

audiolense



Liberate the music!

After 3 months with Audolense XO in my system, I have come to the conclusion that I am experiencing nothing less than a complete technological breakthrough! Here we have a product that finally realizes the dream of close to perfect digital sound reproduction in a typical domestic environment.

TEXT: PETER DALE

The need for Equalization or EQ is not new. In the 60's it was common for amplifiers to have bass, midrange and treble controls to correct for acoustic deviations in the recordings and to accommodate the sonic peculiarities in quite a few speaker builds of the time. In the 70's these were superseded by separate graphic or parametric equalizers with fashionable rack handles. Since the 80's, the trend towards minimalist amplification and 'direct source input' has made the old analog tone controls less well regarded. Digital Signal Processing or DSP was introduced in the wake of the CD medium and the digital developments of the 90's. In short, DSP enables not only EQ but also Digital Room Correction or DRC and other sophisticated forms of sound treatment

to take place entirely within the digital domain. Just in case anyone has forgotten, room acoustics are actually the weakest link in the whole playback chain. Standing waves, early reflections and their uneven decay all cause degeneration of the sound much more so than the vast majority of the world's electronics. On the other hand, we live where we live and even we enthusiasts can't just tear down the walls or get rid of the spouse, so most of us have to settle for the room acoustics that are already there.

Peter Lyngdorf and Tact were early to market with serious DSP products. He is a true visionary and a vigorous business man who has earned his place in the hi-fi business Hall of Fame. Over time others such as Marantz and Accuphase have entered the scene along with those in the semi-professional arena such as DEQX and Behringer. Recently, in Fidelity #29 we tested the Copland DRC205's room correction capability. It's safe to say that DSP is presently one of the strongest trends in hi-fi and is now found in numerous receivers, multi-channel systems and subwoofers.

UNREALIZED TECHNOLOGY

In the early years, audio aficionados learned that as with sound quality from the CD medium the DSP lunch wasn't entirely for free. Taken in isolation, conventional DSP can seemingly perform magic since smaller and larger corrections can be made "almost" without loss. The problem is that "almost" isn't good enough for us audio folks. Something happens with the sound that I just don't appreciate.

A few years ago I tested the then version of the Tact RCS and described how the DSP introduced a sort of "bland" sound character that was a little "tame" in its presentation of micro dynamics. The beats and strokes on some of the instruments were smoothed out.

To me, this is a very serious shortcoming, since a good pulse response and well reproduced micro dynamics are key parameters in the quest for realistic sound reproduction. Since then the Tact technology has improved by a noteworthy margin. But I read recently in the July 2008 issue of the highly regarded Hi-Fi News, that the reviewer expressed his dissatisfaction with a "significant blunting of precision, which softens dynamics and adds an element of sameness to everything this system reproduces". This was from their test of a complete Lyngdorf system with DSP room correction. Similarly, in Fidelity #29 the review panel stated that the Copland DRC205 amongst other things gave a "lusterless dynamic contrast".

One question that we should perhaps be asking ourselves is why in 2008 aren't more high-enders using DSP room correction? The technology is superior; at least on paper. I think this can partly be explained by those aspects of psychoacoustics that address how we perceive sound in familiar surroundings.

By way of these phenomena, over time we create an adaption syndrome that masks our awareness of the room's acoustic characteristics. After a while we simply tend to ignore the poor acoustic properties of our living rooms. Our brains adapt and they work continuously to "listen past" the room's limitations. This is most noticeable when you come home from a long vacation and turn on the stereo. Since the acoustic memory has been weakened you will more easily notice the room faults. This is something I have experienced on many occasions, while visiting other enthusiasts they respond with puzzlement when I comment on the irregularity of their room's acoustics.

Needless to say, I've also experienced this from the other side when I have had guest listeners. While I strive to demonstrate resolution and dynamics, they sit there and complain about the poor sound due to room induced colorations and resonances. My point is this; we learn to live with suboptimal acoustics. On the other hand, the ear is far less forgiving with regard to reduced micro dynamics. Even though DSP corrected room acoustics may represent ten steps forwards, we still find ourselves becoming frustrated if the micro dynamics take

even one step backwards. Put another way: You can learn to live with an aching hip, but you can't walk very far with a stone in your shoe.

It was therefore with certain skepticism that I accepted the request from Bernt Ronningsbakk to test Audiolense.

LISTENING TEST

Bernt came over from Stavanger with his own audio-PC in the car. He connected the equipment, made a measurement, ran a few algorithms and shortly after that we had sound. Bernt did a brief check before concluding that the correction was acceptable and vacating the mid sofa seat. For me this was a moment of *déjà vu*. A huge improvement where the room's influence was significantly marginalized but still with a hint of the unsatisfactory "blandness" or "tameness" that I had previously encountered. Bernt, on the other hand was comfortable with the result and thought that I would be more content if I found an even better target curve for the frequency response. The last couple of hours were spent on user assistance before he packed up his equipment, thanked me for having him as my guest and said goodbye.

The day after, I installed Audiolense on my own audio-PC using Bernt's measurements and the same target curve. In other words exactly the same setup but now with my XX Highend software player and Eximus DAC. Tonally, I found this very similar to my first impression but the micro dynamics and the dynamic contrast had become better. In other words there was less "blandness". The shift from Lynx sound card to Eximus DAC gave an improvement, considering the price difference anything else would be a surprise.

Some of the credit must be shared with the XX Highend player which sounds (slightly) better than Windows Media Player and Foobar. My wife joined me for the evening and we listened to the newest release from Kari Bremnes, she stated quite clearly: "it has never sounded so good before". Basically she was right, but I still sensed that some of the aforementioned "blandness" was present.

THE REVELATION

Then I became aware that Audiolense XO has an option called Group Delay Correction or GDC. This is an extended frequency compensation mode in which Audiolense addresses the pulse response of the corrected signal. No sooner said than done; and on with Kari Bremnes for the nth time. What was about to happen next would go a long way beyond my furthest measure of rational expectation. An outright, number one, top of the line audiophile miracle



Developer Bernt Ronningsbakk

occurred! Immediately I heard that the long lost micro dynamics had returned in all their glory. For the first time in my experience of DRC the snap and punch of the guitar strokes were there to be enjoyed! In a phone call to Bernt the next day he confirmed, in his typically understated way, that with Group Delay Correction he tended to achieve a slightly more “lively” sound.

After discovering GDC I searched through my collection and played all manner of new and old music. In general the greatest quantitative improvement appeared in the mid and upper bass region. Audiolense XO eliminates practically all standing waves in my living room and the result is a clearer and purer bass presentation. When all the excess weight is removed from the lower registers the bass reproduction becomes more articulate and “coherent” as with high quality dynamic headphones.

Such a marked reduction of the room’s resonances in the bass region also produces a purer and more transparent midrange. This is clearly audible in male voices and equally so in symphonic music where, to reproduce the orchestral soundscape realistically, the huge ensemble needs all the elbow room it can get.

Audiolense XO Group Delay Correction processes the signal so that all frequencies arrive simultaneously at the ear. Therefore, Audiolense will compensate for any failings in either the speaker construction or the speaker setup, particularly with regard to toe-in, listening height or stands. If you have a sub located in the far corner, the program will align the other frequencies so that they all arrive coincidentally at the listening seat i.e. at the microphone position, at the same time. The program linearizes phase to as high a degree as is beneficial at all relevant frequencies. We are basically talking about phase errors due to room reflections but since the program corrects all sound at the monitoring position any errors that are not introduced by the speaker or by the room will also be corrected.

All this adds up to razor sharp precision in the soundstage together with pin-point imaging. If the speakers are placed asymmetrically the benefit will be even greater since Audiolense also corrects the channel balance on all frequencies. The recorded ambience becomes more distinct, something

«The sheer impact of GDC was a huge boost for my further evaluation of Audiolense.»

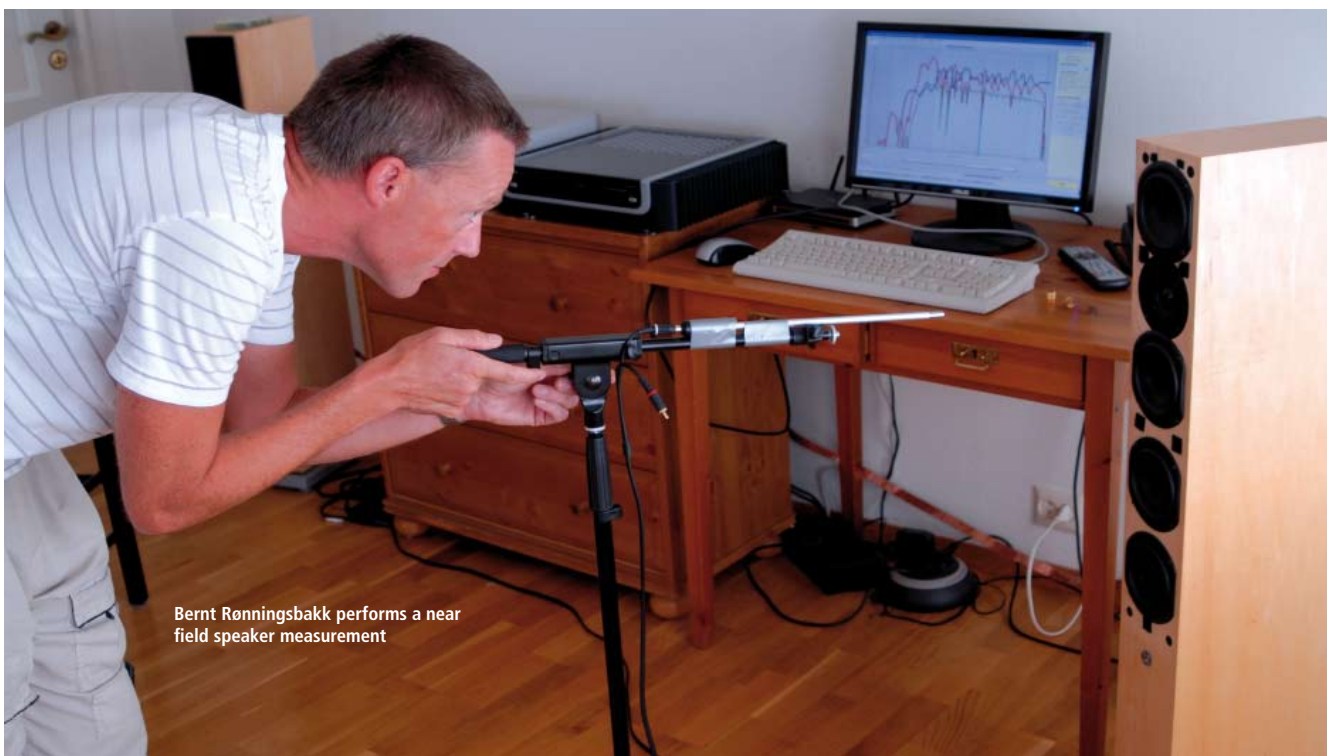
that on most recordings also means a wider, deeper and higher sound stage. You can also quite comfortably monitor these at greater volume levels since the distortion from the dominant room modes has been brought under control. In other words: Audiolense delivers more pure near-field sound all the way over to you on the sofa.

Everything that Audiolense does with the signal is based on what the measurement microphone captures in the listening position. So you get the optimal result around the sweet spot. Seated on the sideline, the stereo image becomes a little less razor sharp and the tonality may vary. For instance, the correction for standing waves in height and length modes will remain effective, while the correction in the width plane may tend to err. But it doesn’t get any worse with Audiolense than it would have been without correction. A little bit different perhaps but not “worse”. Another point is that mentally, one tends to take off the critical spectacles when one is lying on the sofa enjoying background music. In such situations the musical experience tends to be more important than the absolute sound quality. The saying that you have to listen to all DSP’ed systems with your head clamped in a vice is a total myth.

EQ

The combination of the proprietary GDC and linear phase FIR filter technology makes Audiolense the “world’s best” equalizer where you can effectively draw any target curve. The graphical interface is easy to use and you can have as many dB of cut or boost anywhere in the frequency spectrum that you wish. You simply rub on the magic lamp and Audiolense translates your wish into reality. You want American, English or German sound? - No problem! With Audiolense, in a moment, you can create a single peak in the bass, a BBC-dip in the midrange or produce a more pronounced presentation in the treble. As well as correcting for failings in speaker construction or placement you can also create an almost infinite variety of EQ curves to compensate for particularly oddball media mastering. Considering the current controversy over cables and the danger of seemingly endless and predictably expensive confusion arising. It appears that the scope for beneficial adjustment from within Audiolense far outweighs what one may hope to achieve through dabbling in exotic interconnects.

The only real limitations are your speakers and your power amplifiers. If you have a 2-way shoebox design you can’t expect to push it to massively high output levels at 20Hz. Neither is it likely that your amplifier has enough power - try to force it and you could later find that along comes a lower



Bernt Rønningsbakk performs a near field speaker measurement

frequency transient and pop goes the protection. When you screw up, so that it doesn't all end in tears with horribly distorted sound or a smoke filled room Audiolense has a "limit lock" at 6dB of boost. Unless you deliberately click on a menu item the program will not allow corrections beyond this range.

Another point to be aware of is that Audiolense often corrects room errors by several dB, especially for standing waves in the bass or when compensating for large phase errors in the signal. However, the software also has special features to ensure that tonal improvements need not necessarily use more amplifier power. If you make abnormally steep EQ curves the program will place a guiding hand on the wheel and will subsequently implement them with a more gradual rate of progress. Thus, you sit and play with simulations of your target curve on the screen and you can easily see the results as a graph of the "expected" frequency response before you ask the program to create a correction filter.

BILL & BERNT

Bernt has wisely chosen to develop Audiolense on a Microsoft platform. In terms of reliability, within the test period I have not encountered any bugs in the program. All buttons, menu items and functions work properly. The integration with the rest of Bill Gates' world is similarly simple. In 2008 the majority of consumers will use Audiolense on a PC with the XP or Vista operating systems.

As a first time solution you can go with Microsoft's Windows Media Player, which allows so-called plug-ins, such as the free Convolver.

If you become more adventurous the Foobar player also accommodates plug-ins. The most spectacular way is, in my opinion, to use the XX Highend player program. It can handle plug-ins, but I have created a digital loop in the software of my Fireface 400 (see test in Fidelity #33). I count the Fireface 400 as a first class external sound card. The quality of the digital S/PDIF output alone is worth the price. Here I use a plug-in host called Console to run correction files from Audiolense. But that said, for the novice in the PC world, it's easiest to start with a complete Microsoft suite.

There is no barrier to using Audiolense with an analog signal source. With a high-quality audio interface that provides A/D and D/A conversion, your PC and Audiolense could be used as a stand-alone component in your system. When using a PC with a sound card having an S/PDIF input and output, simply configure it between your transport or CD player and DAC. You can also use Audiolense without ripping your CD collection to the hard drive.

ACTIVE SYSTEMS

The abbreviation "XO" simply means crossover, or more traditionally crossover network. Buy Audiolense XO and you

will get access to active crossovers as part of the package. If you have a three-way speaker, the program will split the signal between the bass, midrange and tweeter units each with customizable crossover frequencies and filter characteristics. This is in addition to DRC and EQ, so here we really are talking about a very advanced digital solution. Naturally, this requires the appropriate number of power amplifiers and D/A converters and possibly a multi-channel analog pre-amplifier. You may either purchase separate DAC's of the same type that you already have, or obtain a so-called multi-channel DAC. These are now beginning to emerge into the domestic marketplace. The German manufacturer RME also has a couple of interesting options.

A number of these multi-channel units are starting to become available following the prevalence of 5.1 channel equipment. A budget variation is to invest in a multi-channel sound card and to regulate the volume in the soundcard mixer. This is Bernt Rønningsbakk's own solution and a top quality professional sound card from the Lynx Studio range can be purchased from www.juicehifi.com. Bernt said that

owners of active subwoofers can look forward to significantly improved integration and sound quality with such a solution.

I have only used Audiolense in a regular 2-channel stereo setup but the crossover functionality is based on exactly the same filter technology so there is every reason to expect results at least as good as those I have experienced. In addition, we may anticipate extra sound quality enhancements coming from the removal of passive crossover network components thereby giving the power amplifier greater control over the loudspeaker drive units. I'll experiment further with this throughout the Fall and come back with a report on how the "all-digital" Audiolense system works.

QUALIFICATIONS

The main consideration here is of course the PC thing. I often say that computers are rather like used cars; there always seems to be something that needs attention. However, it is a straightforward but nontrivial task to set up a quality media-PC with Audiolense. When everything is up and running, on a daily basis, it works very well indeed. Be prepared for those odd slow moments which could be due to a sudden virus scan, automatic upgrade or simply because your spouse turned off the computer without shutting down the programs in the correct order. On balance though, this is less troublesome than operating a high end vinyl rig with

all its adjustments and record cleaning procedures.

A few hi-fi enthusiasts will be more at home with systems of a vintage closer to the wind up gramophone than with a modern PC-based system. If you have invested a fortune in a vinyl rig, you may not be tempted to digitize the whole of your audio system. So Audiolense may not be the answer to everyone's prayers. Previously, I have advocated the sound quality benefits of ripping your music collection to a hard drive and now with Audiolense the advantages of doing so are even greater. I believe this program will convince a lot of hi-fi enthusiasts to come down off the fence and convert to PC-audio.



«Bernt has wisely chosen to develop Audiolense on a Microsoft platform giving users stability in the operating system and good integration with the device drivers.»

Aside from these few points there is little else to criticize. Much has been done to increase ease of use and at the same time the program has a number of ground-breaking features and functions. As of September I do think that the English language help texts both in the program and in the user manual on Juice Hifi's web site still need improvement. I'm sure that an associate Professor is capable of better (grin). Moreover, the folder where my correction files are stored rapidly became an unorganized mass of correction filters. However, these are minor details, for all I know Bernt will have already dealt with them before this issue is published.

With respect to the most important aspect of all – sound quality – the program executes all its processes with virtually no degradation of the signal. Improvements are so immensely huge, especially in the bass and midrange region, that I cannot detect any errors. The treble passes through without damage as well. Perhaps it comes out ever so slightly dry? I perceive that my ribbon units sound subtly

like a beryllium dome tweeter, discrete and uncolored but dynamic and effortless when the music calls for it. As I said, this is marginal. I like to listen at high sound pressure levels, and maybe it's the reduced impact of room reflections that I'm hearing? Anyway, with the sensational XRCD mastered Sheffield Lab Drum & Track Disk played back at 110dB SPL Jim Keltner's drum kit has real beat and punch; cymbals and hi-hats are presented with such superior dynamics and liveliness that all visitors exclaim it sounds even better than live!

CONCLUSION

Formerly, exceptional acoustic reproduction has been the exclusive privilege of those with deep pockets and large houses. Audiolense digital room correction now makes this accessible even to those with two rooms and a kitchen. Together with its equalization and crossover capabilities Audiolense also enables really great sound from smaller speakers. With a budget starting from somewhere in the region of EU/s 1000 - for the program, measuring microphone and PC you are unlikely to find a better proposition.

Audiolense is a true state of the art product with unprecedented levels of precision and resolution. It sets a new standard for DSP audio systems. Once installed on a modern PC the functionality and usability of Audiolense provide substantial improvements over the alternatives. For the first time I have experienced digital sound correction that delivers what its advertising promises and does so without introducing any significant auditory artifacts. Audiolense XO is a true reference level product and has now become a necessary component of my reference system. As one very critical member of the listening panel finally put it: Now it's just impossible to listen to your system without Audiolense!

Information:

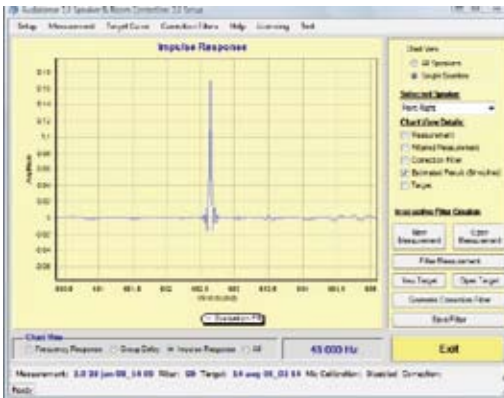
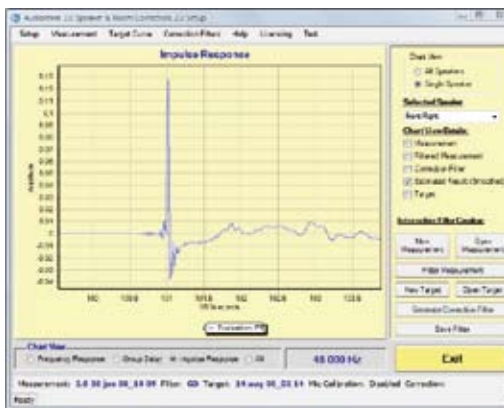
Audiolense XO version 1.3: 375 EUR

Extended license upgrade

and support (per year): 74 EUR

Measurement microphone + amplifier: 161 EUR

Webshop: www.audiolense.com



Filter Procedure Designer

Procedure Name: Filter length: 150 taps 190 284 taps 32 703 taps 131 072 taps

Filter type: Minimum phase correction and linear phase XO Min. phase correction and minimum phase XO Group delay correction and linear phase XO

Boost linking: Prevent treble boost Prevent bass boost Max correction boost: 6.00 dB Partial correction

Measurement filter window

Frequency	Unfiltered cycles before peak	Unfiltered cycles after peak	Unfiltered cycles before peak	Unfiltered cycles after peak
Low Frequency (10 Hz)	8.00	500.00 ms	10.00	1000.00 ms
High Frequency (24 000 Hz)	8.00	0.21 ms	30.00	0.83 ms

Correction filter window

Frequency	Unfiltered cycles before peak	Unfiltered cycles after peak	Unfiltered cycles before peak	Unfiltered cycles after peak
Low Frequency (10 Hz)	8.00	900.00 ms	6.00	600.00 ms
High Frequency (24 000 Hz)	8.00	0.21 ms	6.00	0.33 ms

Help (F1)

STOP PRESS!

Just before this issue went to press Bernt Rønningsbakk alerted me that he would soon be releasing Audiolense version 3.0. In this he has increased the system's resolution with a longer filter length of a staggering of 131,072 taps and he has further developed a new correction algorithm that is even more effective for late room reflections. He gives Fidelity a little bit of credit for some of the improvements in the version 3.0 release. Bernt had retained the measurement files of my subwoofer's in room response that go all the way down to just under 4Hz. Working with this data he has been able to make more precise simulations and predictions in the lower bass region and thereby produce filters that provide an even better room correction. The price of version 3.0 is unchanged and those who have purchased Audiolense during the past year can upgrade for free. Excellent news!