# Table of Contents

Opening Salvo: Where Did the Year Go? .......................................................... 1
Quibbles and Bits: A Case of the Jitters .......................................................... 2
The Audio Cynic: “Snakebit” ........................................................................... 5
Music, Audio, and Other Illnesses: Waiting for the Black Cadillac ............... 8
Too Much Tchaikovsky: Starter Kit .................................................................. 11
Make It Yourself: “CNC” Moving Magnet Cartridge Phono Stage .................. 15
Behind the Glass: Solo, Two Ways .................................................................. 27
Vintage Whine: Weathers, Part 2 ..................................................................... 31
Music to My Ears: Roamin’ in the Gloamin’: John Hammond ......................... 44
Featured: Understanding the Analog Obsession ............................................. 48
In My Room: Hi-Fi from Finland .................................................................... 55
Parting Shot: Nashville Boots ......................................................................... 59
Where Did the Year Go?

By Bill Leebens | Issue 21

Welcome to Copper # 21!

It’s hard to believe that 2016 is almost over, and that we’ve been putting Copper together for nine months now. I’m not a Supremes fan by any stretch of the imagination—I lean more to Stax than Motown—but as soon as the phrase, “where did the year go?” came into my head, the Supremes came with it:

*Earworms.* Sheesh.

In this issue, Richard Murison gets the jitters; Dan Schwartz tells about the events leading up to Rosanne Cash’s *Black Cadillac*; Larry Schenbeck considers a holiday starter kit for Classical music newbies; Duncan Taylor writes about recording two fabulous but very different solo artists; WL Woodward considers the incredible influence and legacy of John Hammond; I look at some of the musical talent lost in 2016, and conclude our look at vintage manufacturer Weathers.

We’re really pleased to have three new contributors this issue: Jim Langley presents a DIY moving magnet phono stage project (and our guy Darren Myers is working on another project which will go nicely with this one); veteran speaker and electronics designer Ken Kantor writes about that pesky objective/subjective thing in the first segment of a two-parter; and reader B. Jan Montana—yes, you too could write for Copper!—gives some thoughts on why we love turntables. I can’t wait to get Michael Fremer’s reaction to this one! Finally, we have an especially yummy reader system from Finland, wrapped up with another striking image from Publisher/Photographer Paul McGowan.

Jim Smith will be back soon with a new series of articles.

Until Copper#22—enjoy!

—Lebs.
Let’s take our good old standby, the Red Book standard of CD Audio, where we sample using 16-bit data at a 44.1kHz sample rate. This sample rate implies a series of specific timing events, and when we play back the audio waveform we need to be sure we recreate those 16-bit waveform values at those precise instants in time. All of the mathematical theories underpinning digital audio assume that this is exactly what happens. Imagine, though, that we make a small timing error when it comes to creating the output waveform. The stored data does not represent the value of the original waveform at that erroneous timing point. In other words – and this is a mission-critical observation – “the right data at the wrong time is the wrong data”.

The interesting question becomes, how big does the timing error have to be before it becomes important? The way to understand this is to consider what the magnitude of the error is, and compare it to other limiting factors in the playback chain. The most important of these – certainly for 16-bit audio – is the Bit Depth. The question then becomes, how much time has to pass before the magnitude of the original waveform changes by more than the resolution limit of the 16th bit? That would be the maximum timing error that we could tolerate.
The point at which such timing errors create the greatest error is when the rate of change of the encoded signal is at its maximum. If it was an analog signal we would be talking about the ‘slew rate’, and we know, for example, that amplifier circuits sound compromised if they cannot keep up with the maximum slew rate demanded by the signal. The maximum encodable slew rate is equivalent to the signal changing from maximum to minimum between consecutive samples. For standard CD audio this means that the smallest encodable change in the signal amplitude can occur in as little as 1/65,536 of one sample interval, which works out to be 346 picoseconds. In other words, if the timing in the DAC is out by more than this amount we have the potential for the errors of some description in the output signal.

Just how precise is 346 picoseconds? Well, if your wristwatch lost 346ps every second it would take a little over 13 years for it to lose a whole second. In 346ps light travels 4 inches, and a speeding bullet will penetrate 1/100 of the way through a single sheet of paper. It is a very small snippet of time.

These timing errors are referred to as ‘jitter’. Most of you will have already heard about it. What I have just described has been the standard view of jitter among audiophiles for the last 25 years. There’s more to it than that.

This simplistic picture assumes that setting the output voltage of the DAC to the desired level is an instantaneous event that happens at the precise instant the clock triggers it. It also assumes that that output voltage is held at the exact correct level until the next clock trigger comes along and causes it to be set to the next required level. Neither are accurate descriptions of reality. The process of recognizing a trigger event occurs in an analog circuit, and in order to have the capability to recognize the trigger with a precision of 346ps it needs to have a bandwidth of at least 3GHz. That bandwidth lies deep in the RF frequency spectrum, which means that it will be susceptible to noise and desperately sensitive to external interference. Circuits with GHz bandwidth and above become exponentially more difficult to design, and exponentially more expensive to construct as you attempt to reduce their noise. Have you ever wondered why DACs with so-called ‘femto-second clocks’ cost thousands – even tens of thousands – of dollars?

The clock circuit registers the clock signal when it detects that the voltage in the circuit has gone from below to above a certain trigger level. But any noise present in a circuit means that the instantaneous signal level in that circuit is perpetually fluttering about. Such noise means that sometimes it pushes the signal level over the clock detection threshold when it wasn’t supposed to, and registers a false clock signal. And sometimes it drags it below the threshold and prevents the correct registration of the clock pulse. The presence of RF noise in any part of the DAC circuit that interacts with the clocking function will cause this kind of jitter-like behaviour – even with a perfect, jitter-free clock signal.

The actual D-to-A conversion requires the output voltage to be set to a target level as soon as possible after the clock pulse is detected, and held to that level until the next clock pulse is detected. Once again, that circuit is going to need to have a bandwidth close to 3GHz if it is
going to respond quickly enough and accurately enough to the clock pulse, and consequently is
going to be highly susceptible to noise. Additionally, it is important to the operation of the DAC
that the target output voltage level is accurately maintained over the duration of the clock
cycle. However, at one instant, the presence of the noise will increase that level, and at
another instant it will decrease it. In effect, the noise can change the effective signal level
encoded by the bitstream, in the sense that a certain value was expected according to the
bitstream, but a different value was delivered thanks to the noise.

So the presence of RF noise in the DAC circuitry can cause the DAC to deliver an output which
contains errors due to at least two separate mechanisms. And both of these mechanisms can
be viewed as introducing the exact same sort of problems that our simplistic understanding of
‘jitter’ is held to describe. So even though ‘jitter’ does not strictly speaking occur as such in
most modern high-end DAC designs, there is still room for them to be afflicted by sonic issues
with ‘jitter’-like characteristics, ultimately caused by unwanted RF noise.
“Snakebit”

By Bill Leebens | Issue 21

A few decades ago I went through the rough patch to top all rough patches. Injury? Chronic illness? Death in the family? Economic stress?

Check, check, check, and check. They were all there.

My next-door neighbor, Ed, was a retired truck driver who had grown up in Mississippi during the Great Depression, and had seen not just deprivation but some truly horrific stuff. Because of that, Ed had a capacity for compassion unlike anyone I’d ever met. It usually took a lot to shake him.

One afternoon while Ed sat on the front steps of his house, chain-smoking as always, I told him about the latest string of disasters that had befallen me. Initially, Ed sat silently; after a few minutes of listening, his eyebrows knitted upward and he began to shake his head and laugh in disbelief. That turned into a phlegmy, racking cough, ending with a noisy pa-tooie as Ed spat into his front yard.
“Bill,” he said, “you SNAKEBIT!”

I wasn’t sure what that meant. Ed explained that it looked like I had some kind of jinx, hex, bad juju, SOMETHING, hanging over me that I couldn’t shake. It was hard to disagree with him.

I’m thinking that for musicians anyway, 2016 is snakebit.

I’m not even going to run down the whole list of notable musicians who’ve passed away in 2016; plenty of other folks are doing that. As my kids would say, it’s depressing AF.

So: just take a brief look at this list—feel free to pick out familiar names, or even ones that are just slightly familiar. This year has been devastating to the music world.

Just a few from the list—by no means complete:

1/8/16: Otis Clay, 73
1/10/16: David Bowie, 69
1/18/16: Glenn Frey, 67
1/28/16: Paul Kantner, 74
2/4/16: Maurice White, 74
2/6/16: Dan Hicks, 74
3/6/16: Nikolaus Harmoncourt, 86
3/8/16: Sir George Martin, 90
3/10/16: Keith Emerson, 71
3/16/16: Frank Sinatra, Jr., 72
4/6/16: Merle Haggard, 79
4/21/16: Prince, 57
5/17/74: Guy Clark, 74
6/13/16: Chips Moman, 79
6/21/16: Wayne Jackson, 74
6/23/16: Ralph Stanley, 79
6/24/16: Bernie Worrell, 72
6/28/16: Scotty Moore, 84
6/29/16: Rob Wasserman, 64
7/24/16: Marni Nixon, 86
8/6/16: Pete Fountain, 86
8/11/16: Glenn Yarbrough, 86
8/22/16: Toots Thielemans, 94
8/25/16: Rudy van Gelder, 91
9/8/16: Prince Buster, 78
10/24/16: Bobby Vee, 73
11/7/16: Leonard Cohen, 82
11/8/16: Al Caiola, 96
11/13/16: Leon Russell, 74
11/15/16: Milt Okun, 92
11/15/16: Mose Allison, 89
11/18/16: Sharon Jones, 60.

In all fairness, many of these folks lived to good old age. The biggest shockers were those in their 50’s and 60’s: David Bowie, Prince, Glenn Frey, Rob Wasserman, Sharon Jones. Nonetheless: it’s difficult to not feel that this year has been, well—SNAKEBIT. What do you think?
Who knows what’s behind our taste? A record that I think persists in its genius (*My Life In the Bush of Ghosts*) you may find abstract and boring. And that’s true even when it’s one that I worked on.

Over the years, I’ve got my favorite people I’ve worked with, and for a variety of reasons; some on the road, and some in the studio. I wish I had recorded with Bernie Leadon, but I met him when his solo record was finished — I toured with him off and on for about 6 months. There’s a guy who’s so on it that when I told him the songs that made me want to play were one-chord songs, he took it as a challenge, and immediately wrote a one-chord song; a really good one-chord song.

I have a lot of respect and affection for Jon Hassell. When we did *City* I was pretty intimately immersed in his career; I know a lot about the challenges he faces, and his persistence is impressive. I’m not sure I’m born to this, but Jon is. And I have fond memories of touring with Stan Ridgway (mostly in Europe). We came to a less-than-happy ending owing to his record
company—Miles Copeland’s IRS Records—being incredibly cheap, but that was 30 years ago. We’re happy to see each other every now and then.

All this is a lead-in to writing about my #1 choice of the records I’ve worked on. I’ve written a bit about the title track before, but it merits a more detailed look. Up to now, I’ve written about one or two songs from records I’ve worked on. But with Rosanne Cash’s Black Cadillac, I like it all.

At first, all I knew was that we were booked to do an album. For a very brief period, Andy Slater and Julian Raymond of Capitol Records considered Bill Bottrell, Brian MacLeod and myself their “A-Team”; their go-to guys. We moved into a (Neve 8078-equipped) studio in the Cahuenga Pass called Larrabee East[1] for 6 months or more, and worked with a variety of artists in that period, most of whom you probably haven’t heard of, however talented they were. They came along too late in Capitol’s long history to make a dent in a dying industry. Some were just expensive experiments: Bill and I worked with Dhani Harrison during that time — he later introduced me to his band-mates as the original bassist in his band, the New No. 2.

We brought a somewhat large collection of gear with us — Brian brought 3 drum kits, including a 40s all-wood kit he called “The Blond Bomber”. Bill had half a dozen guitars. I brought 25 basses, a variety of racks of gear, along with a couple of old tubed amps (a Versatone and a Guild ThunderBass, both about 40 years old at the time) and tubed mic preamps to use as DIs (Telefunken/Siemens V-72 and EAR 824M)[2].

These have the virtues of distinctively different sounds — the Versatone, a “combo” amp with one 12” speaker, isn’t a very bottom-heavy sound, and is capable of the most god-head distortion ever[3]. But turned up to just below half way, it’s clean with a little bit of “hair” on it, a barely discernable amount of distortion, but when you play harder it breaks up nicely[4]. And the V-72, at least as it was modified for my use, does a very similar thing.

The other pairing was the Guild (with a separate cabinet and single JBL D140 15” speaker) and Tim DeParavicini’s EAR 824M, the insanely wide-band and uber-clean tubed mic amp. The 824M was also set up to do DI duty along with Tim’s Wedge-It input device. Though an absurdly expensive DI by anybody’s standard (somewhere north of $11,000), in combination with the Guild amp the resulting sound was full, warm, and pretty clean.

So for the run of the four or five albums we worked on, I had my set-up, and would swing a Neumann U-47fet mic between the amps. How important all of this is to anybody else — not saying it is, or it isn’t — it was the culmination of my pursuit of a sound to go with what my hands were doing. With the old Ultrasone 650 headphones, the whole thing comprised a feedback loop, so to speak, and was as important to what I did then every bit as much as the sound that I developed for City was for my playing at the end of the 80s.

There’s one other thing I want to say in this introduction to Black Cadillac that might aid in understanding the necessity of all this. I’ve written before about meeting Rick Turner, and learning about really good sound at a pretty early age. In some online conversation or other,
Rick said of me that I could pick up a different instrument and find a different musician inside. This was a real surprise to me when he wrote it, but as I thought about it, I realized it was completely true. I don’t approach music one way; I approach it sonically AND musically. Maybe it’s a sense of a musical gestalt. I think most people, if they had my particular madness, would do the same. I just pursued it to a logical end.

Next time, I’ll go into the making of *Black Cadillac*.

[1] The studio was built by Tom Jones in the 70s, bought by the Andorra folks in the 90s, by the Larrabee people just before we worked in there — temporarily the 3rd in their empire — and finally by Dave and Jaimie Way and their silent partner Brent Spiner, before going private. [Brent Spiner?!? Data from ST:TNG?!?–Ed.]


[3] Think Jack Casady on “Sunrise” from Paul Kantner’s *Blows Against the Empire*.

This column began as a Gift Guide kind of thing. You know: “here’s what to buy your classically oriented audiophile friend.” That got me thinking about my Aunt Frances. Beginning when I was in grade school—maybe even before that—she sent me classical LPs for my birthday every year. I must’ve been about three when I got the old Ormandy-Levant *Rhapsody in Blue* in its first Columbia 33⅓ incarnation. Much later she sent some choice Living Stereo releases: Munch and the BSO doing early Schubert; Van Cliburn and Fritz Reiner in the Brahms Second Piano Concerto. I have no idea why she did this; my family didn’t even own a record player. But along with a couple of albums bought with lawn-mowing money, they made up my entire classical collection until I was 17 or so.

So, as to early collecting habits? I didn’t have any. Nor did my friends and relatives. (My cousins, living in Paris at the time, sent me EPs of Sacha Distel and The Crickets—not Buddy
Holly’s band, but an English group.) I’m the last one to ask for advice about acquiring a taste for “classical.” Perhaps the **Appropriate Present** will actually launch your child on a happy lifelong quest. The rest of us might be better off following our impulses, especially if they’re driven by curiosity rather than fear. After all, the universe still seems to take Chaos Theory quite literally. You may just bump into something you didn’t realize you loved.

Thus the modest goal of this column. I’m only recommending a few new albums that *may* provide a pain-free introduction to Classical Music for Innocents (you know who you are) especially if they have a good record player (first things first!). At the end I’ve tacked on a couple of suggestions for people who face a harder gift mission: to find something that a classical buff hasn’t heard yet but may treasure forever.

**(Not) For Beginners Only**

Tops on my Beginners list would be this brand-new issue of a perennial favorite, Vivaldi’s *The Four Seasons*. Comes to us from the BBC SO and violinist Tasmin Little, beloved Brit who’s already recorded everything else in the known universe (*A Violin for All Seasons, Chandos CHSA 5175*). Recording-wise, it’s state-of-the-art: a hybrid multichannel SACD also available for download in the (original) 24/96 PCM format. The string sound absolutely glistens, balances are perfect, and Little delivers a passionate, engaging performance. Besides the Vivaldi, you get *Four World Seasons* by Roxanna Panufnik (b. 1968), scored for the same forces plus Tibetan Singing Bowl. Fun, plus it may pique the curiosity of those who already own a *Four Seasons* recording (i.e., everyone else in the known universe). Click on the catalog number for excerpts. Perfect for that watch-cap-wearing Millennial who’s always heading off to Kathmandu or Williamsburg, *All Seasons* also works for grizzled vets, who can place it alongside their trusty Neville Marriner version.

Speaking of trusty old coots, how about that John Eliot Gardiner? In a long, celebrated career, he has continually surprised us with his willingness to take on new challenges. For the last couple years he’s been recording Mendelssohn symphonies with the London SO. His latest seems tailor-made for tyros: Symphonies No. 1 and 4 (*LSO Live LSO0769*). The physical release includes multichannel SACD and Blu-ray Pure Audio discs, plus stereo files in DSD, 24/96, 16/44.1, and 320-kbps mp3. They’ve got you covered. (If you buy from a [UK retailer](#), it’s a steal; don’t leave the price tag on.)

And who can resist the charm and high spirits of the Mendelssohn Fourth? Inspired by a trip to Italy, he captured the color of the countryside and warmth of its people in four exquisite movements that end far too soon. What first sold me on this album, however, was the First. Written when he was not quite 15, it shows Mendelssohn was already outgrowing his childhood debt to Mozart and venturing into heady Romantic territory. For these LSO performances, Gardiner resurrected a Scherzo composed especially for London in May 1829, playing it alongside the original 1824 Menuet (click on the catalog number for more details). Here’s a bit of the Scherzo:
Some of you will have recognized this music—it’s from the Octet for Strings, written in 1825, just months after the symphony was first completed.

Finally, how about a vocal recital? My pick, whether for younger listeners or the young at heart, would be A Journey, South African soprano Pretty Yende’s debut album (Sony Classical 88985321692, various formats). What pipes! Check these tunes out:

Familiar (i.e., likable) repertoire, a gorgeous voice, sumptuous accompaniment. If this doesn’t inspire your giftee to join the Metropolitan Opera Guild immediately, I don’t know what would.

**Advanced Studies**

As with the Beginners list, no reason to avoid these if you don’t fit the demographic. Stick with Chaos Theory. You’ll learn a lot more than you were supposed to.

First up, Grażyna Bacewicz: Complete String Quartets from the Silesian Quartet (Chandos CHAN 10904[2]). Who was Bacewicz (1909–1969)? Only the most talented female contemporary of Witold Lutosławski and Andrzej Panufnik, that’s who. Like them, she grew up in 20th-century Poland and bore witness to a dizzying succession of political movements, military crises, and cultural cataclysms. Her seven string quartets mirror the, um, interesting times she lived through. She wrote neo-classical No. 1 after studying in Paris with Nadia Boulanger; No. 2 in Warsaw during World War II; Nos. 3, 4, and 5 in Poland’s post-war years, when Socialist Realism dominated cultural policy; and Nos. 6 and 7 as part of the later avant-garde explosion, which brought international fame to Lutosławski and Panufnik.

You can trace the history of modern Polish music in these quartets. That wouldn’t matter much if this weren’t terrific music, period. Bacewicz was also a professional violinist, so she handles writing for virtuoso string quartet with ease. No, it’s more than ease. You can hear her absolutely relishing the possibilities. I really enjoyed my time with this well-played, well-documented 2-disc set; you will too. Be the first on your block. (Click on the catalog number to find excerpts from all the quartets. Start with No. 3.)

Let’s finish with more vocal music: Néère (Hahn, Duparc, Chausson), a French art-song recital with mezzo-soprano Véronique Gens and pianist Susan Manoff (Alpha ALPHA215). Hey, what is with Alpha? All of a sudden they are constantly on my radar, with exciting releases from Il Giardino Armonico, Patricia Kopatchinskaja, Peter Eötvos, and other European “insider” stars. Here’s yet another beautifully curated, lovingly produced recording. Some of the songs are fairly well known, at least to connoisseurs of mélodie; others are rarities. All receive subtle, knowing treatment from one of the great mezzos of our time, a woman who made her reputation with Mozart and Gluck but should also be acknowledged as a master of French song. Listen to an entire track here.
Or check out the Official Trailer from the label:

Happy listening! (Oh, come on! Like you’re going to buy this for someone else and not get your own copy.)
“CNC” Moving Magnet Cartridge Phono Stage

By Jim Langley | Issue 21

My friend Bill and I wanted a simple phono pre-amp for shop use, one that was not expensive but would give high end performance. I like the KISS principle and picked the recommended circuit from the National Semiconductor datasheet using two LME49720 op amps.
Two sockets, two chips, two 9V batteries, a switch, two 100uf power supply caps and a handful of .1% and 1% resistors with Panasonic polypropylene caps assembled by Bill on a RatShack perf board and the simple little preamp sounded VERY good! On initial listening to an acoustic performance it was open, airy and very detailed. It was much better than the internal phono pre of the “inexpensive” shop receiver.

For a total outlay under $50, we were quite pleased. I shared this breadboard phono pre amp with the good folks at Audiokarma.org. The DIY crowd there then ran with it and went so far as to create PC boards and build of material lists. The thread is over 125 pages, 2500 replies and 420,000 views. People from all over the world have built these little wonders that the group dubbed “CNC” for Charlotte, North Carolina. The pc board and BOM include switchable input loading so you can try different loads on your favorite moving magnet cartridge. Industry standard is 47k ohm. With the CNC you can also try 18k, 32k and 62k to fine tune the sound. There are also discussions about plugin power supplies so you are not reliant on batteries, including schematics and PC board layouts. I prefer batteries as they provide cleaner DC power. But if you forget to turn off the CNC after use there go your new 9 volts (ask me how I know…) Lantern batteries, rechargeable batteries or AGM batteries are also options. This thread is a wealth of DIY information, including tips on how to populate a pc board and tips on soldering.


You don’t have to have a premade PC board, but it does make assembly easier.

This pre-amp is also a great way to see for yourself if component changes affect the sound quality. Is there a difference in sound between types of capacitors? How about Op-amps? I
believe there are audible differences, especially when you are amplifying a small signal in the millivolts. But don’t take my word for it. The CNC is affordable enough you can try the different components and listen and make your own decisions. My personal preference in opamps is either a pair of Burr Brown OPA2134 or replace the first Opamp with an LME4990 (you will have to put the surface mount chip on a Brown Dog adapter) or LM4562. I also prefer Polypyrrole film and foil capacitors for the 1uf DC blocking/coupling capacitor, like the WIMA FKP series. You can also experiment with bypassing the 1uf with .1uf or .01uf caps. I like the Russian Teflon film capacitors as they are affordable and have a very clean top end. Some folks swear by NOS or Russian paper in oil capacitors.

You will need a case for your pre amp. I have used jewelry boxes, cigar boxes and rat shack aluminum and plastic cases. Bill put the first board in a small, plastic toolbox. I have even gone to an arts and crafts store and used a basswood craft box that looked like a book with hinged lid. Use your imagination- repurpose something that will look cool on your shelf. Happy Listening!

**Preliminary Bill of Materials:**

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<td>9V Battery Connectors</td>
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**Note:** The schematic above should be considered preliminary. A complete, detailed schematic will appear in *Copper* #22, along with a source for finished circuit boards and a link to a Digi-Key shopping cart to simplify purchase of parts. For the PCB work and BOM we give credit and thanks to [http://muffsy.com](http://muffsy.com)! —Ed.

![Board #1—before it was christened “CNC”](image)

*Board #1—before it was christened “CNC”.*
An 8.2k resistor is ideal, it goes between the long leg of the LED and the positive input of the PCB. It can go on the switch output, the shorter lead goes on the negative input or the negative switch output.

Switch Digikey:
9v Battery Connectors:

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<td>232K-ND</td>
<td>STRAP BATT ECON 9V L STYLE 4&quot; LD</td>
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“CNC” phono stage in flea market jewelry box.

Inside the jewelry box.
This wooden cigar box cost me $1 at the flea market.
The box had room for spare batteries. The holders were also from Digikey.
Second “CNC” phono stage in a Godinger jewelry box- RCA jacks moved to back.
“TurntableDaddy” Big Bill put board #1 in a cheap toolbox for shop use!

The extra space in the toolbox allowed use of lantern batteries.
Nellie McKay

In December of 2012, Nellie McKay had an image problem.

Or rather, she had a video problem. In one of the most-impromptu sessions we ever recorded, Nellie swooped in three hours after we called, expecting a radio interview and a few tunes.

Stepping inside our video studio with its deadish ambience and bright box lights, it was obvious we were doing a little more than a simple radio show. Nellie wasn’t phased, just surprised. She had just arrived in Boulder and was fresh out of the shower, and hadn’t packed anything to wear with some “pop.”

But she did have a secret weapon with her: Robin Pappas, a former actress with roles in The Shining, Superman II and Chariots of Fire, who also happens to be her mother. The two escaped to the well-appointed newsroom bathroom (our studio was built into Boulder’s
newspaper’s newsroom), and 5 minutes later Nellie emerged blow-dried, made-up and swathed in a coat of many colors. The jacket she wore for the performances was perfect. Her style has a touch of the formal, her voice is luxurious and her message can be unexpected and vividly direct.

She brought a simple setup into our studio, playing simple tunes. I’ve written before about finding magic in the essence of an artist’s presentation, and while I think it also applies here, I think it does so to a much lesser extent. Nellie’s recorded work is expertly produced and wildly entertaining and nearly every track has feels different from the next. She’s a talented multi-instrumentalist, and on her first album, *Get Away From Me* (the first female debut double album in history, by the way), she plays nine different instruments and each track features her voice prominently. She’s also on the bill as composer, arranger and associate producer.

So she has that old school kind of music knowledge and skill, the kind you come across in the practice rooms of music halls in serious educational institutions. But she doesn’t carry the self-importance of some in those academic circles; in person doesn’t seem too weighed down by a healthy intellect. Her presence is as light and charming as her presence and vocal delivery, and she is quick and witty in her lyrics.

For these recordings, we had the opportunity to listen deeply into what is perhaps her best instrument: her voice. In the video below (as always, look for related videos or search YouTube for the others — we shoot three songs with each artist) the ukulele is almost an afterthought as accompaniment, a subtle touch of rhythm or the whisper of a chord here and there. The main event is Ms. McKay’s amazing voice, replete with its own subtlety and touch.

I tried a few different microphone sizes and patterns on her voice, and settled on a large diaphragm figure-8-patterned mic for the task. The ukulele was so soft in volume I found I could use any pattern I wanted, and I liked what the large diaphragm figure-8 did for her tone. It was a new mic and captured her very disciplined high frequencies well (I rarely encountered such control over sibilants and consonants in the studio), and the bipolar pattern provided a little sense of space to the otherwise intimate sound.

I’m quite happy with the result, and since the recording have used the high resolution version as a personal reference for the female voice. Despite our awkward start, at the end of it we were all smiles, and the artist was satisfied. Though her YouTube presence more heavily highlights the pizazz-y side of her as an entertainer, I’m glad we got to capture a more intimate take on Nellie and show it to the world.

**Otis Taylor**

The videos I’ve featured and written about were recorded in a random office on the second floor of an office park building in Boulder, home to the city’s newspaper of record. Really nothing special to the room except that its walls were extended all the way to the roof, sealing in the area above the suspended ceiling. The rest of the top floor had one conjoined ceiling
space, so the mild isolation was a plus for us when, say, we were recording a raging rock 4-piece replete with Marshall stacks and multiple Fender Twin Reverbs blasting, and someone was trying to hold a conference call a few doors down.

Noise battles aside, the connection to the newspaper was only a plus. Traditional media may be in massive transition, but it still holds great weight in the music and arts promotion industry. We were able to record one major band a week for three years because the bands were coming to us, and so many were calling that we could afford to be choosy about whom to record.

But sometimes we still had to seek out artists who were hard to pin down. Consider Otis Taylor among these. It helped that the newspaper already had several ties to the Boulder resident and world famous blues musician. For one, his wife Carol trained me to archive the newspaper before she left in 2008. Carol was the librarian at the newspaper for many years, and I regretted that I recognized her razor-sharp wit too late. All I remember about the training session is that I was constantly snickering.

Otis is known in the blues world as a fierce champion of African heritage and social justice worldwide. Most of his songs feature serious lyrics about serious subjects. And I found that even his in-studio demeanor is solemn and direct. I won’t deny being a bit intimidated as I set up for our recording in October of 2013. Otis had few words for me during the two-hour session, but I was surprised to watch him and my creative partner at Second Story Garage, videographer Paul Aiken, joshing around like old chums.

Paul and Otis had met many years prior, at a party, I quickly learned. Paul is one of a kind: as director of photography for several newspapers in Colorado’s Front Range, working 12+ hours a day, you’d think he’s already in pretty good shape. But actually, in his off time Paul teaches martial arts to young bucks at a dojo across the street from the paper, and occasionally (very occasionally) would show up to work with a black eye. As a black belt with a hard job to do, Paul often could be as professionally intimidating as Otis seemed that day. So I suppose it makes sense that the two would get along well.

The track I referenced is Otis’ “Be My Frankenstein” from the 2003 album Truth Is Not Fiction. Otis actually wrote this song about Paul’s heart condition, after learning about his faulty heart valve and the cadaver valve installed in its place. I was thrilled that Otis chose to record this one with us; though I hardly noticed Paul crack a smile while he was shooting (typical), I might have spied a smirk.

The way I chose to record Otis, given the semi-dead ambience of our space, was to use reflectors and diffusors strategically to enhance the sense of space in the instrument mics. I placed his stool above two sheets of plexiglass, to get a reflection off the otherwise carpeted floor. To each side of him I placed large wood diffusors to kill any slap-back echo, and to help swallow frequencies in the “boomy” range.

I was presented with the same challenge as with Nellie, namely that the voice and the instrument are recorded separately but are only a foot or two apart from one another. The
classic singer/player live challenge, usually solved by extremely close miking.

I don’t like to get extreme with any recording style, so I set up a stereo XY cardioid pair for his instruments and used a tight super cardioid pattern condenser for his vocals. The vocal mic I placed just close enough that it didn’t hide his face in the video but focused squarely on the voice. I then backed the stereo pair up until just before the instrument became background in the track.

There’s not a lot of stereo to be gleaned from stereo-miking one instrument relatively closely. Even though different frequencies emanate from different parts of the guitar, it’s still largely a point source. But it adds a little something to the sound, and was useful in this case. In contrast, because Nellie’s minimalist uke playing wasn’t as much of the whole sound that Otis’ playing was, I believed a simple mono mic was sufficient.

Recording both in minimalist fashion accentuated each of their unique voices and pushed their lyrical messages to the forefront. You’ll be hard pressed to find two more different artists in today’s musical landscape, but in my studio they were on similar footing and produced similarly refined recordings. I’m honored to have witnessed both from my seat on the other side of the glass.

More information about Nellie, including where to purchase her music, can be found on her website, www.nelliemckay.com. Likewise, you can find out what Otis is up to at www.otistaylor.com
WEATHERS FM PICKUP SYSTEM

Originally designed for broadcasting and precise sound engineering purposes, WEATHERS FM Pickup has been so advanced in design and construction, that it can be treated like any ordinary phonograph arm under constant home use. It is the “perfect beginning” to professional sound reproduction with high fidelity for everyone! Play your records once or a thousand times and with WEATHERS you'll enjoy professionally perfect high fidelity that's distortion-free, carefree!

Perfectly balanced for perfect record tracking
WEATHERS FM Pickup System is the only pickup designed and balanced at a stylus force of ONE-GRAM. For this reason, it perfectly traces all the minute record engravings which produce delicate overtones and reproduces sound with true fidelity. It causes no flexing of groove sidewalls, thereby improving response to high frequencies without increasing surface noise.

Saves records... preserves Hi-Fi qualities
Improper stylus force can ruin high fidelity qualities of your records at the very first play. WEATHERS, the lightest, professional touch, shows no record wear even after a thousand plays. Your favorite records, your valuable records will last a lifetime—and still sound new! A sapphire stylus on a Weathers pickup will last longer than a diamond stylus on ordinary pickups.

Distortion-free... carefree
WEATHERS FM Pickup System is free of all common causes of sound distortion. It does not pick up rumble from motors, it blanks perfectly even if your turntable is tilted to a 45° angle, no leveling necessary! Accidentally dropped, WEATHERS pickup floats with featherlight ease onto your record. Weathers pickup is shock-mounted...eliminates mechanical vibration and acoustic feedback.

MORE than a pickup, WEATHERS offers more to Hi-Fi
WEATHERS tone arm and pickup is a complete FM system, a virtual miniature FM radio station. Its sole purpose is to pick up and transmit impulses from your record. Your record practically dies.No work when played with WEATHERS pickup. The result always is a flat response from 20 to 20,000 cycles.

WRITE FOR WEATHERS FREE BOOKLET ON HI-FI FACTS AND RECORD CARE TODAY!
In the last issue, we discussed the initial appearance of the Weathers FM phono pickup. In an era of record-chewing cartridges that tracked at 6 grams or more, the Weathers would track at 1 gram. Combined with a viscous-damped tonearm that applied tracking force with a spring (rather than gravity), and protective stylus guards on the base of the cartridge, the Weathers cartridge made it almost impossible to destroy records. Even though vinyl LPs were considerably more break-resistant than brittle 78s, record damage due to heavy tracking weights and mistracking was a significant concern for many users. Common “cures” for mistracking in that era included Scotch-taping a penny or nickel to the tonearm...which of course resulted in increased groove-wear!

The ad below is typical of ‘50’s hi-fi ads, which often showed the whole family gathered ’round the speaker (still mono!) to listen to music. It may have been an idealized portrayal: mom was sometimes in an evening gown while dad puffed a pipe and wore a suit...and the kids were always well-behaved. Nonetheless, the family was involved (which is more than we can say about today’s ads!), so gear that would be both indestructible and kind to records was important. —Come to think of it, we might do well to focus on those traits again.
Despite
Weathers’ attempts to make “universal” versions of the FM pickup which could be used in other brands of turntables and tonearms, the lightweight cartridge and the light tracking weight posed difficulties. The record changers which then dominated the market generally needed at least 4 grams of downforce to trip the changer mechanism. Paul Weathers focused on a complete package of turntable/arm/cartridge/oscillator which could be plugged into the auxiliary input of a preamp or integrated amp.

Weathers being Weathers, the record player system exhibited very little mainstream thinking. The turntable utilized a stamped aluminum platter that weighed less than most pie-tins. Driving this was a pair of tiny 600-rpm clock motors, one each for 33 1/3 RPM and 45 RPM, which drove the inner platter rim by way of a tiny, spongy rubber drive wheel. The tonearm was simple almost to the point of crudeness, with a slide-holder for the pickup itself, a spring for downforce, and the damping mechanism that would slow the arm, if it were to be dropped.
Fig. 5. Spindle and housing for Weathers turntable.
The turntable’s spindle was a slender 1/8” shaft with spherical bearing surfaces on both ends, running on thrust plates at both top and bottom. Compared to the spindle and bearing assemblies found in most turntables, the Weathers seemed toy-like; given the platter’s light weight, the assembly was claimed to produce almost immeasurable rumble, and have an indefinite lifespan. The whole turntable assembly—weighing only 5 pounds or so—was mounted on springs within the base, which Weathers called the “seismic platform”.

Weathers continued to exhibit novel thinking as stereo became more common in the late ’50s. The company marketed a pair of speakers with each unit the size of hardbound book, indeed made to look like a leatherbound book. Containing a single driver with limited bass extension, the small speakers were designed to couple to an optional common bass speaker, likely the first 2.1 speaker system. What could be more inconspicuous than a bookshelf speaker designed to look like a book? Larger speaker systems arrived as well, like the unit shown in the ad above. Accompanying amplifiers were also sold, but the record players were what the company was known for.

The company’s contrarian approach to product design likely had economic benefits as well. A former Weathers employee wrote years later on the Steve Hoffman Forums, “Mr. Weathers was, as I have posted, a rare combination of excellent engineer and excellent businessman. The tonearm: piece of wood, machine screw and a piece of lead. Worked well, cost next to nothing to build. His factory was just a few miles from [RCA’s headquarters in] Camden, NJ. Most of the speakers we used were surplus stock from RCA. They were treated at the edges with a mixture that I still have the formula for somewhere. Then lead weights were glued to the centers and some were given a large pad of thick cotton, also glued on. He DID know how to make a silk purse out of a sow’s ear! The customers were very happy and loyal. If they had known the cost to retail price ratio, they would have fainted.

“He sold out to TelePrompter... [then the company] went through a couple of other ownerships. He would develop a new line of products, sell a lot, a company would come in and buy him out. Then they would just let it go and come back and ask him if he wanted the company back. He would buy it back, for next to nothing and then introduce new products, that he had been developing all that time. He did that several times. He knew how to make money.”

The FM pickup technology didn’t translate well to the 45/45 stereo format, and while there was an FM stereo model, the company shifted emphasis to a ceramic cartridge which managed to keep most of the benefits of the FM pickup, such as light tracking weight and low overall weight. The company also picked up an employee whose influence would extend far beyond the walls of the factory.

In 1960, a frustrated hi-fi writer went to work for Paul Weathers. In a 1997 Stereophile interview with Steven Stone, J. Gordon Holt told how he came to leave High Fidelity: “I was having constant problems with the publisher, who kept insisting I couldn’t hear the things that I kept reporting that I was hearing. I was a troublemaker. The publisher
had to keep riding herd on me to make sure that I didn’t tell the truth about some of this equipment, because on a few occasions the manufacturers had wet their pants when I did.”

Holt found Weathers to be a sympatico personality, and went to work for him: “we went out for dinner. I looked at their equipment and all that kind of thing, and he hired me on the spot...I was their Technical Information Person. I was there for, oh, two years, responsible for writing and distributing technical service bulletins and upgrade notices to dealers. I started putting in some recommended recordings that dealers could use for demonstration purposes. Then we noticed after a while that we were distributing more than three times as many of the things as we had dealers. Seems they were handing them out to their customers. We were distributing something like 300-and-some to about 80 dealers. I figured maybe I was on to something. I decided then that I was going to launch Stereophile. Paul Weathers and I parted amicably, and I started the magazine in 1962.”

The company continued for several years after Holt’s departure, largely rehashing and revising the record player. Oddly enough, NOS units of the later turntables are still available at a surplus company.

A later-model Weathers turntable, still available as surplus.

The company never regained its spot in the sun, and faded away with the advent of the bigger-better-badder receivers that dominated the late ‘60’s. Weathers himself lived until 1992, when he passed away at the age of 86. Nearly 60 years after the Weathers company’s heyday, many still regard it as a shining example of innovation and creativity...and ex-employee Holt’s magazine is still around, 54 years later!

Special thanks to John Atkinson, Editor of Stereophile, for assistance with the JGH
chapter of the Weathers story.
John Hammond was born into wealth in 1910 to John Henry Hammond and Emily Vanderbilt Sloane. Yeah. Despite growing up in a five story mansion in New York, early on he developed a different love for music than the rest of the storied family. At 4 he studied piano and later violin. His mother tried to give him an appreciation for classical music, and certainly this served as a basis for his upbringing but he heard a different muse. At a very early age he would steal down into the basement to listen to the music of the African-American servants while the family was upstairs listening to opera and the safer machinations of Beethoven and Mozart. One of his favorites was Sir Harry Lauder. Lauder was a serious Scottish composer, as can be heard here.

Now that’s a classic. Must’ve given mom fits.
She had no one to blame but herself, because besides trying to bring up a son into classical realms she also was socially active and made sure John was aware of the importance of using their wealth to increase the fortunes of the less fortunate, and little Johnny took that activism a bit further than the family would probably approve.

In 1923 the Hammonds visited Europe ostensibly to further the young lad’s world view and education. It worked. The family attended a musical show called *From Dixie to Broadway* featuring Sidney Bechet, a brilliant soprano sax and clarinet player and already an influential Dixieland performer and composer. The 13 year old Hammond didn’t have a chance. He returned to America a changed boy.

Sidney Bechet was the first important soloist on jazz records if you believe his biographers. Louis Armstrong’s bios would argue, but the fact was it was close by a few months. Johnny wasn’t listening to anything new on that trip, just new to him. Bechet had studied clarinet with ‘Big Eye’ Louis Nelson and George Baquet. I’ve seen pictures of ‘Big Eye’ Louis. I don’t quite get it.

OK, maybe. But the boyz missed out on hanging George with ‘Butter’, or ‘Sweet Cream’.

Bechet developed quickly and was playing in Dixieland bands in his teens. In 1917 at 20 he moved to Chicago, and by 1919 was touring Europe with Will Marion Cook’s Orchestra. There he found a soprano sax in a music shop and the soprano became his main instrument from then on. His phenomenal skills as a soloist always made him stand out and in fact made other players uncomfortable because they either couldn’t keep up or had no idea what he was doing.
And he was flying high when he sent Johnny Hammond back to Manhattan.

On returning home Hammond immediately began searching for jazz and blues records. In 1923 music stores in Greater Manhattan didn’t carry a lot of black music. John ended up going to Harlem to find what he was looking for. You KNOW his parents didn’t know about dis shit. This started a string of adventures, skipping school, convincing head masters to let him ‘take lessons’ in Harlem, going to jazz clubs. By the time he was 20 he’d dropped out of Yale and gotten a job writing for Melody Maker. Pop, a Yale alumnus, was reportedly proud.

In 1931 he funded the first recording of Garland Wilson. He took non-paying jobs DJ-ing for jazz stations. Because he would pay for his time slot he could choose the musicians he had on his show, guys like Fletcher Henderson and Art Tatum. In the next two years he used his influence to convince the depression flagged English Columbia label to record jazz artists like Henderson, Benny Goodman, Benny Carter, and Joe Venuti. John was 23 years old.

John Hammond didn’t discover Benny Goodman, but he knew a great thing when he heard it. In 1934 he introduced Benny to Fletcher Henderson who became the arranger of all those great Goodman hits. Fletch was black, which was a verboten combination then. Not to be deterred, Hammond convinced Goodman to form a band with outstanding and even ground breaking black musicians like Lionel Hampton, Charlie Christian, and Teddy Wilson. Goodman got and took a lot of credit for this, but it was Hammond who convinced the frightened Benny this was a good move. The Goodman recordings from the late 30’s with his small bands including Wilson, Hampton, Christian on that guitar (!!) and Gene Krupa are still some my favorite recordings of any genre.

“Air Mail Special” arranged by Fletcher Henderson.

John Hammond made the King of Swing. Beyond argument.

In 1933 Hammond heard a 17 year old Billie Holiday and arranged for her to record with Benny Goodman. In ’37 he saw Count Basie and his orchestra in Kansas City and brought him to New York. He was instrumental in reviving the music of delta bluesman Robert Johnson and in fact had Johnson slated in his 1938 Carnegie Hall presentation From Spirituals to Swing but the fool got himself permanently poisoned by a jealous husband at a dance Johnson was playing at. Damn. ‘Big Bill’ Broonzy took his place.

Hammond was one of the very few producer/talent scouts who transcended musical evolutions. In 1961 he saw Bob Dylan playing harmonica on a session with Carolyn Hester and signed him to a contract with Columbia. Only the good Lord knows what Hammond heard that night. The Columbia executives howled and dubbed Dylan ‘Hammond’s Folly”. He then produced ‘Blowing in the Wind’ and ‘It’s a Hard Rain Gonna Fall’.
Before Hammond retired in 1975 he had discovered, produced or funded talent as diverse as Benny Goodman, Garland Wilson, Billie Holiday, Count Basie, Charlie Christian, Harry James, Teddy Wilson, Big Joe Turner, Pete Seeger, Aretha Franklin, George Benson, Freddie Green, Jim Copp, Babtunde Olatunji (had to add that one in there), Bob Dylan, Bruce Springsteen and Leonard Cohen (R.I.P, by the way). Most of you will recognize a majority of the names on that list, and few know his.

After retiring he continued scouting talent. In 1983 he signed a Texas blues guitarist named Stevie Ray Vaughn to a contract for Epic Records and was executive producer on that first album.

Long Live the Stratocaster.

From Sir Harry Lauder to Stevie Ray Vaughn. Dig THAT transition.
“I don’t need no bike that don’t need me!” Harley Mike proclaimed. He was responding to a question asking why anyone would choose to ride a motorcycle that was so problem-prone and maintenance intensive.

Mike is one of those guys who actually likes to work on bikes, unlike the rest of us, who want only to ride them. He gets satisfaction from taking them apart, inspecting the greasy pieces, and fixing or replacing whatever is necessary. For Harley Mike, that’s part of the joy of owning the machine.

It would be easy to dismiss Mike as suffering from some kind of masochistic personality disorder—but he’s not alone. Harley Davidson owns almost 30% of the American motorcycle market (about the same as Honda) so there must be a lot of enthusiasts who enjoy working on their machines.

*Consumer Reports* revealed in a May 2013 reliability article that, “Despite the number of problems, Harley and BMW owners were among the most satisfied with their bikes.” (Apparently, BMWs are even more problem-prone than Harleys.) It seems the more attention their motorcycles demand, the more their owners love them.

Could it be that mankind has an inborn need to be needed? In this era of childless couples and pet-less singles, is that need being transferred to machines? Is there a correlation in the world of audio?
In a heady discussion with fellow audiophiles, the consensus was that many of us are much like Harley Mike. Some enjoy messing with their equipment as much as utilizing it, particularly the vinylphile guys. To the unschooled masses, it’s painful to watch a vinylphile go through the seemingly endless ritual of extracting the album from the double sleeve, dry cleaning it, then wet cleaning it, de-sparking it with a plastic gun, de-fuzzing the stylus, resetting the VTA, etc. But to the vinylophile, it is a cherished sacrament to insure a boundless harvest.

Both the Harley rider and the vinylphile carry on about their product experiences in transcendental terms that are difficult to understand. To the non-believer, these arguments are akin to mythology or deficit spending. They know that in empirical terms, Hondas are superior in every way to Harleys: they accelerate faster, stop quicker, and handle better. Likewise, digital audio has a wider dynamic range, deeper bass, flatter frequency response, lower harmonic distortion and a lower noise floor. So what is it about these vinylphiles that keeps them rooted in their anachronistic technology?

The Harley guys will tell you they get more chicks, but that doesn’t apply to vinylphiles. They don’t get more chicks, they get more clicks. Clicks can’t run out for beer, but there is more to the story.

Just as Harleys have clear limitations compared to Hondas, the preference for analog, at least in part, may stem from three limitations:

1. Analog presents a limited dynamic range. When the volume of the crescendos are capped, the pre-amp can be turned up louder without disturbing the neighbors. Therefore the quiet passages become more audible. The result is described by vinylphiles as greater realism, superior resolution, more body, fatigue-free tonal lusciousness — anything except louder. The claims of superior realism are not without merit. Large concert halls also limit dynamic range, albeit acoustically through distance. The in-your-face dynamics of close-miked recordings faithfully rendered by digital front ends on accurate equipment may actually be less like “live” than the analog presentation.

2. What else may account for the analog preference? Most listening rooms consist almost entirely of hard surfaces: walls, ceiling, floor, furniture — all reflect high frequencies back to the listener. Those reflections hit the listener’s ears at a later time than the direct sound from the tweeters, so the high frequencies sound muddied and distorted. This makes some systems unlistenable, especially in small rooms. The correct solution is damping material judiciously placed around the room to absorb reflections. Failing that, attenuating high frequency energy by means of a treble control or an analogue front end works almost as well.

3. A common saying in the early days of audio was, “Large speakers create large problems.” Because they produce deeper bass, large speakers are more likely to excite room modes, which makes rooms sing at certain bass frequencies like a kid blowing across a soda bottle. Today’s loudspeakers are capable of reproducing deeper bass than in the past — even those that aren’t particularly large. The deeper
the system’s bass response, the more likely it is to excite room modes.

Digital front ends produce deeper bass than their analog counterparts, which are limited by the physical nature of the recording medium and tracking capabilities of cartridges. As a result, the problem of room modes has become endemic. Most of the listening rooms that I’ve measured exhibit bass peaks of 10 to 20 db. When I offered to correct them by electronic means, some owners shook their heads refusing to “mess up their sound” with anything that isn’t Harley approved. They believe that 20 db bass peaks are less problematic than “digital hash” from correction devices like those manufactured by Tact, Lyngdorf, DEQX, Behringer or DSpeaker.

Other owners agreed to some type of electronic room correction below 300 Hz., but I’ve been surprised in two ways by their responses:

1. Not a single owner raved about the improvement in bass. Some actually didn’t like the more linear response — so used were they to their bass hump. Yes, this included the guys with $100,000 systems. All that money spent for perfect sound and their systems were less accurate than those lads who spent $3000 on a pair of stand-mount monitors with generic electronics.

2. Once the bass hump was corrected, virtually all the owners raved about the improvement — not in bass linearity — but in mid-range resolution! They had assumed the lack of vocal clarity originated with their equipment. Some had repeatedly replaced equipment in an attempt to improve resolution. It didn’t occur to them that the bass hump created by the room was drowning out their mid-range.

So as well as the satisfaction to be derived from cherished sacraments, an analog front end presents at least three additional idiosyncrasies attractive to vinylphiles: it limits dynamic range, high frequency reflections, and bass room modes — all of which foster louder playback levels. As Dr. Floyd Toole discovered during his well-documented speaker research studies for the National Research Council in Ottawa, louder is always perceived as superior.

But there is no need to take Floyd’s word for it. Ask any Harley rider!

We just don’t get no respect, us audio engineering types. After all, we were the kids who founded audio clubs, spent our free time at whatever hifi boutiques would allow us in, and memorized the calendars of every venue within a 100 mile radius. The nuts who spent every dime from mowing lawns and paper routes on records and hifi magazine subscriptions, who
could solder and read schematics long before we could drive. My own story is far from unique: music has been a central pillar of my existence as far back as I can remember. The AM radio by my bed, my Dad’s hifi, childhood music lessons, marching bands and school orchestras, basement rockers, jazz clubs, concert halls, stadiums and punk shows, these comprise the essential icons and memories of my life. I built my first tube amp at 11 and my first home-brew turntable at 15. I’ve lost count of the Heathkits, Dynakits and Eicos that I assembled for myself or finished for floundering friends.

When my friends were saving up for their first car, I was saving up for a better tonearm. They spent their weekends playing sports, dancing and drinking. I spent mine listening ecstatically in the dark or reading every hifi magazine and equipment brochure I could get my hands on. Sound familiar? I bet it does!

When it dawned on me that I could make an actual career in the field, I didn’t think twice. I majored in electrical engineering with a specialization in audio, psychoacoustics and human hearing, and minored in music composition. From the design lab to the factory floor, from the concert hall to the recording studio, my ears have been bringing me great joy and paying the bills for my entire adult life.

My point here? No need to lecture me about audio obsession and perfectionism; it’s my world; I get it. I worship music, musicians and high performance audio above all else. But, the minute I try and discuss objective audio testing and questions of audibility, I get written off as a tin-eared meter-reader, with a crappy system, too boot! Why is that? Of course, conflict sells newspapers, and conflicts require opposing camps. Since the first wave of hardcore audio subjectivism in the early- and mid- 1950’s, the high end press has built its business model largely on a contrast with the “mainstream” audio world, questioning the quality and performance of mainstream products, the listening skills and hearing abilities of mainstream consumers and the corruption and ineptitude of the mainstream hifi press. True or not, this contributes to the antagonistic situation. Still, the way I see it, there is something more fundamental at work: human nature.

In an evolutionary context, few things are more important to an organism’s survival than its ability to accurately and reliably evaluate the environment around it. Our primary senses make up the very foundation of our daily existence. As a result, humans rely heavily on eyes and ears to navigate the world, and come to trust them implicitly. Thus, we hold our perceptions in very high regard.

Having the reality or accuracy of these perceptions questioned in any way feels like an indictment of our innate abilities, our intelligence, even our sanity itself. Further, most everyone wants to hear and emphasize sonic differences between products and technologies, whether they exist or not. Manufacturers, both high end and mainstream, make a big effort to advertise them, and structure their product lines around their existence. Reviewers completely depend on them for their livelihood. Listeners use them to feel justified and gratified about their systems.
The bottom line here is that, if anything suggests that we are perhaps being mislead by our hearing, it feels like a criticism; our first instinct is to reject the claim as flawed or irrelevant. If a lot of tests and experiments go on to yield a similar conclusion, our tendency is to reject the entire experimental methodology, or the even the fundamental idea that our hearing is capable of being meaningfully evaluated in the first place. This is basic human nature, and not at all unique to audio. Nobody is quick to accept information that contradicts their thinking and experience.

From a scientist or engineer’s point of view, the problem is that, as remarkable as our ears are, they have clear limitations and are far from 100% reliable or consistent. For one thing, the human hearing system is not really the simple machine that we learned about in high school. Over the last few decades, researchers have learned that hearing is actually a very sophisticated neurological process, with portions of the inner ear sending control signals to other areas, and with the brain even sending real-time control signals back down to the hair cells in the cochlea to adjust their characteristics from moment to moment as we listen. (That’s one reason we can hear pitch so accurately.) Thus, the brain doesn’t just interpret what comes to it from the ear, our brains are actually a critical and inherent part of what we hear and perceive.

I am both amused and frustrated when, as often happens, I am told by an audiophile that they understand their personal biases and have factored them out of their decision making process. Or, worse, that since they had a limited budget, their preference for a more expensive amp must indicate an objective stance. Such statements display a profound naivete and misunderstanding about the difference between a conscious and an unconscious bias, and about the nature of biases themselves. As any professional psychologist or cognitive researcher will tell you, biases simply cannot be inferred from expectations, hopes or desires, nor can one’s unconscious biases be correctly inferred from the conscious biases one is aware of. Indeed, that is the very definition of the term, “unconscious.” This is well-established and indisputable, and so I will not discuss it further.

As you can imagine, all this makes the scientific evaluation of audio equipment a difficult and nuanced game. Sound causes hearing, but desire affects hearing. Expectation affects hearing. Mood affects hearing. Visual input affects hearing. Opinions affect hearing. Biases affect hearing. These factors are not just “mental.” They can actually influence what one can or cannot physically sense, in addition to influencing how one cognitively evaluates what one is hearing.

Failing to account for the unstable nature of human hearing can lead a designer down a hall of mirrors, modifying and remodifying a product for months, only to come back to where they started. Sure, biases and opinions are perfectly appropriate for an audio consumer, I get that. After all, what really matters is that you like what you like! But, these things are hell for an equipment designer. Each listener has their own unique perspective, as does the designer them self, and so it becomes crucially important to try and understand what a product is really doing to the sound in order to fine tune, replicate or improve its performance. What’s
Enter objective testing. Simply put, objective audio testing is an attempt to understand the performance of audio equipment isolated from any external factors which might affect the perception of sound, but not the actual behavior of the device. Think for a moment about why a speaker designer needs an anechoic chamber. It’s not because their customers listen at home that way. It’s not even the way the designer listens and tunes their own product. Rather, it is simply a technical tool to help the designer isolate and study the intrinsic behavior of a speaker, free from external acoustical influences, so it may be adapted correctly to the variety of different rooms it will actually be used in.

Objective testing is important for the same reason; it is used to isolate and study the intrinsic behavior of an audio device or process free from external factors. Objective testing is used to investigate and understand inherent sonic characteristics and thus to allow the designer to achieve whatever their goals are under whatever range of actual listening conditions they wish to optimize for. It is used to properly set and prioritize design goals, evaluate component parts, make design revisions: it is essential! Rest assured that there would be no such thing as high fidelity audio equipment in the first place were it not for the ability of designers to dissect and improve their ideas using objective methods and tools.

[Ken will conclude this piece in the next issue of Copper—Ed.]
I started my career at a radio & TV repair shop, and I like to every now and then do some upgrading and restoration jobs.

This is my #1 setup, and I used to be a big fan of Avantgarde horn speakers. Before acquiring these Sonus Faber speakers I had AG Duo Mezzo speakers. The AG’s are really impressive speakers, both visually and sound-wise. However, I was never really happy with the integration between the mid-horn and bass unit. Now I’m satisfied.
My sound preference has developed more and more towards a coherent, non-fatiguing listening experience. I prefer to have the vocals right, especially using the voices of some very well-known lady singers.
Setup 2 is based on Marantz 2230 and a really nice Pioneer SX-34B, Sonus Faber Venere 2.5 and streaming Tidal using Mojo Dac and Macbook Pro.

I listen to music ranging from Classical to Sharon Robinson, a singer who often collaborated with the late Leonard Cohen.

Preamplifier/ Tuner: Mcintosh MX110Z

Power amplifier: Mcintosh MC225

CD player: Ayon CD2

USB interface for Apple Macbook Pro: Hiface Evo Two

DAC: Rega DAC

Turntable: TW Acustic Raven GT

Tonearm: Kuzma 4 point

Speakers: Sonus Faber Elipsa Red
Streaming Service: Tidal Hifi

I am especially proud of my current system, as it allows me to enjoy more music than ever.

Would you like Copper to publish your system? Write us by email and tell us what makes it special. We’d love to help you share with the rest of the world.
Nashville Boots

By Paul McGowan | Issue 21

Nashville’s known for its music and colorful country attire too.

iPhone 7