

THÖRESS

Puristic . Audio . Apparatus

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"Behind The Curtain"



THÖRESS P.A.A. was founded after I graduated in mathematics (physics as subsidiary subject) at the RWTH University of Aachen, about 25 years ago. My laboratory is located in the centre of Aachen in walking distance to the famous cathedral (constituted by Charles the Great in the late seventh century). The core of the early medieval edifice, known as the Carolingian Octagon, well preserved until the present day, is admired by many visitors from all over the world. Founded by the Romans, Aachen is a city with a long history located very closely to the spot where the territories of Germany, Belgium and Netherlands meet, about 50 miles away from Cologne and Düsseldorf. My hometown is blessed with an opera house, a modestly sized concert hall (both of which auditories offer favourable acoustics) and a division of the famous Cologne Conservatory of Music. The Orchestra and the Choir of the Bach Society of Aachen gratify music lovers with passionate performances of J. S. Bach-s sacred music in local churches regularly. Whereas the Society of Modern Music of Aachen is known for arranging appealing concert events of Modern Jazz, Avantgarde and Experimental Music held in a dedicated modestly sized auditory, again endowed with enjoyable acoustics. Concert events in Düsseldorf and Cologne are within reach for citizens resident in Aachen, as well. So the region by all means is a favourable area for a music lover to strike root!

MUSIC...

Music has always played an important role in my life. All kinds of musical styles appeal to me... Classical Music, Jazz, Rock, Blues, Metal, Fusion, Funk, Disco, Pop. It never occurred to me that one particular music genre is more valuable than any of the others. There is only good and bad music. And I stick firmly to this attitude until the present day, at an age of 50 plus. Accordingly, it is my firm conviction that a truly world-class audio system should be designed to be NEUTRAL and UNIVERSAL, in the sense that the timbre of acoustical instruments are replayed with utmost accuracy such that every kind of musical program can be reproduced in an equally appealing and convincing way. Otherwise the system will tend to narrow the musical horizon of the user, from my perspective a big drawback if not a sin!

In my childhood I was so fortunate to own one of those large 1960s vacuum tube AM+FM radiograms. It was an outstanding if not avant-garde piece of audio gear made by Philips, which I only fully appreciated decades later on...featuring a 800

ohm full-range oval paper cone transducer fired by a unique single-ended push pull output-transformer-less vacuum tube power stage (launched by Philips along with the EL86 tube in the late 1950s, the famous EISENLOSE ENDSTUFE, iron-less power amplifier). This old-timer delivered fantastic sound quality! Such radiograms are called MUSIK-TRUHE here in Germany. TRUHE as in the word SCHATZ-TRUHE, treasure box. And that is exactly what the Philips receiver was to me: a treasure box, filled to the top with precious jewels in the shape of musical tunes which daily called for my attention. I made extensive use of my beloved tube receiver, even when I reached my teens and transistorized audio gear became prevalent.

Since my early teenage years I have also attended all kinds of concerts regularly and became acquainted with numerous concert halls, opera houses, churches, jazz clubs within reachable distance to my home. In each auditory I had figured out specific sweet spots where I was keen to be seated for concert events. Fortunately, expensive seats were rarely blessed with extraordinary listening quality, which kept things affordable for me. After school classes, I used to travel to Düsseldorf frequently, where I would spend a couple of hours in various record stores until closing time so as to move on to TONHALLE, SCHUMANN SAAL or a church to attend a thrilling concert event. On other occasions, I travelled to Cologne, to go to the opera house or the SENDESAL DES WDR to listen to the world famous WDR Big Band or to take part in some avantgarde music happening. Such a trip was usually preceded by a visit of the Saturn Media Store (which at that time was the biggest record shop in Europe!) which I usually left with a big heap of vinyl records under my arm (and an empty purse in my pocket).

On one fine day our music teacher, a passionate music lover himself, assembled a herd of committed teenager scholars to go visiting the famous STUDIO FÜR ELEKTRONISCHE MUSIK at the Cologne Conservatory of Music (founded in the early 1950s by iconic avant-garde composer Karlheinz Stockhausen). I remember well that after a few tracks of freshly produced electronic music had been played back to the gang through a pair of vintage loudspeakers, I found myself stepping forward to utter ruthless words of criticism regarding the deficiencies of those monitor loudspeakers, to the amazement (amusement...embarrassment...?!) of my classmates, our dear teacher and the superintendent of the famous studio.

In view of such a lifestyle it was only a question of time until High Fidelity Audio would become a major point of concern in my life. After decades involvement with live and recorded music, I have gained a crystal clear imagination about the sonic profile of a truly MUSICAL system. All my design choices have always been ruled by this ideal, while aspects of marketing and commerce have been predominantly neglected.

DESIGN PRINCIPLES...

The THÖRESS story is about AMPLIFIERS AND LOUDSPEAKERS. A fact which has been frequently overlooked in the past. Maybe because the rather unique amplifier products have stolen attention from the loudspeaker creations...? Or perhaps the radical and idiosyncratic solutions regarding technical principles and appearance were found consternating...? In any case, I strongly believe that amplifier and loudspeaker design are so closely related to each other that they need to be treated simultaneously in order to reach the very top of musical reproduction. Decades of search and struggle for the ""right"" loudspeaker design principles have led me far away from stereotyped mainstream recipes to rather unique design choices such as undamped transmission line woofer loading...

cabinets made of low-density poplar plywood...

constant directionality horns...

underhung motor transducers...

crossovers optimized for maximally flat group delay...

These are foremost targeted to optimize transient response, the cardinal point of loudspeaker design (and audio science in general). Music inherently is nothing other than a (highly organized) universe of acoustical transients, after all. (If music was predominantly a static phenomenon audio science would be a meaningless discipline!) Meanwhile, THÖRESS Loudspeakers gain increasing reputation aside from the amplifier products which I admittedly note with a certain degree of satisfaction and pride.

In case of amplification, I strongly believe in the supremacy of

MINIMALISTIC , SINGLE-ENDED , ZERO-FEEDBACK , VACUUM TUBE TOPOLOGIES

while strictly avoiding balanced schematics, push-pull operation in particular. My Parametric Phono Equalizer (Phono Enhancer), for example, offers purely active MC amplification in single-ended mode with excellent signal-to-noise performance by solely employing two triodes (per channel) operated at HIGH IDLE CURRENT. Even the thought of forcing the phono signal through a sequence of integrated circuit chips (operational amplifiers) each of which is composed of a network of at least 30 on-chip transistors all run at PIDDLY IDLE CURRENTS linked by loops of negative feedback makes me shudder.

BALANCED VERSUS SINGLE-ENDED TOPOLOGIES...

Balanced circuits (roughly speaking) not only require twice as many parts as comparable single-ended structures and as such contradict my minimalist design approach at the root (not to speak of arrays of on-chip transistors (operational amplifiers ICs) as they are highly common in balanced technology). They exhibit a very particular distortion behaviour, in contradistinction to single-ended circuitry, related to...

HARMONIC CANCELLATION...

EVEN overtones (in principle harmless and pleasant impurities added to the wanted signal due to non-linear distortion) CANCEL OUT whereas UNEVEN overtones (ugly haze) DOUBLE! Since overtones generated in an early amplifier stage obviously evolve consecutive overtones in the following amplifier stages, distortion products introduced by a chain of balanced amplifier stages are exclusively composed of freshly generated UN-even overtones of the wanted signal plus UN-even overtones, of UN-even overtones inherited from earlier stages (Yes, a devilish avalanche of ugly haze indeed) whereas ALL EVEN overtones cancel away completely. Hereby each balanced stage adds TWICE, note twice (!!!), the number of uneven overtones to the wanted signal than a comparable single-ended structure (built around the same active elements). Electronic science claims that this is not a problem since these unwanted hazardous distortion products can be reduced to almost nothing by applying a sufficient degree of NEGATIVE FEEDBACK (yet admits that they cannot be eliminated completely). Curiously, the following simple common-sense considerations readily reveal that things are much more complicated and combine to immersively suggest that the common theory of non-linear distortion and negative feedback is a rough approximation of reality, at its best.

The notion of distortion reduction via negative feedback essentially relies on the assumption that the frequency of the overtones added to a pure sine wave signal (the indivisible atoms which constitute a periodic signal, so to speak) by a distorting amplifier device are UNFLAWED INTEGRAL MULTIPLES of the respective ground tone frequency. That is why non-linear distortion products are often referred to as HARMONICS, suggesting a similarity of conditions between electronic amplifiers and vibrating strings. But can this assumption be in fair accordance with the real world relations...?

CERTAINLY NOT!

Let me illustrate my point with the following allegory...

It is well known that the overtones of REAL WORLD vibrating strings are IN-HARMONIC. This is to say that the frequency of each individual overtone deviates to a certain (very slight) degree from the unflawed integral multiple frequency predicted by the physical theory of the IDEAL (vibrating) string. Hereby, the grade of in-harmonicity is dependent on length, diameter, tension and material of the living object - and (despite of its tiny magnitude) a measurable quantity. Furthermore, in-harmonicity is a commonly accepted notion in the field of instrument making, incorporated in the design and the tuning practice of string instruments. Interestingly, strings exhibit the lowest grade of in harmonicity if they are long, thin and exposed to the highest possible tension. Obviously conflicting requirements which have to be accounted for, brought into balance and optimized in the field of

string instrument design. So it is no wonder that grand pianos incorporate a heavy steel frame to take the massive tension arising from more than 100 long steel strings stretched out close to their breaking point. In the light of such considerations, it would be quite a miracle if real world amplifying elements emit perfectly harmonic overtones as products of non-linearity...

The overtones arising in electronic amplifiers due to non-linear distortion MUST BE IN-HARMONIC!

Moreover, it is easy to imagine that the various amplification elements such as vacuum tubes, FETs, MOSFETs or bipolar transistors exhibit different grades of in-harmonicity under different operation conditions. Curiously, I have not come across a single scientific paper dealing with the subject of in-harmonic non-linearity products of amplifying elements in any way, although the measuring tools in the digital age are certainly sufficiently sophisticated and sensitive for a revealing analysis of the conditions.

Astonishingly, the concept of in-harmonicity seems to be totally unknown in the field of audio electronics - until the present day!

But what happens to IN-HARMONIC distortion products (overtones) in the presence of negative feedback...???

Their amount is reduced, that is certain, as it is clearly shown by common distortion measurement. This is, by the way, a method which is much too imprecise to ever observe or even quantize the tiny frequency shift given by the in-harmonicity effect, due to the limited frequency resolution of the band pass filters used for separating the overtones from the ground tone for this rough measuring procedure. On the other hand, it is equally certain that the reduction of non-linearity overtones via negative feedback as demonstrated by the standard theory (with the aid of so-called Fourier Series Transformation) definitely COLLAPSES if one declines the integral multiple assumption! This naturally gives rise to intriguing yet uncomfortable and awkward questions like...

What are the technical and PSYCHOLOGICAL impacts of in-harmonicity in audio...???

Does negative feedback reduce harmonic distortion while introducing or increasing some other unknown form of signal degradation...???

Is it possible to extend the existing theory of linear distortion and feed-back in a meaningful way by including the concept of in-harmonicity in electronic science...???

Do vacuum tubes exhibit lower in-harmonicity than solid state devices...???

With such considerations in my mind, I have over the years evaluated all circuit topology one can think of as a practitioner, both by ear and measurement, and found that balanced technology and negative feed-back are sound degrading concepts. This is the reason I decided to stay away from these concepts and devote myself EXCLUSIVELY to single-ended zero-feedback topology...

The sonic coherence and beauty attainable with this kind of circuit architecture is simply matchless!

From my perspective, the one and only purely technical merit and right to exist of balanced technology is the immunity of the associated cable lines against electromagnetic interference (EMI) based on the so called COMMON MODE NOISE CANCELLATION effect. In order to make use of this effect a dual signal (composed of the wanted signal and a 180-degrees phase shifted clone) needs to get transmitted from the sender to the receiver component (accordingly cable lines for balanced signal transfer require 3 leads: hot1, hot2, ground). Hereby the receiver device has to present an active differential amplifier stage (with dual input, inverting and non-inverting) - or an audio transformer with centre-tapped primary winding to the incoming balanced signal. Balanced technology might be indispensable in sound studio and public address applications where cable lines likely have to run through environments polluted with electromagnetic smog. Yet it means useless technical overkill in domestic audio installation. Overkill that comes with sonic degradation!

My amplifiers and crossover networks are made with meticulous hand construction using CLASSIC point-to-point wiring techniques, exactly suiting a radical purist design approach. Integrated circuits and printed circuit boards are employed, beyond the audio circuitry, for the purpose of remote volume control only! However, THÖRESS is not about dogmatic tube circuit design. Despite the golden age subtitle of my brand, it is not my aim to glorify the lost age of vacuum tube technology. I have dedicated myself to vacuum tubes, particularly triodes, because they are inherently linear amplification devices which in addition (like field effect transistors) offer the advantage of powerless excitation (solely voltage swing yet no current flow is needed in order to excite these devices!) Therefore vacuum tubes are perfectly suitable for MINIMALISTIC, SINGLE-ENDED, ZERO-FEEDBACK circuit design by their very nature. At a rather early stage of my career it had already become evident to me that I had to fuse the ancient vacuum technology with the contemporary solid state technology in order to reach ultimate sonics. Accordingly, I freely dispose of the whole palette of ingredients and spices the universe of electronics offers. An approach which can be classified as...

**CONTEMPORARY SOLID STATE INTERLEAVED TUBE TECHNOLOGY,
CON/S/T/I/TU/TE**

CONSTITUTE should by no means get mistaken for the more common vacuum tube transistor hybrid technology, where tube and transistor stages are merely COMBINED rather than INTERLEAVED and ENTANGLED. As a matter of consequence, in my circuits vacuum tubes are complemented by solid state devices like light emission diodes, MOSFETs or bipolar transistors as side elements in order to create optimal HIGH CURRENT operation conditions for the tubes, aiming at the lowest possible distortion figures (and in-harmonicity!) in complete absence of negative feedback correction. Just as in case of piano strings stretched close to their breaking point, tubes (amplifying elements in general) ought to get operated at the highest practical idle current in order to deliver the most harmonious performance!

In case of my EHT based amplifier models, the latest achievements, I take the CONSTITUTE approach to the next level by applying it in the context of a unique minimalist zero-feedback vacuum tube MOSFET hybrid topology, which I call EHT Topology (E.intakt-H.ybrid-T.riode, single-ended hybrid triode). The EHT topology consists of a single-ended triode gain stage followed by a unity gain MOSFET output stage (Power buffer) also operated in single-ended (class-A) mode with high idle current. It represents the PUREST form of all possible single-ended triode power amplifier configurations and allows to fully exploit and mate the most desirable characteristics of both vacuum tubes and solid state devices determined by their very nature. Despite of its elegance and extremely high sonic capability, the EHT concept has never been utilized in a serial audio product before, as far as I know! Probably on account of its low power efficiency and because its implementation is rather tricky. The EHT Integrated and Mono Amplifier are those products where the THÖRESS line approaches mainstream rather closely, at least in terms of output power and driving capability and hence universality.

STONE CONTROL...

Another rather unique off-mainstream peculiarity found on crucial components of the THÖRESS line worth mentioning. Four THÖRESS amplifier components (Phono Enhancer, Dual Function Amplifier (DFAmplifier), EHT Integrated and EHT Mono) offer subtle tone control functions via on-the-fly selectable sound presets (timbre registers). Notably, these timbre registers act in a much more subtle way than common bass-and-treble tone control facilities and do not rely on conventional clumsy and sound degrading tone control circuitry. In fact any of the registers are realized by interposing solely one additional capacitor (per register and channel) to the respective neutral mode circuit! The timbre registers are useful for restoring tonal imperfections of the listening program, matching the tonality of the loudspeakers to the listening environment and, in case of the Dual Function Amplifier, for equalizing the response of individual headphones by adding bass and/or treble extension to a given component (and for counteracting the weaker perception of bass and treble frequencies of humans at lower loudness, known as loudness effect).

TRANSFORMERS...

All THÖRESS amplifiers are equipped with proprietary mains transformers, output transformers and filter chokes produced in-house to the highest possible standards. This allows me to tailor these parts so as to perfectly suit the respective circuit context and also keep full control over built quality. In fact every coil ever used in a THÖRESS amplifier has been fabricated by myself with the aid of a vintage winding machine made in the year 1964, which curiously happens to be the year of my birth. In the case of the mains transformers this ensures maximum reliability, deadly quiet operation and low leakage field emission. Apart from that, it enables me to readily make dedicated power transformers for all kinds of mains voltages such as 100Vac (Japan), 120Vac (USA, Canada), 220Vac (South Korea, China, Thailand, Indonesia), 240Vac (UK) or 245 Vac (Australia).

APPEARANCE...

All ten component models which nowadays form the THÖRESS product line have been initially and primarily developed to serve my own needs. Hence their appearance and construction style primarily displays my personal taste and general attitudes. The small 1D66 loudspeaker model is believed to represent an unobtrusive and timeless piece of style-neutral furniture. Whereas the large 2CD12 loudspeaker follows the example of the self-effacing style of a vintage JBL studio monitor. As for the amplifiers, I want them to be perceived as apparatus, PURISTIC AUDIO APPARATUS as I call them: precision gear meant to serve committed music lovers to broaden their musical acquaintance, rather than luxurious status objects for showing off. Components free of redundant frills yet with soul, solely dedicated to honest and accurate musical reproduction. The undeniable more-or-less subtle retro touch my products emanate are understood as a tribute to the tradition of audio components from the golden age of the vacuum tube, which I consider as one strong root of my approach (and highly adore since those times when I was listening to music through the marvellous vintage Philips tube radiogram).

Greetings to All Music Lovers World Wide!

REINHARD THÖRESS

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THÖRESS...

**A Tribute to Professional Audio Components
from the Golden Age of the Vacuum Tube !**

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