

Forward into the Past

Hi Fi Fathers Luxury Audio

by Pat McGinty of Meadowlark Audio

The era of HiFi began in the 1950s when *two new ideas*, the electronic amplifier and the moving coil speaker were combined with the phonograph. Today, the next era of audio is about to unfold as *two new ideas*, the digital signal processor and the amplifier module are combined with the HD datastream. What we have all known and loved as HiFi is overdue for a major update. Get ready for what's next: Luxury Audio.



The key to understanding the impending transition is some historical perspective. The year 1887 marked the beginning of the recording and playing back of sound. In his Menlo Park New Jersey laboratory, Thomas Edison made the first recordings with his wax cylinder device, the Phonograph. He later formed the National Phonograph Company to distribute wax cylinders for music and spoken entertainment.

Calculating that the difficulty of mass producing wax cylinders would ultimately become Edison's disadvantage, Emile Berliner introduced the Gramophone in 1889 which used a flat circular disc. Later, Berliner's insight would prove correct: the flat 'record' could be readily mass produced by simply stamping out copies and so it became the standard for distributing audio. Prior to the invention of polyvinyl chloride, records were made from shellac, an insect derivative then commonly used as a wood finish. Berliner's successful Victor Talking Machine Company later became RCA Victor which participated in the introduction of the Long Playing Record, LP, and later in stereo LP.

Both Edison's and Berliner's devices operated on the same principle. The alternating compression and rarefaction of air (sound) entered a horn of

decreasing cross section thereby amplifying it's magnitude enough to drive a metal diaphragm at the bottom connected to a sharp stylus that cut a groove into the soft recording medium as it spun past. For playback the process simply reversed: a stylus following the groove in the record caused the diaphragm to vibrate causing the air in the horn to rarefy and compress in about the same way it had during the recording process. Remember the two tin cans and the string? It's like that. The device was entirely mechanical; the motivating force that moved

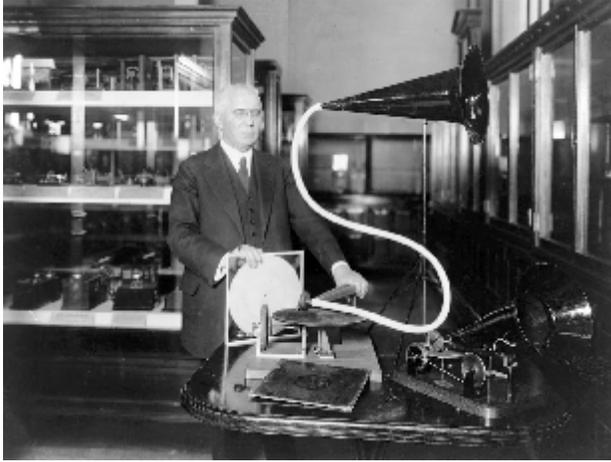
the record past the stylus was a clockwork type spring energized by a hand crank.



It is important to recognize, lest you've lost touch with the meaning of the word *analog*, that sound, which is a pressure/time phenomenon, is converted to a displacement/length *analog* on the record. Needle deflection is the analog for air pressure and length the analog for time. The shape of the coiled groove is the analog of the recorded sound.

Later in our 130 year long story that began in Menlo Park came [two new ideas](#) that brought us from the hand-cranked Gramophone to the era we call Hi Fi. At first, Edison and Berliner needed to drive their records at a very high speed to deliver enough energy

to the stylus to drive the diaphragm hard enough to drive the air in the horn hard enough to reach a useful volume level. This meant that, at 78 RPM, it took a whole 12" disc to hold just a few minutes of music. The mechanical contraption nature of the thing really limited sound quality. And the huge pressure that the stylus had to exert on the record to capture the force wore both out rather quickly.



Emile Berliner and his Gramophone

(It was nonetheless wonderful. A first in human history: music in your home without having to play instruments or hire a band! By 1902 Enrico Caruso had made the first gold record, selling a million copies of 'Vesti la giubba' from Pagliacci. You probably know the tune. I butcher it in the shower.)

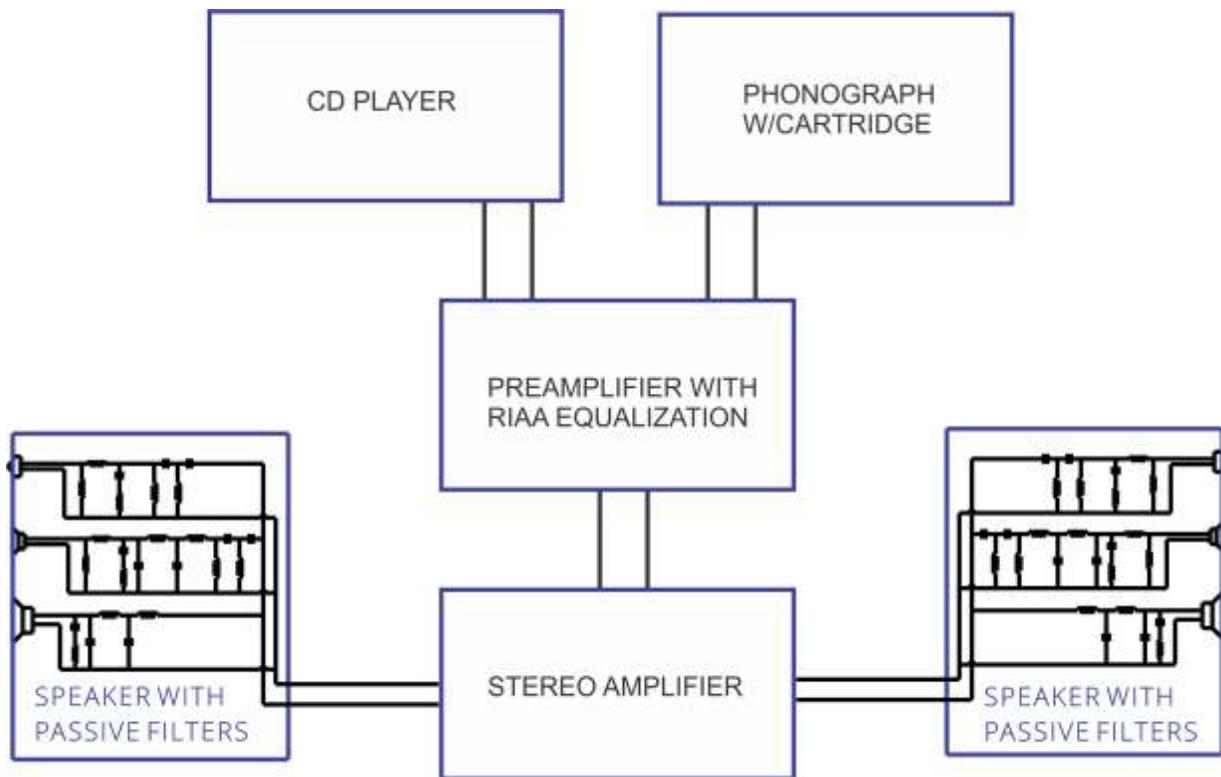
Then, along came the **two new ideas** that changed everything: the electronic amplifier and the moving coil loudspeaker. The electron tube used to amplify electronic signals actually descended from Edison's observation, while fooling around with variations of lamp bulbs, that he could control the current flow between two electrodes in an evacuated glass vessel by placing a grid between with a smaller current going to it. Funnily enough, Edison couldn't think of any use for his discovery and set it aside. Today we call it the "Edison Effect". The moving coil speaker descended from Alexander Graham Bell's work on the telephone which, in turn, descended from Michael Faraday's observation that a moving magnetic field will induce a current in a hunk of wire and vice versa. Today we honor each man's work with their namesake units of measurement: the Bell, more commonly the decibel, and the Farad more commonly the microfarad, our unit of capacitance.

Anyway, a straightforward adaptation of Alexander Graham Bell's moving coil became the magnetic cartridge, replacing the stylus/diaphragm while the amplifier/speaker replaced the big pretty horn. Now that the cartridge was so much more sensitive and that the amplifier/speaker was so much more powerful the speed at which the record must pass by the needle could be greatly reduced from 78 to $33 \frac{1}{3}$ RPM.



Add a clever equalization standard established by the Recording Industry Association of America RIAA that allowed much closer groove spacing and the LP was born. 20+ minutes per 12" side and it sounded great. Stereo LP came along in 1958 kicking open the door to the Golden Era of Hi Fi that has given all of us so much pleasure for so many years.

As you can imagine, at the time there was some bitter resistance to the advance from mechanical to electronic audio just as there always is to any technological advance. You had to buy all new hardware and new records. Arrghhh. And some guys just found it painfully difficult to let go of their cranks.



It's important to recognize that an additional *analog* had just joined the signal chain: deflection/length is now being converted by the cartridge into voltage/time which is then made larger by the amplifier. Then another conversion occurs at the speaker as voltage/time is transduced into pressure/time (sound). So, two *analog*s in a row, followed by the real thing.

You still with me?

The transistor came along a little later as an alternative to the valve tube, then the Compact Disc joined as an alternative source. That pretty much encapsulates the 60 or so years of the Hi Fi era.

Now history is about to repeat itself in a delightfully.....um.....*analogous* way. Once again **two new ideas** are about to change everything. Hi Fi is about to yield to the next superior technology just as the old hand cranked 78 yielded to the superior technology of Hi Fi.



400W amplifier module

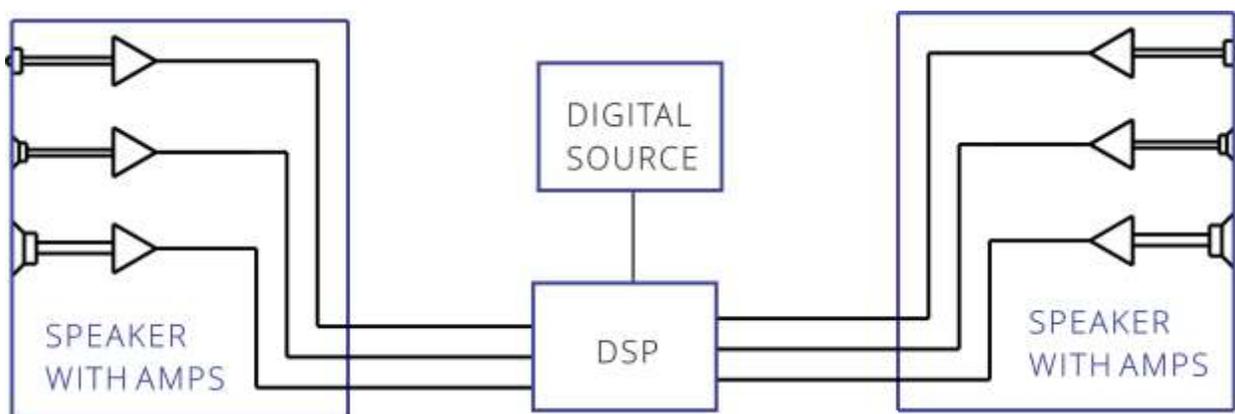
What are those **two new ideas**? The emergence of wonderful sounding, thoroughly engineered, tiny, inexpensive, cool running amplifier modules and the arrival of the cheap and powerful processors needed to accomplish digital signal processing, DSP. Together they allow us to take the next step forward and upward to the next level of musical realism because, like the earlier valve amp/speaker advance, they allow us to do wonderful things that were not previously possible.

Just as the moving coil loudspeaker was paired with the valve amplifier, the modern digital signal processor's strengths are fully realized when paired with multiple amp modules. Just as the valve amp's output wanted a speaker, the processor's multiple outputs want multiple amp/speaker couples. And now that those amps are tiny and cool running and now that the passive crossover inside the speaker is completely unnecessary, the amps rightly belong right next to their drivers.

Just as the valve amplifier facilitated the birth of the LP, the SPDIF data stream has facilitated the birth of Digital Signal Processing, DSP. We are now free to manipulate that data stream - **without loss or degradation** - in any way our imaginations conceive - correct the room, correct the transducers, correct the bass, correct the timing, add safeguards and personal taste colorations and on and on then apply the results to as many amplifiers and drivers as it takes to get the job done. So it's a whole new world of possibilities and we've barely scratched the surface. I've built systems with as many as 20 amps and with as many channels of DSP as were needed. Matched them perfectly to the room acoustic. And produced outcomes that simply could not have been done with Hi Fi.

A new Luxury system will consist of a music source and two processor/amplifier/speakers that make a unified system. In many cases, the source will also be incorporated into that single system. So you'd see nothing but two speakers and a tablet for control.

Yes, the 'hobby thing' will take a hit, and not without some remorse. I'm still smarting from the progression from the simplicity of my '68 Chevy with the four barrel carburetor atop a 327 to a car that I can neither comprehend nor repair. But the progression from wall mounted dial phones to smartphones has really been quite pleasant, no? So I think, emotionally for many of us, it'll be a mixed bag. But ultimately, as with the car and the phone....we'll be happy with the improvement and not look back.



Luxury Audio, like the modern car, will replace mix-and-match, pick-and-choose hobby fun with an integrated system of superior performance and infinite adjustability. And, as simply as I can state it: Luxury Audio offers a better value proposition in part because designers can optimize the whole thing within a budget. Please don't take this the wrong way, but the consumer who spends, say, \$1000 on speaker cable really has no idea whether that \$1000 would have been better spent on something else, maybe better tweeters. In no sense is that purchase an optimization. It's an increment. A fun and satisfying increment, but likely pretty wasteful. That each successive increment yields a progressively smaller improvement creates the tantalizing illusion that one is approaching the ideal. So the misallocations just keep getting worse; I suppose this could be true of any hobby. For Luxury Audio, the system designer can actually know that his last dollar was best spent and so the customer simply gets better value.



two 250W amp modules and four channels of 24bit 96KHz DSP

Plus the new way refocuses the designer's attention upward during product development and pushes back the frontier of what we can achieve. I have spent decades devoting my time and resources to things like bass system alignment, crossover work and time alignment. Now those things come quickly to heel, freeing me up to work on higher issues like rise/settle times, signal tracking, dynamic linearity and compressing the overall size of the speakers. So our concept of what is doable is expanding; I know that my top product does things that I've never heard done before.



In Luxury Audio, we're just now taking our first baby steps so I'll give it to you that, today, your \$20K Hi Fi might give my \$20K Luxury system a run for its money. You might have an edge in detail and soundstaging. But I'll beat you roundly on dynamics, bass performance, slam and midrange pop. And in half of the size. That it's even arguable might give you the sense that you're retelling the story of Paul Bunyan and his blue ox Babe; those close contests will become fewer and fewer as the new machines ultimately win the day. Luxury Audio is only at version 1.0. The old way is maxed out and you know

it. The time has come.

As Luxury Audio improves and becomes more flexible, attention will shift from components and interconnects to user interfaces, room acoustic compensation and the user's tastes and lifestyle preferences. To our young customers who expect both quality and simplicity, the new way will be the clear choice. A single, integrated, easy to control system with a single price? Or a mix of components, speakers and wires with choices that are beyond comprehension? Look, guys: have we not lamented our failure to appeal to new customers long enough? Obviously, this is the path to the next generation's heart. They'll pay for Luxury and they'll receive Luxury. A very simple proposition. They're gonna love it.

It's a happy day. We're here for the birth. Hi Fi fathers Luxury Audio and the squirming lad holds more promise than we can know. Things are about to get exciting for the first time in a long while. With a nod to the hand crank and to the vacuum tube we slide back into our chairs to listen and enjoy, tablet in hand.