



INFORMATION ON NEXT MEETING

## *Loudspeaker phase distortion*

Thursday, 3<sup>rd</sup> of April 2008, 17h30 at Studio des Nouveaux Monstres,  
Av. du Silo 9, 1020 Renens (VD)

**SPEAKERS:** Alain Roux and Marc Chablais - Relec SA  
Samuel Harsch - Harsch Acoustic  
Veronique Adam - AudioNetworks SA (Goldmund)

**ORGANISER:** Veronique Adam

**LANGUAGE:** French

The purpose of these lectures is to show how loudspeaker phase distortions may be significantly heard and put forward different solutions to correct them:

### **1. Group delay perceptibility and analogue correction (Relec):**

- Introduction of the past presentations made by Relec related to the phase topic.
- General presentation of the experiments of J. Blauert & P. Laws about the threshold of perceptibility of group delays.
- General additional information given by the papers from H. Fleischer and P. Zwicky.
- Link to Relec activities through a feedback of approximately ten years about the perceptibility of PSI Audio users.
- Technical reminder about pros and cons of the analogue solutions.
- Technical explanations on analogue treatments procedure.

### **2. Correction of crossover phase distortion using reversed time all-pass IIR filter (Goldmund):**

The purpose of this paper is to describe a correction implementation of group delay distortion arising from a two-way loudspeaker system crossover. Having determined an IIR all-pass filter having a group delay response

corresponding to that of the system crossover to be corrected, we have validated under *Matlab* and implemented in DSP the time reversal solution proposed by S.A. Azizi, S.R. Powell and P.M. Chau, enabling an IIR filter to be inverted, whilst retaining stability and causality.

In addition to theory and calculation validation, we have also carried out some preliminary listening tests, supporting the evaluation of timber modification, sound clarity and space localization due to the group delay distortion correction.

### **3. Quasi-linear phase loudspeaker using standard IIR crossover (Harsch Acoustic):**

The two most problematic sources of phase distortion of loudspeakers are the low cut of the loudspeaker in its enclosure and the crossover. Currently, there are different ways to correct the overall phase response of a loudspeaker, for example, FIR filtering, or by using different kind of all-pass filters.

Those different methods needs to know precisely the impulse response of the loudspeaker and often to use a very specific device. The method presented here provides an easy way to create a quasi-linear phase loudspeaker only by using a standard IIR crossover, or under certain conditions even with an analogue filtering.

### Biographies:

**Alain Roux:** During 1975, whilst Studying at the EPFL in Lausanne, Alain Roux started producing the first speakers under the PSI brand. Two years later, with the speakers making a profit, Alain formed Roux Electroacoustique which in 1988 became a Ltd company and changed name to Relec SA. At this time Alain also relocated the company into a new purpose built facility at Yverdon. Over the past 25 years, Alain and his team have developed a huge variety of speakers for HI-Fi, PA and Professional Studio applications, a large number of which are OEM products for respected international companies who label and market the products under their own brand names. Many of these products have gone on to win the industries most desirable awards as well as being extremely enthusiastically received by the professional press. Today, however, the core business of Relec is to develop the brand name PSI Audio, cutting edge in professional studio monitors.

**Marc Chablaix:** Born in 1979, Marc Chablaix finished his studies in economics at HEG in Lausanne in 2003. Passionate by the audio field, he became the managing director of the Swiss HiFi high-end brand Orpheus Laboratories in 2004, where he developed the export sales, the brand recognition and lifted up the product line. The efforts paid off immediately and the brand got many awards in the USA, France and Japan during 2003 and 2004. At the beginning of 2005, Marc entered Relec SA to promote especially PSI Audio. Today PSI Audio has evolved into a worldwide brand. His efforts will continue to prove that PSI Audio is more than a black box. Marc is mostly motivated by the subjective aspects related to the acoustics, hence his interest for all the psycho-acoustic researches.

**Samuel Harsch:** CFC d'électricien Radio-TV. Brevet fédéral de technicien du son. Since April 2005, he works as an Electroacoustics Engineer for Phonak Communications AG. In parallel, he works for himself on different private projects: conception and realization of different loudspeakers, filtering method implementable on

the Behringer DCX2496 and others digital crossovers, acoustic treatments and room equalization. Some professional projects: A measurement room for the Phonak's Lab, An In-situ measurement system for the Phonak's hearing protections, different acoustic filters for hearing protection.

**Dr Veronique Adam:** She received in 1995 a Master degree in Microtechnical Engineering from the Swiss Federal Institute of Technology in Lausanne (EPFL). In 1995 she joined the Electromagnetics and Acoustics Laboratory (LEMA) of the EPFL to work as a research assistant. She was involved in different European and industrial projects, in which she collaborated on electro-dynamic loudspeaker analyses and syntheses. She received in 2003 a PhD degree from the Swiss Federal Institute of Technology in Lausanne (EPFL), for the thesis work entitled: "Loudspeaker Behaviour under Incident Sound Field". R&D engineer at Goldmund from 2003.

### Schedule:

Doors open and refreshments:	17H30
Start of presentations:	18H00
Discussion and listening tests:	19H00
End:	19H30
Optional dinner:	20H00

The studio entrance is located in the car park of the OBI store in Renens (the entrance will be signposted).

The Swiss AES wishes to thank the Studio Des Nouveaux Monstres and Antoine Petroff for their kind collaboration.

The presentation will also be open for non-members of the AES. We look forward to welcoming you on the 3rd of April!

REPORT ON PREVIOUS MEETING

*An Evening with George Massenburg*

Thursday, 19<sup>st</sup> of February 2008, Uptown Hall, Gurten, Bern

**SPEAKER:** George Massenburg

**REPORTER:** Terry Nelson

The 19<sup>th</sup>. of February saw a 'Special Event' meeting of the AES Swiss Section at the Gurten overlooking Bern and drew nearly 100 attendees! This has to be something of a record and many thanks to all who participated in the event.

The 'Special Meeting' was a combination of the Diploma Ceremony for the graduates of the "Sound Technician" Federal Diploma (this exam being organised by the Education Committee of the Swiss AES) and the third in our series of "An Evening With...." meetings.

The day was made special by the presence of George Massenburg, who needs little or no introduction.

For the Keynote Speech of the Diploma Ceremony, Mr. Massenburg gave his personal opinion concerning the current state of the music recording industry and, though it could be seen as being pessimistic, in fact, it was quite positive! This was due to the fact that new possibilities for offering audio services liberated from the 'old system' are quite varied and should be looked into. The other piece of advice was "take anything! The important thing is to get experience and you can always move on if you do not like the job." The case was cited of a McGill University (Canada) graduate being offered a sound reinforcement job with a circus: the circus in question turned out to be the Cirque de Soleil and 6 months later, the graduate was in Las Vegas with the new "Beatles" show!

The AES meeting was mainly concerned with George's new live recording techniques at his "Blackbird Studios" in Nashville and videos with full surround sound were played.

The gathering adjourned to the Gurten for the traditional dinner and here, records were broken again with nearly 60 people!

Thanks to all who helped with the organisation and to our sponsors who supplied equipment.