An innovative approach to suppress the distortion of electronics

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Every amplifier, no matter how well made, distorts. Don't be fooled: the distortion-free amplifier still needs to be invented. The distortion, introduced by electronics, is even at low levels, annoying, which is why all designers strive for an as low as possible distortion level of their brain child. And in order to be able to compare results, the distortion is measured and is expressed in a number, usually a percentage. Sadly enough, in reality this so-called "distortion figure" shows to be indicative at best, but it certainly is not an absolute measure for how we experience the quality of the sound reproduction. This can easily be demonstrated by a couple of simple examples from daily practice: a loudspeaker commonly distorts at least 0.5%, which is significantly more than the 0.01% of a good semiconductor amplifier. Yet, the misery, introduced by the amplifier, is clearly audible using such loudspeakers. Although valve (tube) amplifiers have distortion figures which are significantly higher than those of semiconductor amplifiers, still a lot of music lovers prefer the sound of valve amplifiers. Also, there is no guarantee that a semiconductor amplifier with 0.001% distortion "sounds" better than one with 0.01% distortion. Unfortunately, we will not be able to dig deeper into the backgrounds of this paradox, but it is important to remember that a distortion figure is barely informative on the experienced, sonic, quality of an amplifier.

There is more than one strategy possible to suppress distortion. The most well-known and the most applied is the use of feedback. Every book about electronics describes it in detail and reading through it, feedback looks like a miracle cure: anything works –on paper at least- a lot better with feedback. Yet, there are numerous music lovers of the opinion that amplifiers with feedback do not sound "musically". The discussion about this issue has already gone on for ages and some of the audio enthusiasts state that an amplifier should not have any feedback at all. We, from "Temporal Coherence", do not agree, but the feedback-criticisers do have a point. All theoretical analyses on feedback make a number of assumptions and as long as these assumptions are valid, the calculations are correct. But in reality, not all these assumptions are valid all the time. And then things go wrong and nasty side effects can occur. So at "Temporal Coherence" we do apply feedback, but only when all the assumptions have been fulfilled. Which is why our amplifiers are built using solely discrete components. Only in this way, we can only guarantee that feedback can be applied without side effects.

A second strategy is to optimise the distortion for our hearing. This sounds rather contradictory, but what we mean is that the properties of the unavoidable distortion are

tailored such that it bothers our hearing the least. Most semiconductor amplifiers produce harmonic distortion which continues to very high harmonics (till above the 30th harmonic of the fundamental). These kinds of harmonics are not being masked by our hearing and are not generated by traditional instruments. As a result, such distortions are annoying even at very low levels (read distortion figures) and lead to an amplifier which does not sound “musically”. At “Temporal Coherence” we have, supported by extensive computer calculations, developed designs which produce little to none higher harmonics. The distortion products which are being generated are masked by our hearing and are already present in the music itself, which makes that these are experienced as non-annoying.

We have a saying in Dutch: “*it is better to prevent than it is to cure*” and this also holds for distortion. By means of an extensive analysis of the causes of distortion of transistors, we have managed to realise designs in which the distortion of the individual transistors has been significantly reduced (by a factor of 10 – 20). This enabled us to create designs with a very low level of distortion, even before feedback is applied. This, in combination with the sonic optimisation of the distortion, has resulted in very “musically” sounding amplifiers with a very open sound stage with ease, a high degree of detail and a well-defined stereo image.

But there are more aspects which can wreck havoc on amplifiers. An often neglected point of attention is the power supply. One of our yells at “Temporal Coherence” is that no amplifier can be better than its power supply. Which is why we have installed a more than sufficient power supply to make sure that under all operational conditions enough power is available so the amplifiers can deliver to the loudspeakers whatever is required. Only then the amplifier is able to display a stable sound stage with ease. The power supply is often treated as a step child, but we have the opinion that trying to save on the power supply costs more than it brings. A good power supply does cost money, but in order to bring the best of the music to the listener, it is essential. Which we have made audible by a large number of demonstrations.

With this article, we have given you some insight into the design philosophy at “Temporal Coherence” and we hope this motivates you to attend a demonstration of our systems. Because only in that way, you can be convinced that this innovative way of designing bears also sonic fruit. If you are interested in more background information: on our website you will find a large number of papers which can be downloaded for free and which include a lot more information than has been laid down in this short article. For questions and/or a demonstration you can contact us by e-mail, but please write something in the “subject” line to make clear that you are not one of those “spam-generators” ☺

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