

Daniel Hertz Master Class vs. Analog Master Tape

Background

If you ask the most respected musicians, recording and mastering engineers, record producers and audio experts what medium they prefer, many will say high speed (15ips and 30ips) analog master tape. Every recording medium has its limitations, but for many people, high speed analog tape remains the top choice for sonic quality.

Many musicians and recording engineers prefer analog tape even though the final product is digital. Chicago-based rock band Wilco is famous for recording this way. Widely considered one of the most well-produced recordings in recent years, Shelby Lynne's "Just a Little Lovin'," her tribute album to Dusty Springfield, was recorded in real time to 30ips analog tape. There must be a reason.

Digital recording is more convenient and has features that are very seductive. You can work faster with no noise or degradation in post production, make unlimited copies with identical quality, send files via the Internet, and so forth. There are many powerful audio mastering tools for computers, some of them industry standards. Typical engineering measurements indicate that digital audio is technically superior, but for sound quality, listeners often say that analog is less aggressive, that it simply "feels better."

The high end audio industry proposes that the cure for aggressive digital sound is more expensive digital to analog converters, cables, and electronics. Ultimately, all of them are ineffective, because they don't address the fundamental issues of human response to digital audio.

The basics: Analog and Digital

Analog audio is based on the sine wave, the fundamental artifact of any natural radiation. Its properties were first demonstrated in the 19th century by the German physicist Heinrich Hertz (great uncle of Mark Levinson, founder of Daniel Hertz SA). Digital audio is based on taking

many small samples of a sound wave. When these samples are recreated with the proper time base, the result is a step-function waveform, so called because the edges of the waveform look like steps.

Using various health diagnostic tests, the step-function waveform has been shown to produce a negative response in the human brain.

This was first demonstrated by Dr. John Diamond at the 1979 Audio Engineering Society conference in NY, where he demonstrated physiological effects caused by pulse-code modulation (PCM), the technology format of the CD and MP3. Dr. Diamond was ridiculed by top executives and engineers from companies like Sony who felt threatened by his findings. They rejected his research rather than using it as an opportunity to refine and perfect the new audio medium they were introducing as the standard of the global recording, entertainment and communications industry.

Dr. Diamond was prophetic. All the predictions he made regarding digital audio have come to pass, including a revival of the analog LP and reverence for analog tape recording.

In 1975, Mark Levinson developed the ML5 high-speed analog tape recorder, based on the Studer A80 transport with his own custom record and playback electronics. Today, through the Tape Project organization, a number of companies are offering analog tape copies of original master tapes as an ultimate source for the rare few who want the ultimate listening experience.

High-performance analog tape is a luxury process. Quality machines are rare and expensive, parts are hard to obtain, and qualified service technicians are becoming an extinct species. Among the complex issues involved with analog tape are proper calibration of the tape recorder's playback electronics, head alignment, playback head degaussing, tape storage and handling, degradation over time of the tape itself, and limited supply of content. Tapes degrade from use as well as from less than ideal storage conditions. Each successive copy adds noise,

distortion, frequency response changes and dynamic range compression.

To maintain their integrity, master tapes must be carefully stored and carefully played. What most people don't know is that so-called "first generation" high speed analog tape copies are usually made from digital intermasters, made to protect master tapes from excessive wear. They are, in fact, not real analog tape copies of the master tape. They are analog tapes made from digital recordings of the original master tapes.

As Dr. Diamond correctly perceived, once an analog recording has been converted to PCM it will create a negative effect on the human brain even if converted back to analog or DSD (the format of SACD). The unease that listeners experience with digital—often called "listening fatigue"—will be provoked by the analog copy if it was made from a digital intermaster. Better cables, sweeter-sounding amplifiers, and more exotic loudspeakers won't make these unpleasant artifacts go away.

There is now a way to eliminate the listening fatigue of PCM digital audio by using Daniel Hertz "Master Class" playback software for Mac.

The Ultimate Test

On the 20 and 21 of September, 2014, a major audio exhibition took place in Gothenberg, Sweden. Audio Concept, the premier audio store in Stockholm and a new dealer for Daniel Hertz, invited Mark Levinson to attend the show to assist in introducing Daniel Hertz products and philosophy to Sweden.

Robert Grubstad, owner of Audio Concept, brought a 15ips analog tape recorder to the show with a collection of 15ips analog tape copies of famous recordings, including the 1950's Sonny Rollins "Way Out West" (with Ray Brown, double bass, and Shelly Manne, drums).

Mark Levinson downloaded the "St. Thomas" track from Apple iTunes on his MacBookPro and made a Master Class version (AIFF file) on the spot in a few minutes. With playback levels matched, Grubstad's

analog tape machine fed one analog input, and the Mac played through the built-in USB DAC of the of the Daniel Hertz M6L preamplifier. The result? Everyone in the room—including many respected audio experts—by far preferred the Master Class version.

The ramifications of this are deep and far-reaching.

In effect, it means that you can rip CD's to your Mac and download compressed files, and from them, make Master Class versions that are equal to or superior to the original analog masters or digital masters.

How ? By addressing two engineering fundamental issues: tonal balance and digital listening fatigue.

Tonal balance

Of all parameters that determine our listening experience, the most important is frequency response. Many of the differences that we hear in audio equipment—especially the differences that reviewers hear in speakers and cables—are the result of differences in frequency response.

Recordings of music vary greatly in tonal balance because of differences in how they are made. Mastering engineers use playback systems that are quite different, one from the other. There is a window of +/-12dB in frequency response between these systems so the recordings mastered on them vary by this amount as well.

Unlike video engineering, where there are strict industry-wide standards about color, brightness, black level, etc., the audio industry has almost none. This accounts for the wide range of interpretations of “realistic sound” offered by hi-fi manufacturers and recording engineers alike.

Recognizing this pernicious problem, Mark Levinson introduced the Cello Audio Palette in 1984. The Cello Audio Palette was and is the first and only analog equalizer with no sonic coloration, designed to

offer tonal balance correction capability to both the residential and professional audio communities.

In production for 15 years with virtually no changes, the Audio Palette today is the most collectible, most costly, and most hard-to-find audio component in the world. Approximately 1000 Cello Audio Palettes were sold between 1985 and 2000. The introductory price was \$7,500 and the last new price was \$25,000. Almost 30 years later, these units sell for \$15,000 - \$20,000—if you can find one.

Daniel Hertz Master Class is the digital version of the Cello Audio Palette, providing even better performance and many useful features for a small fraction of the cost.

Digital Audio Listening Fatigue

Master Class has a unique feature called “A+” which addresses the listening fatigue issue. A+ is an algorithm that fills in the spaces in the step function wave form with original musical information so that the brain perceives it as an analog wave form. This eliminates the listening fatigue issue.

EQ and A+

Equalization is the art of making fine adjustments to the frequency balance of a recording to make it more lifelike and compelling. It's the primary tool used by mastering engineers in the production of virtually all recordings of music and film sound tracks.

Mark Levinson discovered that the combination of EQ and A+ yields the best possible listening experience. One or the other is not enough. A+ is an algorithm that can be turned on and off, but EQ must be done on an individual basis with a given playback system and a given recording. There is no substitute for your ears and your taste.

Humans can easily hear a difference of 0.5dB. Since there is no real tonal balance standard for playback equipment, there is no automated way to optimize the listening experience. It has to be done individually,

with each recording and each system in its own space. The proper EQ for a hypothetical System X isn't the right one for System Y.

We live in an age where people expect speed, low cost, and convenience in almost everything. But music is an art, and art is not based on speed, low cost, and convenience. It is based on dedication, love, and the pursuit of excellence. For those who share a passion for music reproduced with the most natural sound and emotional impact, Daniel Hertz offers Master Class for Mac. Simply put, Master Class is for those who refuse to compromise their music.

A Message from Mark Levinson

I have been recording music since around 1959 when I was 13 years old. I have always loved recording with analog tape. Using Master Class, I am able to make digital copies of my 15ips and 30ips master tapes that sound better than the originals. Master Class allows you to overcome limitations in the original recording with no unwanted effects. It is quite a miracle.

I have used all digital audio recording formats but of all of them, my favorite is now the Master Class AIFF file. With Master Class, we can get astonishing results from any resolution—from MP3 to DSD. Of course, it is nice in theory to have higher resolution, but with Master Class it is possible to enjoy recordings in MP3 as well as higher resolutions.

Audio technology is much like photography. Just because a picture has high resolution doesn't mean we enjoy it, and just because it has a lower resolution doesn't mean we won't enjoy it. After a certain point, the discussion is academic and not very meaningful. What we need in music reproduction is the ability to get lost in the music the way we do with analog tapes and LP's—to forget about hardware and technology and simply enjoy the music. This is what we lost with PCM digital audio. And it's what we regain with Master Class.

Master Class may be the most significant product of my career in audio. My work is associated with high-quality playback equipment that delivers exceptional sonic experience. I am proud of every piece that's ever been associated with my designs.

But audio systems do not reproduce music; they reproduce recordings of music. The recording is the most important part of the listening experience. For every audio system, you can find some recordings that sound pretty good, but with Master Class, the whole world of recorded music opens up with unprecedented natural sound and emotional impact. And while the best audio equipment is priced out of reach of most music lovers, Master Class is affordable to the wider audience, is easy to use, and has many wonderful features.

There is a common assumption that you need the most expensive audio equipment to get the best sound. I don't think this is true. With Master Class, an affordable audio system can sound much better than a very expensive audio system without it.

The early days of quality audio were filled with music lovers and engineers who enjoyed recordings of great music and appreciated excellence in audio equipment.

Today's high-end audio world is driven by profit-making schemes. Magazines give the best reviews to their biggest advertisers, manufacturers sell products with no real engineering basis to justify staggering prices, and the customer is valued last. It is for the most part a world of deception, disappointment and financial loss.

I do not associate myself with this type of business. I founded Daniel Hertz as an alternative to what high-end audio has become. Daniel Hertz offers audio equipment based on solid engineering merits and fair pricing. We build for you what we want for ourselves.

I did not create Master Class to sell software. My goal is to make people happy with music reproduction, and to make sure those who buy

Daniel Hertz audio systems are completely thrilled with their purchase for decades to come.

Without Master Class this promise cannot be truly fulfilled. Recordings are the most important part of an audio system, and unless there is a way to match them to the playback system and eliminate the typical listening fatigue issues of digital audio, there is no real guarantee that the listener will be happy. With Master Class, that promise is guaranteed.

Master Class is friendly to all playback systems. You can use the equipment and music library you already own. Just because audio equipment is more expensive doesn't mean it will make you happier. This is antithetical to the business model of the high-end audio industry, which is to encourage people to keep buying more expensive equipment and new versions of the recordings they already own even if there is no advantage. It's about making money, not advancing audio.

The business model of Daniel Hertz is based on love of music, real engineering, long term satisfaction, honesty, fair pricing, and putting the customer first.

Footnotes

DSD and SACD

Direct Stream Digital (DSD) is a good idea in theory but not in practice. The reason is that there are no mastering tools for DSD. Sony, who introduced the DSD format, found it too complex and gave up. Record producers therefore have the following choices:

1. Record in DSD with no mastering. This is not an acceptable option to most people who make recordings
2. Record in DSD, convert to PCM, master in PCM, and convert back to DSD. This is the way most DSD recordings are made. The problem is that once you convert to PCM, you lose the advantages and can't recover them. The residual artifacts of the PCM step-function waveform remain even when the file is converted to

another medium such as DSD, and they induce listening fatigue just like the PCM version`.

3. Record in DSD, convert to analog, master in analog, and convert back to DSD. This method involves digital-to-analog conversion, the sonic limitations of the analog equipment, and analog-to-digital conversion. It is not pure DSD.

Even worse, some companies are taking recordings made in PCM, converting them to DSD, and selling them as DSD/SACD for more money, with no sonic advantage. Sometimes they sound even worse than the CD due to the processing used to make them. Many music enthusiasts have been disappointed to discover this. Promising customers a better listening experience but asking them to pay for the same thing they already have—or in many cases, worse than what they already have—shows contempt for the buyer and is deceptive if not outright fraud.

Apple iTunes and MP3

If a compressed audio file is made with care from the original master, it can be processed with Master Class and sound wonderful. If the original master does not sound good or if the MP3 conversion quality is poor, the results with Master Class may be limited. iTunes recently created the MFi spec, a protocol for making a high quality MP3 version from the original recording. MFi files are generally excellent for use with Master Class.