

Returning to Reality

A. Introduction

So, what does the Audio Engineering Society have in common with the CIA and myself? I know you're going to say that we all share hidden agendas, but that's not it. It's that, among other things, we're all 50 years old.

I'd also like to say "Happy Birthday" to the 33-1/3 rpm vinyl record, which was introduced in 1947.

So, what does being 50 mean to all but the LP?

1. Not dead yet. Maybe at the midpoint, maybe not. Maybe venerable, maybe not.
2. Much to reflect on and to consider, but, at the same time, much left to contribute.

And another thing. I'm pretty sure of the day I was born, but the birthdates of either the CIA or the AES are less than certain. The CIA was born either on July 26th or September 18th, 1947, no one will say for sure. And we're told that the AES was born in 1948 when a group formally got together at the RCA Studios in New York.

But the date locked in my mind was in 1947, when Norman Pickering and C.J. Lebel and a few other visionaries determined that it was high time that we should get together and talk.

I, myself, have rarely missed AES conventions since 1961. I'd like to believe that the excitement *this very week* of the young, wide-eyed, student engineer will be little different than mine so many years ago. In 1961 I was mesmerized by the gear. But, I was more enchanted to see and often meet the pioneers of that time, who were pointed out to me one-by-one, along with their whispered accomplishments.

B. History

What a history it's been...

As a youth in the audio business of the 60's, everything I touched and used seemed, well, magical. I had already been through ham radio & wire-recorders, but upon first hearing Westminster Sonotape and RCA pre-recorded tapes played on the Ampexes of the day through DT-48's my life was instantly changed and focused.

I then had the opportunity to do live FM broadcast remotes for The Baltimore Symphony Orchestra. Inevitably, comparisons between what I did and the recordings of the New York, Boston, Philadelphia or Chicago Orchestras sobered me up.

And then I recorded my first bands in my first studio. I was mystified as to why my recordings didn't sound like the pop recordings of the day coming out of A&R, or Bell Sound, or Sigma Sound, or Motown, Chess, or Stax Records.

Convinced that the difference was the equipment used, I would have bought anything, given a little bit of cash. But there was none of *that*, and, as was the style of the day, we generally built what we needed, or thought we needed, starting with a home brew recording console and then assembling our own 1/2" 4-track.

Looking back, I didn't *begin* to make listenable recordings of any kind until the moment I started to *listen* critically and objectively. And, frankly, I didn't make music **that connected with an audience** until I let go of thinking of recording as a technology with all of the arbitrary rules and it's shortcomings, and **looked through technology to the art**.

Today, I'll call this part of "...getting back to reality." And, as you might have feared, I'm going to come back to it.

Much of the technology that's emerged through the years seemed like magic to me at the time, but we can *now* agree that, with rare exception, most of our industry's progress must be viewed as evolutionary, if at times, brilliant and/or idiosyncratic.

I wasn't around, as Al Schmidt was, for all of the early inventions, including, but not limited to, Edison's cylindrical recorders.

But I remember:

- ...my first high-fidelity loudspeaker, the AR-1, featuring a Western Electric mid-range driver. Western Electric, and later AT&T, sticks in my mind as a company that has abandoned us more than once.
- ...our first high-performance cutting head, Horst Redlich's mono ES-59.
- ...my first multi-track; a magical tool.
- ...our first equalizers & limiters & compressors. Again, magic tools.

...and...

- ...the blisters from the first vinyl record I pressed, and what unpleasant places pressing plants were...
- ...the first Dolby A noise-reduction units.
- ...the first Altec 604-based loudspeakers (when my control room began to 'rock')
- ...my first 8 track, then 16 track, then 24 track analog machines
- ...and so on.

...but my personal favorites - to me, moments of irony in pro-audio history, are:

- ...the accidental invention (or re-invention, as it turns out) of AC bias by German engineers while working on an unstable, oscillating record

amplifier, for the irony of it.

...stereo. What a concept! Hey, two ears? Two microphones and two speakers! I think the expression that my kids use is, "Duh, dad."

...and, of course, the rediscovery of the 'classic' microphone from the 50's and 60's, after suffering years of so-called technology improvements, most of which resulted in affordable and reliable, and often unlistenable, devices. You would think we would learn a lesson.

When Russ Hamm asked me to speak to you here today, he said that he wasn't looking for 'safe'. Russ, don't worry, I'm only going to ask a few questions. I think that'll do the job.

It's easy to talk about the past, as Soren Kierkegaard pointed out when he said, "Life can only be understood backwards; but it must be lived forwards."

It's hard to look ahead to the future of ProAudio, taken by itself.

Believe me, I'm deeply relieved that I don't have to speak about the problems of, or the future of, the modern Record Business that so many of us have to deal with day to day. What a mess that is.

To name a couple of examples: Consider the extraordinary, windfall profits that CD Catalog Remastering provided record companies. I wonder how much of *that* went back into new artist development. Consider the current expectations of what constitutes a "successful pop record or act or career". And, consider what can only be termed as a "pyramid" scheme that has priced radio station licenses (and, consequently, stations' debt services) such that an entire industry has been transformed - and transformed so as to eliminate anything but the "safest", the statistically most profitable radio formats.

How fortunate we are to have only a few seemingly minor technical issues before us to try to sort out this week. But there is something to be learned by what I should like to call "Making A Science Of Greed" and maybe I'll return to it in a moment.

C. Digital

A few minutes ago I postponed the mention of what may, from some future perspective, be the greatest revolution in our industry, which is the conversion of sound to numbers, the manipulation and storage of those numbers, and the conversion back to something rumored to be a continuous waveform - 'Digital' for short.

Rare is the audio career that hasn't been touched by the transformation. Scarce is the piece of equipment that doesn't at least have a microprocessor, if not DSP, onboard.

Now, let's get real. My life-long experience of listening to, and enjoying, music which compels me to ask a few questions here - to raise a few issues.

Thirty years into the Analog to Digital technology break (one of the longest, if not THE longest, transitions of its kind in Industrial Age history), questions persist *among many* in our industry (although admittedly not a majority) about digital audio, it's application and it's shortcomings.

A quick survey of a quite a few major American and British mastering houses (admittedly not randomly selected, but enough to provoke thought) reveals that more than 50% of the final masters to be transferred to CD master comes in on 1/2" 'analog' tape.

Further questions put to producers and engineers (not randomly selected, but enough to matter) reveal many artists and producers are still 'anchored' in so-called 'analog' methods, tools, and storage. And thinking.

To say we as an industry are still polarized is an understatement, and I think it's time to try to understand why.

Is what's going on here simple contrarianism? Or, too-deeply held traditional beliefs and prejudices, the fear of too much innovation? Or artistic insecurity, or fear of the unknown?

Does the seemingly unbridgeable gulf between the 'postures' have something to do with **the art** of music itself? Paraphrasing Marshall McLuhan, "Any significant advance in technology transforms old pieces of the technology which it supplants into works of art." Do only 'artfully-executed tools' beget art?

You know, some contemporary artists have been known to add "vinyl surface noise" to CD releases. What's going on *there*??

And what's going on with the garish and excessive use of compression in the mastering of the modern pop record? Aren't we, as one producer puts it, stuffing more and more sausage into a tighter and tighter skin? Where will *this* end?

Is there work that could improve existing technology? In the nearly twenty years since "Perfect Sound! Forever!" was achieved, we have learned much was not perfect. Not at all. We have, in fact, since then seen significant improvements in the 'glue' technologies (such as anti-aliasing filters, modulators and decimators)

And, in the most recent past record manufacturers have finally had to admit that there were perhaps timing errors, or jitter, in the CD master cutting process that perceptibly, if subtly, affected the sound of CD releases, and improvements were forthcoming. Are there other places to look for tertiary mechanisms such as clock jitter? Are there other mechanisms?

Or have we pushed the CD and 44.1k/16 bit technology to its limit? Haven't we been surprised to find that this boundary is neither elastic, nor forgiving, and continuing improvements seem to return less and less on the investment.

And, ultimately, how do we measure 'improvement' anyway?

With apologies to David Clark, are there flaws in what we have come to know as accepted listening protocols (e.g., A-B or A-B-X et al.)?

And although I appreciate the contributions of the "Golden Ears", can't we do any better to quantify their opinions? We who are *committed* to telling the truth about such comparative tests can agree that many direct, gestalt listening tests (of instruments/systems/formats) are sometimes hopelessly subtle and often ambiguous.

Is there something that we're missing in concentrated, comparative listening? Is there a "back channel" from the ear to parts of the brain that we haven't explored and explained? I've been told, though I have yet to track down the reference, that less than 10% of the cerebral cortex is given over to "real-time" processing of sound. At the very least, don't we as scientists have to admit that there is already evidence before us that there are many features of the brain vis a vis perception that we have yet to explore? Don't tell me how easy it is to get these answers from an electroencephalograph. Much imaginative work is left to be done there.

Shouldn't discussions of "awareness" and "perception" of sound encompass emotional as well as platonic states of consciousness? Shouldn't we craft listening protocols that address the the long-term relationship between listener and recorded musical performance, and the barely understood workings of the subconscious brain?

Let's get real, philosophers and quantum physicists *themselves* are kicking around what "awareness" is.

To make matters worse, we find ourselves *on the brink* of making standards recommendations that could last for *decades*. We'd told that the 12" and 7" vinyl records still have a bit of life left in them, 50 years later. From what we know, how can anyone of us today state that the CD will be so venerated in the year 2027?

Thus, we will this week be asked to consider standards suggestions. We have a relatively new digital format to consider, 96 kiloHertz 24 bit. In no time we will be asked to determine whether physical and program product "watermarking" is audible or not. And, why not mention the arm-twisting to accept high-ratio perceptual coding schemes, and other data reduction / compression methods?

As we listen under unfamiliar conditions to unfamiliar material, to tests with hidden agendas, I would remind us to ask ourselves, "Where are the controversies really coming from?" Are they coming from those of us who love audio? Or are we endorsing our own "Science of Greed?"

Oh, one final question.

Please, when can we as producers again have a mastering, and perhaps an archive, format that is significantly better than the current release standard, thereby insuring our artistic work beyond this years compromised standard? I would remind us that if we as an industry go to a new release sample rate and word width tomorrow, the archive material that will immediately and most likely supply the mastering houses will be analog 1/2" masters.

The Point

It would seem to be more important than ever before for us to invest our hearts and our resources in doing good, new science. Not market research. Not productization. Science.

As **Lord Kelvin** stated in his Popular Lectures and Addresses, "When you can measure what you are speaking about, and express it in numbers, **you know something about it**: but when you cannot measure it, when you cannot express it in numbers, **your knowledge is of a meager and unsatisfactory kind**: it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science."

But let's get even *more* real. Where is the support going to come from to execute the research to extend our understand of hearing and perception?

Although I stand in awe and appreciation of the so-called Prosumer revolution, the emergence, acceptance, and finally market domination of the low-to-mid-range 8 track digital machines, digital audio workstation, low-end digital and analog consoles and peripherals.... and although I applaud the 'Project Studio' paradigm, and appreciate how much less expensive it can be to master a technically acceptable CD.

...although I, like so many of rest of us, pick from among the technological cherries from that tree, I have come quickly to hear and to feel the limitations in Prosumer technology.

I *am* impressed with the prices, but beyond all technical issues, I'm hearing very little in the way of real innovation or real improvements in music traceable to the technology itself.

Let me digress and point for a moment to a similar revolution in photography some decades ago that put professional photographic tools into the hands of nearly everyone for a great deal less money. But, the Nikon F and it's forebears didn't transform the photographic amateur into Ansel Adams or Richard Avedon or even Annie Leibowitz.

Want to talk about computers? A contributor to Gabe Wiener's ProAudio mail list points out that with a "near typesetting quality" printer on every

desk, we now see more badly written, poorly edited, and hard-to-read publications than ever before.

But, back to audio.

I'm sorry folks, Glen Ballard and others were doing *great* records long before Glen produced the Alanis Morissette record. The record *did not* sell in excess of 20 million copies because it was done on an 8 track digital recorder. Alanis and Glen wrote great music, it was not written for them by a machine. Their work connected; it told a story; it spoke to an audience that was largely being ignored. The technology worked mostly *because it was transparent to the art*.

Let's get real.

I would ask these Prosumer companies that have profited so much, "What have you invested in basic research?" I'd ask them if it's not time for them to do so. We should be *deeply suspicious* if and when the only 'evidence' for maintaining the status quo is these companies *can't afford* to do better.

I would remind them, and all of us, that there's no such thing as a free lunch.

Let me speak to each of us for a moment...

Wrap-up, Digital

To those among us that believe that things are just fine the way they are, that 44.1/16 two-channel is "good enough", let me give you the bad news.

Technology, and silicon technology in particular, has *bounded* ahead since the CD standard was cast. For instance, the rather expensive 1 MIPS minicomputer from 1980 has been eclipsed by inexpensive 200 to 300 MIPS PC's today.

Converter technology, likewise, has improved *tremendously* since 1980. We'll soon have faster, more accurate, inexpensive A/D and D/A converters, and engineers who will inevitably ask, "Uh, so, how does it sound if we use these?" Again, the inadequacy of today's efforts will be better illuminated from the perspective and the wisdom that the future holds.

Wrap-up, Analog

To those few among us who believe that we are forever doomed to do evil things to music when we convert analog streams to digital and that new digital technology has no future, let me give *you* the bad news.

First, let me reiterate that keeping up with technological progress is very much like riding Dr. Barry Blesser's elephant of technological progress: go to fast - get a little too far ahead - and get trampled, but fall behind and...well, you can imagine. With every passing day, the manipulation, storage and transmission of media is accomplished more and more by unambiguous, numerical methods. It may be years before we see the return of continuous functions to certain beloved areas of technology.

Secondly, as Ken Pohlmann puts it, there is a "new world", a frontier, out there with much to discover. And the the young and the brash will not be held back by mysticism.

And if that's not good enough, let me quote from the Matthew 5:37 on computers, "But let your communication be Yea, yea; nay, nay; for whatsoever is more than these cometh of evil." Although presumably not *exactly* referring to 4 bit ALU's.

And, let me ask us all. We may not agree amongst us, but for the love of the art of audio, let's make the future proud of our honesty and passion.

"We few, we happy few, we band of brothers..." [Shakespeare]

...let's not try to improve the world, let's just have some honest answers.

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