

Preface

It is still a challenge to develop a low-noise amplifier – despite the fact that nowadays (2007) nearly every solution of an electronic question of the consumer world can be solved by digital means. There is a wide field of tasks left that can only be satisfyingly attacked with the help of old-fashioned analogue technology: sensors that are coupled to the existing and living world around us are always confronted with analogue signals. Those – in most cases – tiny signals have to be amplified and treated with unbelievably high electronic care. Therefore, frustration on noisy devices should always be turned around into motivation for the search of nearly noiseless solutions!

As a producer of such tiny analogue signals the vinyl record (33 1/3 LP and 45 Single/Maxi) is a typical representative of our yesterday – 20th century – life. Despite the nearly 100% digitization of the consumer world it is still alive – with growing sales revenues around the world. One should expect that all secrets of the amplifier chain that transfers the signals out of the record's grooves to our ears are well known. Yes and no! Much is written about distortion, overload matters, noise, phase angles, frequency response, etc¹. Most technical aspects of amplifiers and sensors were well described.

But simple questions like e.g.: “my moving-magnet cartridge – how much noise does it produce?” or “what's the signal-to-noise-ratio (SN) of my phono-amp after A-weighting?” are still not that easy to answer today.

World-wide, mathematics is the only language that can be understood by nearly everybody, assumed that there exists a certain talent for it, and, not to forget, the right software for calculations. In this book calculations were all carried out with MathCad². An easy to get for free simulation software would help as well, e.g. MicroSim v8.0³ but, not to increase the necessity for the use of various softwares, this simulation software is not essential to understand and follow the mathematical courses.

¹ Inter alia: “Self on Audio”, Douglas Self 2000, Newnes, UK, ISBN 0-7506 4765 5

² MathSoft Inc., USA

³ MicroSim Corp., USA (see also footnote 3 on page 17)

Therefore, for mathematics-refusal-free and ambitious amateurs and/or students who want to design their own amplifier for specific cartridges this book will find answers to such simple questions and many others concerning RIAA phono-amps! It's also a collection of articles which were published in a more condensed form in the British magazine *ELECTRONICS WORLD* (EW, formerly called "Electronics World and Wireless World (EW+WW)" or "Wireless World (WW)").

As a consequence, the content of this book will lead to affordable amplifier design approaches which will end up in lowest-noise solutions not far away from the edge of physical boundaries set by room temperature and given cartridges – thus, fully compatible with very expensive so called "high-end" or "state-of-the-art" offers on today markets – and, from a noise point of view in most cases outperforming them!

With easy to follow mathematical treatment it will be demonstrated as well that theory is not far away from reality. Measured SNs will be found within 1 dB off the calculated ones and deviations from the exact amplifier transfer won't cross the ± 0.1 dB tolerance lines. Additionally, measurement set-ups and results will be presented and comparisons with measurement results of test magazine will soon become easier to perform.

Last remark: the presented electronic circuits do not contain extra made or extremely expensive components. They all can be found at component dealers worldwide.

Very last remark: I guess that creativity does not mean to reinvent the wheel again nor to find out absolutely new things. In many cases it's nothing else but simply rearranging well known parts. Therefore, when I started developing the many circuit schemes presented in this book Okham's Razor⁴ and one main goal ranked very high: to combine and to re-arrange well known different circuit designs to promising new solutions.

⁴ "If you have to choose from some number of competing theories, choose the simplest one because it's most likely to be true",

Sharon Kay, www.royalinstitutephilosophy.org/think/

The Sound of Silence

Lowest-Noise RIAA Phono-Amps: Designer's Guide

Vogel, B.

2008, XII, 352 p. 240 illus., 30 illus. in color., Softcover

ISBN: 978-3-540-76883-8