

In this newsletter you will find:

- Welcome p1
- About us p1
- Our vision – modules for DIY p1
- New product - DIY CD player p1
- Techtalk - jitter p2
- New products - tubes and digital p3
- New applications - field coil power p3

Dear reader,

This is Tentlabs' first newsletter. We intend to send about 4 each year, to inform you on a regular basis about new developments, products and future ideas. It includes our tech talk for the more experienced DIY crowd, where we share technical issues. We appreciate feedback, comments, suggestions, corrections and more.

We hope you enjoy reading this newsletter.



Guido Tent



Boy Spaan

About us

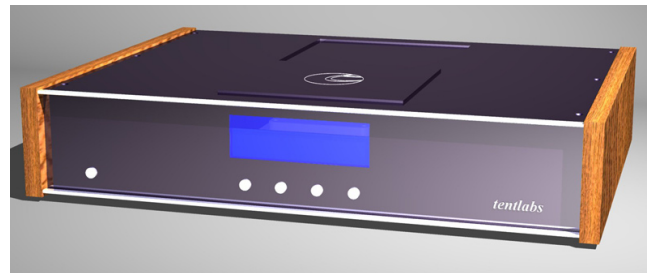
After going full time May last year, Tentlabs grew quite rapidly, so we welcome our first employee, Boy Spaan. He is responsible for module assembly, product testing and product quality. He also takes care of all IT issues in the lab.

Our vision

TentLabs designs manufactures and sells audio modules, performing specific functions in the audio chain. We strongly believe in the audio module business. Assuming that the architecture and implementations are set up right, the amount of applications widens. A well-balanced combination of modules results in a DIY CD player, whereas some of these modules combined with others create a high end DAC. We will extend the range of modules in other area's, generating many many new applications for the enthusiastic DIY'er and music lover.

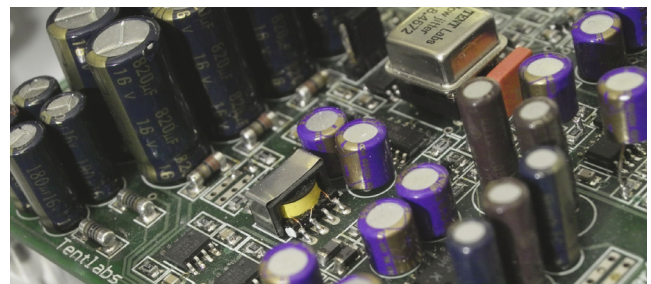
New product - DIY CD player !

We are about to finalise a new DIY CD player. Availability will be October. It is a beautiful sounding product, surpassing many commercial units being twice as expensive, or more. Worth waiting, so start heating up that soldering iron!



Available as integrated CD player as well as CD drive (transport) only, the kit will be complete, containing the cabinet, all modules, parts and wiring you need to build a working player. The wonderful, slightly retro styled, cabinet is fully modular, all boards are pre-assembled and tested, cabling is as much as possible pre-fabricated so what is left is the mechanical assembly of the cabinet, putting all the boards and modules in, wire them and

The result is a professionally looking CD player. The respected Philips CDpro drive, Tentlabs clock and high end PCM1704 DA converter chips (running in non-oversampled mode) are surrounded by 12 (!) voltage regulators. 6 of these are equal to the well known Tentlabs shunts. Audiophile capacitors like Black gate and Panasonic are used throughout. A double-sided board gives place to all 240 parts.



The DAC output current is fed into a novel design E88CC based IV converter. A 6X4 rectifier assures clean, smooth and transparent playback. A straight output with (2.7 k-ohm) and a buffered version (< 200 ohm) offer flexibility to most (pre)amps.

Please take a look at our renewed website for more info about the DIY CD player

Techtalk

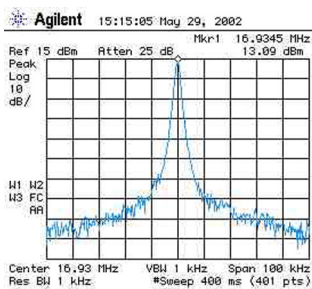
I'd like to share with you some basics on jitter. Jitter are short term deviations from something that is supposed to show constant performance. Consider a normal watch that ticks every second. If the ticks are not evenly spaced we have a jittery clock. Usually this is no problem, as long as the long-term stability is OK you'll be in time for your next appointment. However, there are occasions that clock-jitter is of utmost importance, for example a 100m race. Differences are in the order of 0.01s so each second should precisely be 1 second!.

Redbook

The same holds for audio! It is of no importance whether the clock is slightly off its' absolute frequency, specified in ppm's (parts per million). According to the redbook CD standard, limits are +/-100ppm. A single 440Hz tone then could only deviate +/- 0.044Hz in-audible. It now becomes clear that specifications like 2ppm accuracy do not add to sound quality. A TCXO is such clock that achieves low ppm values, as it is very constant over long time. Fine to have on board of an accurate frequency counter, but no use for audio.

Short term

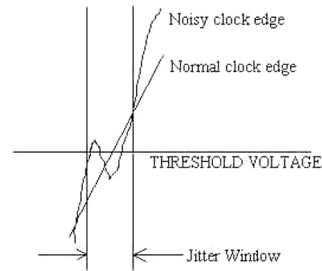
The short-term stability is important! Cycle to cycle deviations, or cycle to 100.000th cycle. If you look at the spectral content of such signal, it should look like a single frequency, with the noise floor as low as possible (as all periods T are equally long, this translates in a single frequency 1/T). Practical clocks do not show that very narrow single frequency, but a bit wider spectrum, rapidly decreasing at 10 to 100Hz from the central frequency. A well-known clock supplier tried to convince us by showing this graph:



What we actually see is the performance of the analysers' video filter, namely 1 kHz. Good clock spectra are well within this window. The only clock performance we can deduce from this measurement was the one that didn't count for audio: It meets the redbook spec. It does not meet the manufacturers own spec of 5ppm though

Claims

Another clock manufacturer tries to convince us existing clocks look horrible in the time domain:



Honestly, I've never seen such "noise clock edge". What does happen is that the crossing of the edge passing the threshold voltage is amplitude modulated, but that looks different than what above picture suggests.....

I read another claim:

" It completely outperforms its predecessor and sets a new standard in master clock oscillators and far surpasses any other aftermarket clock available "

wheras yet another manufacturer claims:

" Jitter factor 10 lower than other leading ref. Clock "

The only way to compare clock quality is to supply measured data and compare that. Again another clock manufacturer specifies

" Accuracy: +/- 1ppm, Jitter: 1.5ps "

Proof

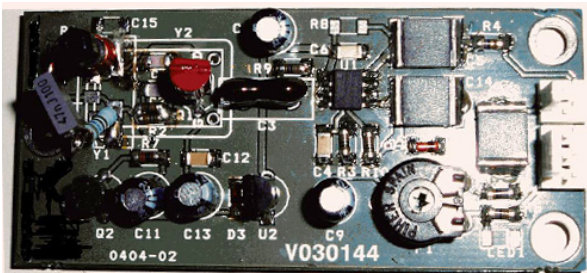
At least they specify the jitter in ps. Unfortunately, the measurement bandwidth is lacking, so this spec is still useless (similar to noise specs in the time domain without giving the measurement bandwidth).

Tentlabs XO clocks are below 3ps rms in a bandwidth starting at 10Hz (the noise decreases with increasing frequency so the jitter there does not add to the integrated jitter level).

Well, interesting, but what does this do with the sound? From our own perception, but also from customers feedback, the colouration in the low end reduces, precision and focus increase, the grain disappears and the typical stress of digital playback reduces to a great extent!

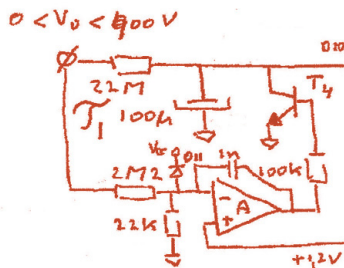
Implementations

Be careful out there in the jitter jungle. Below clock was found in the upgraded CD player of a customer. He paid 250 euro and wasn't happy with the sound quality. Apart from the horrible implementation, the oscillator was of the LC type, which by default is worse than crystal based types.



New products

We have many new products on our roadmap, we'd like to share some ideas with you. The range of modules intended for building tube amplifiers will be extended. We now have heater and filament supplies available. New modules that bias output stages will complement these: one for class A and one for AB circuits.



The drive level of AB amplifiers affects the bias once it goes into B. Traditional control loops drift depending on the drive level. Menno van der Veen and Guido Tent solved the problem with a novel circuit. The result will be a module providing stable bias to multiple tubes, equally adjusted with only one trimmer. That bias stays independent of tube age. Additional high voltage regulators and some more nice goodies together will help you building tube amplifiers.

Another area is digital audio. In short future Tentlabs will bring a high end (read low jitter) USB to SPDIF converter to the market. As a stand-alone module this will interface your PC audio with your existing DAC, improving the sound quality over standard PC audio. The same module will also put out I2S, the interface format used in our CD player - Yes, the CD player is prepared to embrace this module, creating a one box solution for

playing back optical discs as well as harddisc based files. The module will also contain a wordclock input, so the Tentlabs CD drive then matches perfectly to DACs with wordclock outputs like dCs.

There's much more to come, keep reading next newsletters and watch the webspace.

New applications

Late 2003 we introduced the filament supply, to heat directly heated tubes like 2A3, 300b. In contrast to the AC heating methods (high intermodulation distortion) or voltage regulator based DC solutions, this new Tentlabs topology has satisfied many customers, bringing the ultimate transparency to directly heated tube amplifiers. Now available in 2.5A and 5A version, as well as low noise version for line amps, one of our customers found another interesting application area: He uses the modules to feed the coil of field coil loudspeakers.



He reported similar positive results as found when upgrading tube amps with these filament supplies, very interesting and taking the potentials of field coil speakers one step further. There aren't many field coil speakers left, but Fertin and Supravox make new ones.

Feedback

We are interested in your opinion, and therefore appreciate feedback

- Did you find this letter readable?
- Which subjects do you find interesting, which not?
- What did you miss in this letter?
- Do you know other people who would like to receive this newsletter?

www.tentlabs.com,
info@tentlabs.com,
 +31 (0)40 2130 186

Subscription

If you do not wish to receive this newsletter please mail us at newsletter@Tentlabs.com with "unsubscribe" in the subject field.