setup which would soon become a 11PM to early am claustrophobic prison for me in many ways.

A set of steps led up to the recording booth itself where Sid, the Producers, and Shefsky peered down upon us through a wall of glass. Fortunately, we did not require many takes on the 14 tracks as all of the tunes were regular in our performing repertoire. Those that did need re-takes were usually in the vocals, which were recorded on separate tracks. The sound effect employed by the engineers was the only distinction between LIVE and recorded as we never used echo in performing. Apparently, Audio Fidelity had taken the idea of Phil Spector’s LA sound, incorporating as much as possible into our tracks. But then again, the recording was supposed to be a dance album with us musicians being secondary, which AF hoped to market for the new Disco craze. It is without question now upon looking back, Shefsky was desperate for a deal and took what was offered, We were, however, able to secure two 45 rpm recordings for release on their own merits as The Teemates with our 4 Original songs..

J.S.: The Teemates were apparently marketed to be like a New York version of the Beatles with songs like ‘No More Tomorrows.’ However, ‘Movin' Out’ and ‘Nightfall’ have a much rawer kind of street attitude and a Link Wray cum Dick Dale surf and blues influence. Were there disputes between the band and Audio Fidelity as to the direction of The Teemates’ music?

B.P.: No disputes at all. You are correct in the initial idea of the Beatles but the fact was, we were the First World copy of The Beatles. But then the Rolling Stones entered the picture. Now these guys (the Stones) were certifiable identifiable about who Ritchie, Robbie and myself were all about inside. Grungy, in your face bastards against conformity was a picture that made it possible to finally articulate the real get down on the world. It allowed us to provoke and express the attitude we always had underneath the forced, clean cut image of the Beatles. Bryan, the drummer tried, but, as a scion of a banking and very conservative family, he could not muster the F the world attitudes we all felt comfortable with.

As far as Surf or other genres, we emerged from varying Rock n’ Roll backgrounds. The Ventures’, ‘Walk Don’t Run’ was a favorite cover we performed, as well as numerous other genres (Blues, Rhythm and Blues).
“The First World copy of the Beatles”, indeed!

**J.S.: What was it like dealing with Sid Frey?**

B.P.: I never had to deal with him. All communication was between him and Shefsky.

**J.S.: Did you feel The Teemates were treated fairly then, and do you still feel the same way now or not, and why?**

B.P.: That is a tough question, albeit a good one, and I WILL BE VERY FRANK. The Teemates were never dealt with fairly. By anyone. Look, we were kids at best emotionally. Even at the age of 21, I had the emotional equivalent of a 14 year old. I took what they gave me.

The Teemates never made a nickel off any of the recordings. Shefsky comported himself as ‘The Composer’ on the LP when in truth, the music was created by myself and Richie. Had we been represented by a lawyer, things may have turned out for the better, at least as we musicians were concerned. The licenses on the cover tunes we recorded on the album were secured, so that is a rare good bit of news, as those songs by Lennon/McCartney, so one can find a Beatles song recorded and sung by me alone. ‘I Love Her’ is still one of the top unchained melodies of today. In real truth,, I would not have done anything different. I had a record with my name as a musician on that record. I helped create and implement that music along with my bandmates. We all had a good time for a while. Today, I can honestly admit that in America, anything was possible.
J.S.: What happened to the Teemates after Sid Frey sold Audio Fidelity in 1965?

B.P.: The end of the Teemates as a band was not surprising. I personally did not like and never got along with the lead singer, Richie. It was even disclosed to me some years later, the other members urged Shefsky to get rid of me. I find that still a hot button issue as the rhythm section of that band was entirely me. Kudos to kudos, each musician was skilled way before their time. I would have none of the narcissism behavior that I felt Richie displayed. The Teemates happened to break up the same year Sidney sold AF. So, all could be viewed as a live beginning with a short end. Alcohol abuse, nasty habits and attitudes along with lack of commitment to the players all added to the end. Along came Uncle Sam and off to the fields of Vietnam went Robbie along with Richie serving in a safe position with the navy.

But the major contributor of our demise was a huge mistake Shefsky made in a phone call to a top New York deejay at the midst of the Payola Scandal. That scandal brought down renowned deejay Scott Muni, Alan Freed, and others. I will not go into detail about that mistake other than to say: had that not happened, the Teemates would have found themselves in the top 100 Billboard charts.

J.S.: You are now billed as Bobby Palomino and are the keeper of the flame, so to speak, for The Teemates place in music history. What are you doing now in music, and what are some of the ways that people looking to rediscover The Teemates in 2018 or to check your current work can hear it or see you play?

I bill myself as ‘Bobby of The Teemates’ and as a co-founder of The Teemates. Re-establishing the name after decades in obscurity was and still is a reward of a lifetime achievement for me. The other members still say we were a small time once in a blue moon band. Baloney. Many groups of today across the country were influenced by the Teemates. My rediscovery of the band took place in the age of the internet.

My current work goes back about 6 years to a 4 song EP I wrote and recorded in 2011: ‘530 East 87th Street’. The music and lyrics were conceived after my finding sobriety in 1976. Still, my emotional foundation remained shaky until an experience with romance landed me in a hospital ward with unaddressed emotional issues. The EP is all about that event. It can be found on any site including Itunes.

My current performances are limited due to physical disabilities and a long love affair with the wrong potions. Nicotine mainly. I (WE) never did hard drugs, thankfully, and today I am sober for 46 years and use my experience helping others (Including some very well-known legends of music).

At present, I remain in the top 10 within my region of Virginia in the Blues Genre. As I grow older, the voice has become more raspy but is perfect for the genre as well as many of the good old rocking tunes. I am currently distributed by an Aussie based company called Blue Pie Productions and a historical website is in the making for the band. I am also found on a variety of sites. Just google Bobby of The Teemates and choose from any of the 20 to 30 pages that
come up.

Despite being 76, I still perform within my adopted city of Charlottesville, VA. My new gang consists of very accomplished musicians, which include Greg Brown on guitar and Reverend Joe Tucker on all instruments, including keys.

I will be forever grateful to all, the good and the bad of my past, as it is clear – Without them, my musical history and affiliation with one of the greatest labels (I really can appreciate now having been amongst the esteemed artists that share the label’s past) would not be possible.

[Thanks to John Seetoo and Bob Pulhemus for a truly interesting interview covering a vital period in American music. Best of luck to Bob!—Ed.]

Bobby today.
In the previous article in this series, we discussed the design of an RCA interconnect, and how it’s important to have a good coaxial cable design in place before designing an XLR cable. Here, I lead you through the process that went into designing the Belden ICONOCLAST, but these are basic variables that every cable designer must work with. It may be worth repeating from the RCA article that distortions can’t be totally eliminated, so every cable is a compromise of some sort.

XLR Design Brief

1) Conductors

Both the copper conductor and size considerations were answered when we started the RCA cable. Though an XLR cable will mirror the reactive variables of inductance and capacitance, we don’t want to change the current coherence with a differing conductor diameter from the RCA design. But if we are to use the same wire between an RCA and XLR design, how to we work around the completely different geometry of each cable?

This is assuming you want to match the RCA and XLR properties and maintain the same signal quality, and we certainly do. A good RCA cable is designed first, and that used as a base for the
2) Dielectric material

For our XLR cable, we will use four wires in a star quad configuration. This design uses two cross-connected wires for each polarity, which doubles-up the wire gauge for lower signal attenuation. Two 25 AWG wires have the direct current resistance of a single 22 AWG, yet have way better signal coherence.

I could have used a cheaper and easier two-wire XLR design but the inductive and signal coherence benefits of a star quad are too good to pass up, as we’ll see later. Star quads have a higher degree of CMRR (Common Mode Rejection Ratio) when properly signal balanced. Two wires of a star quad are a “positive” voltage, and two wires are a “negative” voltage (180 degrees out of phase), hence the term “balanced”. Some call this differential mode, since each signal is equal but different in polarity.
In the example above we show only two wires, but the concept is the same for a star quad design. The signal is encoded as +2 volts and -2 volts. The noise of +1 V in this example can’t “change its spots” relative to the cable’s twisted pairs, and shows up as the same voltage on each wire. The twist ratio helps make sure that the wires see the noise for the same amount of time, and this is vital to the function of the circuit.

Here is where balance is so important; the signal ideally becomes the superposition of all the voltages, or +3 volts and -1 volt. No more, no less, and thus the signal voltages are still exactly 4 volts “apart” from each other: +2 to -2 with no noise, and +3 to -1 volts with 1 volt of noise.

The signals are fed into a difference amplifier that, you guessed it, looks at the “difference” between the two voltages and sees 4 volts with, or without, the noise. Ideally, the noise is absent at the difference amplifier’s output, and in order to do this, every wire has to be presented to the noise in the exact same way via cable twist, has to be the same length so the signal stays time-aligned down the wire. Also, every wire has to have the same attenuation. The difference amplifiers need to be nulled perfectly between gain halves. Believe it or not, this gets done really well with good quality products.

The control tolerance of the copper is 0.0005”, so attenuation issues are mitigated and CUB (Capacitance UnBalance) tests insure we see military-standard quality in the finished cable. All quality types of copper can be used in the XLR design; it is the overall cable structure that is the most “magic”, not so much the copper itself, although the copper draw process does influence the sound.

3) Dielectric geometry
This CAD drawing is what we have inside our XLR design so far, showing just two wires instead four. Remember I wanted to make inductance and capacitance reactive variables *exactly* the same for each cable, RCA and XLR, with exactly the same wire size and draw science?

It’s a huge challenge to match capacitance between a single conductor coaxial cable, and a multi-conductor twisted cable. Capacitance is sensitive to the distance to a conductive plate area, all the way around a wire. In a coaxial cable this is easy: we put a ground around the wire at a known distance which stays the same for the entire run of the wire.

But in an XLR cable, we have shifting distances to the ground depending on the twist, and we have four wires all with their own capacitance. Somehow this is supposed to come out to around 12 pF/foot (with connectors), same as the RCA!
And now, inductance. Because of the many wires, the “loop area” of an XLR cable is huge, which means a very high inductance. It is a challenge to get a loop area as large as ~0.170” to produce an inductance as low as the 0.15 uH/foot needed to match the coaxial cable.

To get capacitance low enough, I use distance between the wires, air. This also has a direct effect on the inductance. By using air, I can set the center-to-center distance of the wires to meet my capacitance target, and because air is such a good dielectric, this distance is lower than is needed with most other materials. This lower distance means that inductance is also lower. How much air? Well, exactly the same as the coaxial cables! How do we do that? Very carefully.

Let’s look at a section from the earlier CAD drawing showing the air chamber:

\[
\text{Area} = 0.007552 \text{ inches}^2
\]

Each individual wire uses the same design from the RCA cable, so each wire’s loop area is the same across cables. The chamber, shown above has an area of 0.007552 sq in, and the area of my RCA air dielectric is 0.00754 sq in. Okay, it isn’t exact, but it’s off by only ~0.000009” sq in.

Careful measurements show that the capacitance and velocity of propagation of this design is very close to the coaxial cable. But what about inductance with that significantly larger loop area? Isn’t that going to kill this design? No, because of some properties of magnetic fields. Magnetic fields cancel if they see each other in opposite directions. If we can reduce magnetic field lines in the cable, we can directly reduce the measured inductance.

If you grasp a wire in your fist, with your thumb pointing in the direction of the current, your fingers around the wire point in the direction of the induced magnetic field. When you have four of these wires together, with two different voltage polarities (so that there are two different current directions), we see how these four circumferential fields cancel each other.
Where the arrows are pointing in opposite directions between any two wires (including ones across from each other on the diagonal), the field lines cancel. This allows larger wire-to-wire spacing in order to reduce capacitance, while also keeping inductance low. Now we know why I didn’t use a two-wire system! However, this inductive cancellation is less than what would be expected, because the field lines that extend around and outside the cable do the opposite of what is happening inside, and reinforce the magnetic field.

I finally tested both my RCA and XLR designs, and here are the results.
What we see above is impedance / phase for the XLR and RCA superimposed one on top the other. Note that there are four separate lines. We have two identical cables with exceptional reactive variables.

### 4) Shield material and design considerations

The outer shield is an important consideration in the design. A 95% BC (bare copper) braid is used. Audio cables are not RF designs, and the braid shield will *not* shield low frequency magnetic interference. The common mode rejection ratio of the XLR is going to do that for us. The braid does knock down RFI by 80 dB, but this is a consideration only at high frequencies. The audio band of 20-20,000 Hz is a predominantly magnetic field frequency range where the B-fields decay at a ratio of 1/x^3. So distance is the best solution for isolation of cables with magnetic properties.

### 5) Jacket design and material considerations

All ICONOCLAST cables use Fluorinated Ethylene Propylene (FEP) as the jacket to reduce UV sensitivity, plasticizer migration, and provide chemical resistance. The cables are designed to
Summary

I hope that this design summary of ICONOCLAST RCA and XLR interconnect cables shows how important good design is for all your audio cables, and that every manufacturer has to manage the same variables to produce these results. There is little “magic” in the design of good cables. There are indeed tertiary variables that we can’t measure, but those should not excessively influence the ones we can measure. Mother Nature abhors complexity, so the better managed the known variables in a cable, the better the cable may highlight “unknowns”. To put it another way, the more we put knowns into their proper place, the better we may distinguish the effects of the unknown. Wire draw science, for instance, can be heard better, and more fairly, in a superior electromagnetic design.

Belden has no special sauce or magic in its products, and I think the cables perform as well as they do because we did not design around “unknowns”, and then make it appear as though we had unique influence on those unknowns in the design.

Truly low R, L, and C cables are difficult to make when consideration is given to manage all three variables in a balanced fashion. The designs can be simple looking, but frustratingly hard to manufacture, as processes are pushed to the limits of current capabilities. Belden’s focus is to make real measured values as low, and properly balanced, as we can.

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