

# A Personal Opinion

by Mikhail Kucherenko

January 2015.

«Regarding the Benefits of Your Head's Self Treatment – Some Thoughts on The Doctorhead's "Loudhead-2014" – The Moscow Personal Audio Festival ».

## – A Visit to the «Doctor»

In my last August "Personal opinion" - <http://news.soundex.ru/stati/analitika/lichnoe-mnenie-mikhail-kucherenko-iyul-2014-my-way-chast-3> - I mentioned that I've spent the last few years looking at portable audio in general, and In-The-Ear Monitors (IEMs) in particular.

Some changes in my life style, exacerbated by a saturation point reached in "big" audio, made me interested in portable matters. I wanted to evolve "sonically" further on, but at that moment I started to feel that there is no way for me to further expand my arsenal of High End ideas and tools. Neither had I any resources to buy some new expensive High End hardware.



Moreover, however blasphemous it might sound at this forum, after having passed numerous rounds of High End Audio hobby, I believe now, that using "big" speakers for listening is **an outdated** way of getting satisfaction from the music recordings. And the last statement is not only a result of recent progress in portable audio, but also a consequence of the constant escalation of big systems' cost and that all sorts of inconveniences, associated with them, starting to take its toll on me, and this toll started to feel as too much.

Way back in 1990, when I was 30 years old, I got hooked by The High End Audio. At that time there were a lot of elder "audio buffs", yet the large part of that community consisted of people **younger** than me. Fast forward to nowadays: at the present time, do we see a lot of **serious** "audio buffs" in their 30's?! As among the home audio enthusiasts we see mostly representatives of the older generation, then, would it be natural enough to assert that for the younger generation this hobby was replaced by something else?!

For short description of how changes in our industry, due to the changes in mentality, system of values, dominating technologies and the life style, as well as world demographics led to the recent recession of interest towards serious music and high quality audio, the phrasing like "High End Audio crisis" could be used. Phrasing it differently, some people would be inclined to the phenomena, at least from conceptual point of view, as that the "big" audio became "**outdated**", or even "**obsolete**".

As we know, "the most constant thing in the world is changes". That's why, even though the music priority for me haven't got lost, changes in my life style, occupation, and income forced me to revise my vision on my **main** audio system. I started to spend more time outdoors and in public transportation. An apparent solution for me could be to acquire a portable music playback system of such a high caliber that, even, in comparison with my "big" uncompromised High End Audio system, it wouldn't impair my enjoying of music. And if it would, then, OK, by not **too** much.

The "true" followers of High End Audio don't take the portable audio very seriously, believing that it's not

quite worth their attention. I do not agree with them at all.

And I recently witnessed another proof of this at The “Loudhead” - the personal audio festival in Moscow “Sokolniki” park’s expo center, organized by the Doctorhead (doctorhead.ru) .

Many thanks to this great company (and especially to the general “Doctor” Artyom Poduruyev for a long and a thoughtful conversation we’ve had during this event)!

Unfortunately, I was not able to audition all the great gear, demonstrated there, carefully, because I decided to participate in this event on my own. I have brought to display there my “home-brew” earphone with the special portable active balanced two channeled DAC / crossover/earphone amplifier. I briefly described both of these components in my “Personal Opinion” back in August, and placed some pictures there.

However, at The “Loudhead” a bad luck struck me: twenty minutes after the festival was opened, a wire broke in one of the earphones channels. Too bad, but the fact that it happened exactly at this critical moment, not a day before or after, complies well with the “Murphy’s Law”...

So I had to go back home to fix the earphones’ cable, and thus missed the most of the show. When I got back to The “Loudhead” in a few hours, the action was still there in full spring.

Just before the show closing I’ve had a chance to audition a few earphones, players and amplifiers, and all of them left me with a very good impression. In particular, locally made Laconic HA-04AF earphone amplifier from Ahmed Mamedov which was demonstrated to me by Stas Vardanian, who kindly shared his desk with me (see the picture attached), as well as, among other things, the Monster Audio player with domestic “Alex Mod” modification installed (see the picture attached).

My first impression of this event, which took a space of roughly a couple of hundreds square meters, where each participant was given either a whole table or a half of it, was that it was not a big event. But if would transpose each earphone system into a typical “room” system at a High End Audio show, then taking into account the number of portable systems exposed at The “Loudhead”, the scale of this event would become quite close to a typical audio show taking place in a big hotel.

Unfortunately, having missed the large part of The “Loudhead”, I can’t make a judgment on the quantity of attendees, but, nevertheless, I was able to appreciate its “quality”. First, and foremost, I saw representatives of all age groups – from sixteen to sixty, and their distribution was more or less even (which fascinates me a lot). Second, there were no skeptics, only enthusiasts who, seem to take everything there with delight and passion. Third, there were a lot of visitors, who came over to Moscow from a lot of different cities; I even spotted Dmitry Trush, who’ve flown from Japan (!) to demonstrate some portable stuff he’s been selling in Russia for years.

Also I was so pleased to find out that some major players (Sony, Sennheiser, Oppo, etc.) provided sponsorship for this event.

I believe that such a cheerful and easy-going atmosphere (compared to the few recent “big” High End shows) does have something to do with the reality of what’s going on, and some exciting positive dynamics in this field.

Those who have read my recent articles, should have noticed that, in my opinion, a current typical High



End Show became completely detached from the reality. Comparing it with the situation at The Loudhead, it differs significantly not only by the general lack of satisfaction from its demos and killing prices, but also by the total absence of the “fresh blood”, which is always there when some positive dynamics in providing a **result for all to see**, starts to dominate the market. Unfortunately, the typical home audio shows I attended in the last years, with some very **rare exceptions**, have all turned into pretty gloomy spectacles.

At The “Loudhead” it was quite the opposite: a lot of young people and lots and lots of new and exciting gear. And what’s very important: at the prices affordable for the vast majority of the attendees.

There are a lot of comments at this forum claiming that “He’s (that is me-M.K.) been burying the High End Audio for the last 15 years but it’s still alive and kicking and it should not be buried alive”. But the simple comparison between the way the audio was when I started in 1991 and the way it’s now, at least to me, demonstrate that it is passing away and gets slowly buried, really, I see no reason to state otherwise. For another proof of this statement you should look no further than to look at the price stickers on the current High End Audio gear and then conclude to **whom** the “big” High End Audio companies nowadays are appealing to.

Definitely, not to me, and, definitely, not the most of people who criticize me. So, in that respect, for us, it’s dead (OK, I was wrong, for it we’re dead, that is, non existent).

As for myself I have buried “big” High End exactly at the moment when my attention was switched, out of desperation, from home audio to its portable brother, and it happened as a result of both recent socio-political global changes in the world, and, also, due to the steady evolution of portable technologies.

When I felt that in the home audio there is no way back, I felt that **there is not much sense** to stay associated with the “big” stuff any further.

Judging by the **positive dynamics** at The “Loudhead” and **its complete absence** at the recent Hi-Fi shows, diverting my ways from High End Audio in the direction of The High End Personal Audio, looks like quite a natural decision. I see no point in continuing to polish to the holes the old steam engines.

And this path of musical ecstasy is still the path of my personal conquest for the Holy Grail of Audio.

## – Anamnesis and pathogenesis

During the last ten years, while “big” audio has been “deflating”, the portable audio industry went through the state of rebirth. Things changed **dramatically**: hundreds of new manufacturers appeared on the market, the model ranges spread at both sides, new technologies - for instance, “custom” in-the-ear monitors and portable digital music players- started to populate the market. The nomenclature of portable components has grown dramatically. Changes started to penetrate the field not only “horizontally”, but also **vertically**: with a help from the computer audio the quality of portable systems made a giant leap forward, while more and more uncompromised solutions were found in huge variety of the portable components.

I would compare the portable audio boom caused by the breakthrough in new digital players’ quality with the emergence of the Home Theater phenomenon, which itself became a reality due to the arrival to the market of the optical digital media, like DVD and BlueRay.

Before the first digital video formats came to life, having on hand just the VHS cassette, it was hard to, even, talk about home theater of any kind. Likewise, prior to CD and especially the new “computer” audio, which greatly stimulated interest towards portable audio, it would be impossible to seriously discuss any High End “on the go”. You simply could not put a vinyl turntable in your pocket, and the quality, available from an analog Compact Cassette format, was not high enough and convenient enough, to look any further.

Recent appearance of some truly revolutionary portable products, such as, say, HD-800 “open” headphones from Sennheiser, IE-800 earmonitors from the same vendor, HiFiMan-801 portable digital player, and some other innovative products, opened huge possibilities. The same goes for another innovation, which grew much stronger in the recent times: the so-called “custom”-monitors, which utilize personal ear molds. This direction was instigated by Jerry Harvey from Ultimate Ears (and further on by the company bearing his name). After his initial effort this technology was successfully picked up by innumerable other companies.

Nonetheless, despite the fact that during the last decade some portable audio manufacturers – both foreign and local- were developing these technologies deeper and deeper, their activities mostly was taking

place in the fields of various electronics, headphones, “custom” IEMs and the software development, but not in the category of **portable “universal” in the ear monitors**.

By portable I mean **sound insulating**, because most of the no-hold-barred headphones or earphones, which recently appeared on the market, with the sole exception of “custom” monitors, and I’ll get to back to their advantages and limitations below, despite their exceptional sonics, are not sound insulating, and, therefore, are of little use in portable application. As, to use “on the go” you need a sound insulating headphone or an earphone, and as the sound insulating “closed” traditional headphones are considered, by definition, a crude compromise, so the only uncompromised, **and**, at the same time, sound-insulating approach is a sealing in-the-ear channel monitor of the highest quality.

At the last “Loudhead” show a lot of electronics, demonstrated there, could easily meet all the uppermost criteria of the ideology and craftsmanship of the High End Audio (including exotic DAC’s from small companies and earphone amplifiers using direct heated triodes), but the most of the earphones, with some **very rare exceptions**, were **mass produced** by the manufacturers whose approach, **by definition**, have nothing to do with the High End system of values.

That’s why most of truly exceptional products, that were exhibited at the “Loudhead”, were made by very small companies. As some examples, I can point out the Audeze’s headphones, some HiFiMan headphones, Grado’s earphones and headphones, and, the Stax’ electrostats.

Also, despite exhibits of **numerous** domestic manufacturers of portable and stationary electronics of highest class **only one** domestic headphone firm was exhibiting at the “Loudhead” – a tiny electrostatic headphone “manufacturer” from the city of Yalta in Crimea.

Perhaps the absence of some new and creative ideas, implemented in **earphones versus headphones**, is due to the fact that even traditional for High End Audio subjectivism in this case is multiplied twofold. The fact that the ear channel positioning and sealing is a totally personalized procedure adds to the traditional for The High End Audio disputes of “how good do they sound” some additional dispute ambivalence.

If the arguments in home audio are, at least, anchored to the fact that everybody listens to the same system in the same environment with “objective” connection to the given specific room sonic character, then in the case of the in-the-ear monitors **nobody else but the listener himself** has any grounds to comment on how the earphones do sound at any given moment. Due to the personal anatomy, which, no doubt, can effect positioning, comfort, ear seal, and acoustic properties of the sound radiation, it seems, that, really, there is **no common ground** to make any “objective” sonic evaluations. Even if there is some, the doubts will still be there. That’s why it’s so surprising to see even **some** agreements over the sonics of an earphone, considering how much disagreements exist in the world of the home audio.

Therefore, without precise manufacturer’s “precept” and background, both explaining how their products **should** sound, and without original sonic ideology declared by the company, any comments and evaluations inevitably pass through the filter of an individual perception and preferences, first, and then, this ordinary for home audio subjectivism gets squared, **especially in case of in-the-ear monitor**, by the individual external and internal ear anatomy.

Regarding the dedicated earphone electronics, it lacks that second serial filter of subjective anatomy. That’s why at The “Loudhead” we’ve been experiencing such an abundance of “garage made” High End headphone/earphone electronics of the highest caliber, and, on the other hand, almost complete absence of “garage made” headphones or earphones of the same level of aspirations.

Respectively, due to the same subjectivism “squared” phenomena, the difficulties in design and marketing for an earphone product get “squared” too, especially in their highest quality segment, where the ear anatomy uniqueness can’t be ignored. That’s why, The High End Audio market, the top headphone market, and the top portable **electronics** market are populated with a lot of truly “no-holds-barred” products, but, at the same time, the most of the reference quality **earphones** do not reach maturity of their design, and, I presume, even if they do, they, seem, are not taken to it.

***Hereby the very important conclusion can be made: for a “portable” manufacturer it’s a lot easier to set up earphone electronics or headphones’ production and marketing, rather than a production and marketing for an absolute quality earphone, because it’s impossible to ignore the customer’s unique anatomy, especially for a sound insulating product. And without its consideration, there is no way a substantial achievement can be reached.***

I presume, that it’s taken for granted, that in an every niche segment striving to reach the absolute, The

High End Audio is a typical example, you can apply the rule that postulates a **necessary** condition for expectations for a “no-holds-barred product”, namely, “the bigger the company, the smaller the chances of expecting an absolute product from it, and vice versa, the smaller the manufacturer the more chances you can expect such a product from it”.

Naturally, the size of the company is only necessary, but not sufficient, condition. Therefore, extrapolating the principle, the absolute products **in audio** originate, as a rule, from the companies where only one person plays the key role. As I see it, a company’s expansion calls for the attempts to please more and more customers on the market, and because these customers’ system of values don’t coincide, this can require to unfocus the unique, **aiming to the absolute**, product vision. I’d give you a few examples.

Open planar magnetic Audeze headphones appeared on the **very top** of the headphone market when their creator Dragoslav Colich was still making them in his garage in Huntington Beach, CA, where I first visited him a few years ago. As soon as he has sold out his company to the third-party investors a couple of years ago, their new products, like closed type LCD-XC headphones, started to have lesser aspirations “sound-wise”, and, obviously, were based on certain new set of compromises, with an intention to expand their market niche by appealing to the **lower** common denominator.

At last year’s CES show in Las Vegas Dragoslav gave me a new version’s sample of LCD-3 to try. After listening to it and comparing it to the pair I acquired during that first visit to his house I had to disappoint him. Dynamics became worse; the sound became less expressive and so on. The question - do these sonic changes have anything to do with their attempts to increase the production volumes, undertaken by the Audeze’s new owners, design drawbacks, or quality control level – for me, still, remains unanswered.

Many years ago, during one of my visits to the Grado factory, I asked, naively, John Grado, the owner: “Why are you still staying in this Brooklyn “shabby shack” and don’t even try to grow”? (Like, for example, Koss was growing pretty fast, back then). John, at first, didn’t get what I was trying to ask: “I beg your pardon”? Trying to explain my point I continued: “I presume, as everybody says, your sales must grow, which means that your company has to evolve, move to a new and a bigger facility, and so on”. Only after that explanation John answered: “But **I do not want to grow**, I’m fully satisfied with what I’ve got now, so **I don’t lose the quality control over my products**”.

To me, at the time, his reply was a revelation. This, possibly, helps me to explain my doubts over that new Audeze sample. What I heard and didn’t like, could be just some differences between particular samples of a product, so the new LCD-3 version, in fact, can be a better one. I just, happened, to get a wrong sample, from which I have drawn some wrong conclusion. Taking in account increased volumes and possible problems with the quality control, isn’t it a possible explanation of the bad impression, I’ve got?

A similar explanation can be provided for last year’s withdrawal of **revolutionary** (without any doubt) Sennheiser ie-800 in-the-ear monitor. After resuming of the supply later in the year, the earphone still leaves an impression of a half-baked product with a “floating” quality, changing from a piece to a piece, depending on when and when you heat it. Although, when the supply resumed, the manufacturer, possibly, could resume it with a different voicing for the IEM. Trying to bow to the lowest common denominator on the market, it fully possible, that the Sennheiser, reacting to the initial, but not expected response, decided to move from a silky-smooth but lacking a body presentation to more full-bodied but lacking in that enchanting resolution on top. Who knows? They don’t think that they **should** explain their vision to us.

I have brought these examples in order to illustrate the fact that, from my personal experience, only such small companies like Grado, at least, at the necessary level of its own declared values and attitudes, does comply with a necessary condition of what constitute a High End Audio vision: good quality (via its control) as a priority.

From the above examples it also follows that, when the quality of a product varies we’ve got no idea, regarding what’s going on, and **nobody’s explaining** why it happens to us. Is it a quality control, is it a different voicing, we’ve got no idea, and not a single prompt from the manufacturer, who’s completely hidden behind the veil of their promo literature.

Can a product from a latter stable qualified as a High End product, even if it looks great, and costs a lot of money? I doubt.

So, to reach our sonic goals, on the one hand, we have to be **diligent**. As some dedicated manufacturers, however small and not visible, which from outside have an appearance of a “farm”, even without verbal declarations of “reaching to the stars”, do talk about true goals and values. The smaller they are, the more effort we have to spend to seek them out, as they’re speaking very privately.

On the other hand, we have to be **vigilant**, as some other companies declaring “reaching to the stars” cliché, in fact, in their desperate seek for growth, move further and further away from the real values. And, the bigger they are, the more vigilant we should be, as their ads’ words, in an attempt to be heard everywhere, are so loud, that it deafens any quite and meaningful conversation.

And then, there is a gray area in between...

As another example, Sony do not make High End Audio products not because they are not capable to do so, or don’t want to (in fact, they are capable to stun us with the things that nobody else could even dream about). I am sure, they would, even, **love** to do so, but they just **can’t afford** themselves to sell, say, just a hundred pieces of a product a month. But you can’t find more sophisticated audio connoisseurs in the world that are in a buying mood during this period. Their business model would fall apart, if they would had produced something that what would sale only in such “tiny” quantities. So they’ve got **no choice**, but to produce products which would be relevant to the “regular consumers”, who are not so picky, and who are not willing or able to spend much. So, we are talking now about the intentionally inferior products to be sold by tens or even hundreds of thousands pieces a month.

Another reason why huge corporations do what they do is that the flawless quality control costs a lot; therefore, they have to use a restricted amount of technical means and technologies. In this respect, small manufacturers, such as, Grado or Audeze, are not as restricted, as substantially smaller production quantities allow them, at least, in theory, to individually check the quality of each product.

There is one more feature of the headphone/earphone market, which I’d like to point out. Comparing to the home High End Audio companies, with their companies’ products promoted, as a rule, via a recognizable face, the people behind the headphones and earphones products, even operating in their highest quality segments, prefer to “stay quiet” and keep their profile very low. Due to this low visibility of an “iconic” face, even the highest aspirations headphones and earphones are lumped together in a fashion that would remind me of the shuffle of the middle-of-the-road home audio segment, typically called “**mid-fi**”.

Do we know anything about audiophile pretensions of John Grado, Dragoslav Colich, Dr. Fang and others? Let alone Audiophile pretensions of Sennheiser, Beyerdynamic and other bigger companies’ designers? Do they have any audiophile pretensions at all and, if so, what, exactly, are they?

Since I know all three of them personally, I can say that, with all the respect to their knowledge and experience, strictly speaking, they don’t project the images of the most hardcore audiophiles in the world. The same goes for Jerry Harvey, whom I spoke, alas, very briefly, during one of the T.H.E. Show events in Las Vegas a few years ago.

From my perspective of the hard-core audiophile, all of them never had anything to do with High End Audio **per se**. Dragoslav Colich, before he started making Audeze headphones, used to design and install the ribbon transducers for sports arenas. John Grado is most famous for humble-priced cartridges for vinyl turntables, and even most expensive ones, however decent they are, in the context of all the esoteric solutions, don’t, seem, to strive for the absolute. As for Chinese Dr. Fang from HiFiMan, it’s hard to say anything certain about him. I don’t want to put him down, but after several conversations we’ve had at the several CES’, he hasn’t left an impression, that you can strike a meaningful “high brow” audiophile conversation with him.

Even Mead Killion from Etymotic Research I interviewed several years ago for our Audiomagazine (see <http://www.stereopravda.ru/files/file/article/Audiomagazine/killiontest.pdf>), was visibly shocked by my question about a possibility to improve on their ER-4S’s: “Why would we do so, why do we need to improve its sound any further?? I can hear the symphonic orchestra through them the same way, as I hear it right in the concert hall!”, – he exclaimed. To that I replied: “Then one might state that the good low cost mini-monitor loudspeaker can make similar claims, and if it were true, then the whole High End Audio industry’s existence is based on nothing, right?! Why, then, should anyone buy some huge and super-duper expensive High End Audio floor standing speakers?!”

And then I continued: “To me, The High End Audio’s Modus operandi means exactly the opposite: the constant, non-stop, however subtle, improvement after improvement of the music playback chain towards more and more “perfect” and realistic sound, widening the boundaries of musical and intellectual content available to the listener for deeper, more precise, and enjoyable perception of musical, emotional, and the intellectual” thoughts” in the reproduced content”. After I uttered this last statement, Mead’s face expressed an embarrassment, showing that he didn’t get exactly what I, actually, intended to say.

Hopefully, it was not, just, the language barrier... That in such a reaction, his lack of positive feedback on

my thought was a symptom of a perfect product placement for ER-4s. This moment, to me, was, probably, a decisive moment, which instigated my own personal endeavor, because I saw Mead's reaction as a symptom of an untapped opportunity. From a hard core audiophile, like myself, brought up on constant improvement philosophy, I saw a lot of potential waiting to be realized in their truly ingenious product. But at this moment I vividly saw that its manufacturer has got no desire to do so. Since that interview, which took place almost ten years ago, Etymotic Research proved my conclusion by not taking its ER-4s' design any further. They steered its new earphones' portfolio by developing, sonically, less and less sophisticated models.

See, I had no choice, but to do that by myself...

While the ideology of each High End Audio company is inseparable from widely highlighted vision of its chief protagonist, which publically propagates his or her point of view, the names of headphone and earphone manufacturers are simply not found in the field of their own products discussion. You can call me old fashioned, and that "in the current culture of up-and-coming technological innovations that needs to know the "true essence" of a product, it should speak for itself". But it were strictly so, then I'd like to hear more about the role played by Steve Job to get his iconic status.

I have noticed that in the forum discussions about the home High End Audio the participants frequently use direct quotes from the companies' chief executives while discussing a company's sound ideology. In a case of the portable audio and, especially, the earphones, the names of the product designers and their personal opinions about their own products' sound character are almost never revealed in the dialogue. Some third party participants do voice their opinions (e.g. a Sonion engineer can comment on their BA drivers' quirks and promises), but "the voice of God" is never heard.

Even in the case of outstanding Stax, let alone companies like Sennheiser, the product creators keep their profile "at the ground level", apparently, in the belief that their products are so good, that no any extra comments are needed, and their quality speaks (*sic!*) for **itself**.

But, then, my doubts of how should **really** sound Audeze or ie-800 mentioned above, remain unexplained. Which direction should we aim our attention and efforts to, finally, appreciate their sonic ideology, and to realize the potential of their products? Do we hear what is **intended** to be heard?

To reiterate: in the home High End Audio we can get a "first hand clue" about what we can, at least, **expect** from a product (and, probably, what we can not).

In the headphone and earphone domain we've got no first hand clues, so we can only speculate.

And people **do** speculate.

My latest visit to the pleer.ru forum's Etymotic Research ER-4 thread brought a striking phenomenon: 500(!) pages of discussing, basically, a bare bone Knowles ED 29689 driver shoved in an earplug. I am not questioning ER's pioneer effort here, but, I wonder, if the ER were not as secretive about their effort (and they are!), and fill in some information gaps, would the people still be willing to spend millions of words instead of just simply enjoy their wonderful product **knowing** why it's so good? The secrecy around the ER-4s, in my opinion, is a double-edge sword, on the one hand I see the reason why a company would not spread some sensitive info about a trade secret, erecting a screen on which a lot of people project their own movies, but, on the other, ER miss a lot of opportunities when they don't **properly** explain the sonic virtues of their product in **the context of their true believes**, and, as a result, a lot of people pass on it, only because they **perceive** their product as just "an (unattractive) earplug with a driver shoved in it".

The considerable part of home The High End Audio is inseparable from the concept of the "personal statement product". While among earphone electronics, exactly like in "big" High End Audio, there are a whole lot of products that could be defined as a "personal statement product", in "**earphone**" High End such a concept is totally absent.

There is a common phenomenon on headphone and earphone forums, namely, some numerous comparison charts, which are posted by the participants, with tens and tens of products are being compared in one chart. Yet such charts at the "big" audio forums are almost never seen. I guess, that not only the products' cost and physical dimensions are the reasons why it never happens. I am positive, that the other reason is that the headphone and earphone manufacturers deliberately surrender the task of wording the sound of their products to the users, instead of doing it themselves.

So, the only current choices that the headphone and earphone enthusiasts have got is to, either be content with the products whose sound ideology is demonstrated by their actual sound, or to use technical

specs, without any ideological component (based on the manufacturer's **personal attitude**). On the contrary, in the home High End Audio, the personal sonic ideological component often dominates not only its technical justification, but even the perceived sound, even if the latter case is a case of wishful thinking.

And yet, precisely such equipment which is born out of the priority of a given sonic ideology over any technical issues or practical considerations, and which has passed down the chain from manufacturer, via specialized distributors and dealers, is called High End Audio. Yes, it can be sold direct, but then to market the product directly to the customer, the manufacturer should have a capacity to propagate this ideology.

If we will not draw the wrong conclusion from the bad examples, then we will see a lot of good examples of The High End Audio's ideological priority mentioned above, which brought the products and the solutions, that are not fully technically justified, and which are totally **impractical**, but which do produce **fantastic** results.

It's a trivial idea, but to me, it's obvious that for a piece of hardware to demonstrate its extraordinary sonic qualities it should look "extraordinary" (possibly, because it's got some extraordinary "organs" inside). The form and content are always connected, right? The same goes for the portable transducers' market: when the priorities are not set up right **sonically**, when the **form ergonomics** becomes a priority, the headphone and earphone companies immolate the content, i.e. highest sound quality. Striving for the best look and convenience, they neglect the content's priority, that is, their product's sound.

*Thereby we can infer: the invisibility of headphone and earphone companies' own ideology and the absence of creator's personality in the product marketing means that, up to now, by the standards, set up by the home High End Audio industry, the headphone and earphone industry is still staying in its embryo phase .*

*While the no-holds-barred and esoteric portable High End source and electronics totally correspond to the highest standards of the home High End Audio, even the highest quality headphones and earphones, again, according to the home audio criteria, so far, do not comply with the High End requirements, nor in their ideology, nor in their system of values, nor in their design ideas and the ideas' implementation, nor in their marketing tools.*

*In fact, the level of sonic quality, the portable transducers do comply with, would correspond in home audio to its "**mid-fi**" level.*

*So, for true audiophiles, who find the current portable transducers missing in sonic qualities, there is a **bad want for a progress** in this area.*

If we draw an analogy with the home audio, especially in the case of in-the-ear monitors, the current most up-to-date and advanced headphone or earphone systems, connected to the most "exotic" High End headphone amplifier, would look like if we would have connected a super-duper SET-amplifier together with the most advanced source and ancillary equipment to a pair of mediocre entry level bookshelf "mif-fi" loudspeakers.

This analogy, I agree, is not as strong in the case of the top class headphones, like either the best Stax setups, top Audeze models, or something, like, the Abyss headphone.

But in the case of insulating in-the-ear monitors, the **only** category which serves my personal needs, and, I'd guess, also, the personal needs of thousands of audiophiles "on-the-go" all over the world, it would be, indeed, a very close analogy.

## – Diagnosis

Summing up the above, I came to a conclusion that due to their additional complexity (related to the necessity of acoustic isolation and correct physical positioning in an environment of individual ear anatomy, so exacerbated by "subjectivism squared"), the insulating in-the-ear monitors have got some **additional** obstacles to provide a proposition of an uppermost quality. That's why, in audiophile circles, earphones', especially, have got such a bad name.

Therefore, with no apparent proposition, there is no apparent demand. Typical "chicken and egg" scenario: manufacturers, who see no apparent demand for such a product, especially, riddled with an additional problem for a mass production, provide no apparent proposition.

You can go to the "Doctor" (doctorhead.ru, the biggest portable audio retail operation in Russia), but he's got no cure.

The “cure” I need, unfortunately, can not be found neither in the ideology of the existing commercial products, nor in their “pedigree”.

To reiterate, a “product pedigree” means not only the presence of a key person with his or her declared audiophile ideology in the portable product’s origin, but, what is of no less importance, the presence of the same values in the product’s **distribution, sales, and discussion**. And these values should fully comply with “big” High End Audio “Charter”, which I’ve been discussing a lot in my recent articles on soundex.ru.

For exactly the same reasons why I started my own earphone project, the “big” High End Audio boomed at the end of 70-s as a reaction to anonymous Japanese hardware which totally replaced old school American hi-fi from the world audio market making every attempt to challenge Far East dominance seems insane. Let me mention some of the old school names: Klipsch, Marantz, Dahlquist, McIntosh. They’re all the names of the individuals who stamped, even symbolically, the products they made with their **personal** approval.

And then all these companies were replaced by Japanese, whose names sounded like abracadabra: Sony, Panasonic, Akai, Sansui, Yamaha, etc.

We’re currently seeing a similar trend of product **depersonalization** on the earphone market. The same way the Japanese invasion of 70-ies appealed to technical specs, the current earphone manufacturers from all over the world appeal only to alleged technical perfection, leaving their own **unique** vision outside the scope of their product discussion.

For such a die-hard audiophiles as I am, when any sonic improvement of any earphone model on the market is oriented to technical perfection **only**, and when the available technologies have already reached their limits in materials and solutions, the bad want of satisfaction with the existing products is inevitable. Especially, in the absence of a possibility for a customized order, the possibility of which we take for granted in the “big” audio. By “customized” I don’t mean the same as “custom” in custom ear molds, the **only** option besides a mass produced “universal ear tip” earphone option (as a rule, also, mass produced by the big manufacturers).

By “customized” I mean access to more **idea** options to choose from.

I am far from disclaiming any positive dynamics in the field of headphones. “Abyss” is a good example of some steady advancement, but, again, as it’s an open design with a big price tag, so, even for hard core types, like me, it’s got a very limited appeal.

Another good example of a positive evolution in the right direction is a technology of custom ear mold monitor, already mentioned. Yet, because such a solution, **as it is**, simply represents just a **typical** logistical procedure with small variations within the limits of a well-established sound model, and its sonic priorities are subservient to the physical limitations, then, it is nothing but a half measure. This approach represents a technology which, sonically, already reached its saturation phase.

It’s a good example of a pedigree of a product and why it reached this particular saturation point. Jerry Harvey started his career as a professional live concert engineer. His in-the-ear monitors started to be sold to musicians who used them during their performances. The same way as we can hardly expect High End Audio sound from stage monitors, why would we get the High End sound from some earpieces originally built for stage monitoring? It’s a different application, and different industry, right?

The same way planar magnetic drivers used in Audeze headphones are derived from a technology Dragoslav Colich used in his stadium sound reinforcement systems. I’ve got nothing against the sound of his headphones, but, don’t you think, it’d be logical to compare the symbolical “path” to the eardrum between a stadium sound reinforcement system, developed by pro-engineers for drunk hooligans, and a balanced armature driver, developed by audiologists for people who needs as much acoustic information and clues as possible, so they even insert it in their ear channel? And to agree that in the latter case it’s shorter? So, some technologies should serve some applications better, than the others?

In Russia we’ve got a saying: “rescuing a drowning man is up to the drowning man’s own hands”.

As a motto, in my case, it would mean that my elevated demands could be satisfied only with my own hands.

By definition, High End is not “a thing for everyone”. Hence, if you are “not like everybody else”, you have to find an appropriate manufacturer, which is also “not like everybody else”. If he or she will be able to convincingly demonstrate his true beliefs with his words, and if you, happened to, share with him or her the same system of values, and, then, if the next stage of demonstrating the deeds would not contradict the

words, he or she would be capable of providing a sound solution for people like yourself.

This is how it happens in home High End Audio, aimed for non-orthodox approaches and steady perfection.

And this is where the roots of my own sonic convictions come from.

*So, where should an “advanced” audiophile, wanting to acquire some no-holds-barred insulating in-the-ear monitors, go to get them?!*

*As a matter of fact, still nowhere...*

## – Therapy process plan

Out of desperation, having no specialized technical background and appropriate training, I, nonetheless, decided to check out what I could achieve in earphone sound on my own by building some earphones of absolute quality for my personal portable use.

Due to extremely restricted options of ideas and their technical implementations I had at my disposal, **my only tool** was to search some untapped opportunities using High End “ideology” according to its “Charter”.

This simply means that, using my insatiable desire for improvement assisted by my home High End Audio background, knowledge, and experience as my tool, I had **to find some new solutions** within the framework of already existing technologies and approaches, to find there some untapped possibilities whose potential was not realized up to the very highest “End” due to the manufacturers’ reluctance to do so.

Using readily available solutions developed by the established companies (without a personal ability to improve their technical performance beyond factory specs), I wanted to find a spot at which I could apply my hands at. My goal was to find some opportunities for radical improvement of the earphones’ sonic qualities that even the best earphone manufacturers, who, as I mention above, don’t use High End ideology as a priority of their design, don’t even think about. Or, even if they do, they don’t believe that **uncompromised** effort to subscribe to this priority, in the current market place, is realistic.

There is no way here to avoid a digression on the main tool, I’ve got at my disposal, so there is no way to avoid discussing, briefly, my thoughts about High End “Charter” mentioned above. (In some more details they are also formulated here:

<http://soundex.ru/index.php?showtopic=41020&page=5>).

This forum’s comments on my previous “Personal Opinion”, where the link above is taken from, has been lingered mostly on the issue of what High End Audio is, really, about, which particular components could be taken as some **real** examples of its implementation in “hardware”, and which components could not.

For me, it is obvious, that High End Audio is not just the pile of some metal, wooden, or plastic boxes of, say, uppermost sonic pretensions, but, rather, some high spirit, which lives inside them. A true High End Audio component is an embodiment of a **mutual** devotion of the whole chain of its design, production, distribution, sales, and evaluation (!), to the **total** pursuit of absolute sonic truth, as it’s defined by the “Charter”. Only with the mutual and dedicated **pursuit of the absolute truth**, having **the same** reference points, we can hope that, the first, any masterpiece to become a reality, and, the second, that it’ll be given an appropriate and mutual respect.

So, as I said, **all** the links in the chain should be of the same highest standards. Hence, in order to make a verdict on a particular component, it’s necessary to know not only all the details about its sonic ideology, its design and the manufacturing methods used, which does have a lot to do with complying to the necessary condition of its belonging to the highest class of equipment, but also all the details about who and with **what kind of intentions** was selling, evaluating and installing it, in order to find out if the component’s potential is fully (or only partially, or, if at all) realized, which has a lot to do with complying to the sufficient condition.

In the final verdict for a product it’s impossible to overestimate the utter importance of a particular link in the abovementioned chain, the one which I’d call: “Who’s the judge?” It should be also of the highest possible standards, to avoid the possibility of it to become the proverbial “the weakest link in the chain”.

Not only attention to the details, but also a sense of a **common** purpose, multiplied by the possession of a **common** language and a **common** ideology, never mind mutually good intentions towards each other and the highest ethical standards, allows all the members of this chain to meet on the common territory of a true High End Audio masterpiece, understand each other and, being like-minded individuals, possibly, agree

with each other on the component's merits.

*Unfortunately, it makes this verdict to be useful only inside this chain of like-minded people, to the outsiders, this verdict would mean nothing.*

The absence of such mutual ground and a common cause lead to unproductive endless disputes over what is High End Audio and what is not, so, instead of a steady development and some progress in it, in the last years we ripen what we sown: stagnation.

Let me bring to your attention just a few examples of important details which would prick my ears seeing, as a necessary condition for greatness, a possible **golden link** in that chain.

The Audio Research Corporation twenty years ago in an attempt to make sure that all their products are of the highest quality, made **each** piece of equipment leaving the factory to undergo an individual and thorough audition carried out by a special employee in the reference system located in purposely build factory listening room with the controlled acoustic properties. And if this expert had a slightest doubt about the quality of the piece tested, it was sent back to the production area to get rid of all its shortcomings. Since then no any other company, I know of, has been employing such a requisite test on all 100% of its production volume.

Another example of such a significant, but often missed, detail, which can be a clue pointing out in the direction of the pursuit of absolute, could be an answer to the question **how significantly** does a piece of equipment differs **from the rest of the pack** in providing a specific solutions? Even if it's true, that "there are no friends when it comes to the taste and color", the scale of that difference is very important to start to pay an attention. For instance, at this moment, a pair of well trained ears should be immediately pricked at just simple mentioning of some obvious examples of cutting-edge technologies, to name a few, such as, "exotic" speakers, individually calibrated multi bit DACs, unusual digital processors for audio systems' fine tuning, new generation "fempto-seconds" digital clocks, or, say, scrupulously made direct heated triode amplifiers.

So, before reaching a verdict if any component belongs to the highest sonic class, the same "**golden link standards**" should be applied to the rest of the whole chain.

To reiterate, the **necessary** condition for a particular component to belong to the High End Audio class of gear could be expressed as a compliance of each link in the whole chain including manufacturing, selling, installing and its evaluation, to **the letter of the "Charter"**. At least, at the level of sincere intention to reach the goal of achieving the highest possible sonic result.

Then the **sufficient** condition would be the similarly sincere intention of **all** the links in the chain to comply with **the "Charter" spirit**, and if it's so or not so, is what, actually, allows us to reach the final verdict.

Any product represents **an imprint** of its creators' intellectual and spiritual qualities and values, like a mirror, it reflects their combined personalities and the character traits. But your vision has to stay sharply focused to see them.

Because all individuals are different, that's why there exists the above correlation: the smaller the company, the more chances we are talking about an absolute product, and in an extreme case of one person, this correlation becomes the most obvious, as his or her individual qualities are not dissolved in individual qualities of other people, and, in this case such an imprint is much easier to see.

Although all people are different individuals, a common trait, that makes a particular audio product to belong to the High End Audio class, is that its creator should be driven by, however corny it might sound, the **love** for others. This love, imbued in the product by its creator, shine through the product's qualities. But not everybody can see it. Only those, who are sensitive enough, who are willing and capable of expressing the love to others, can feel the shine. The rest of them just don't notice it.

Nobody questions a statement that true High End Audio is positioned on a brink between Technology and Art. But Art is about Love, right? So, before asking for anything in return for their effort, a link in the above chain should demonstrate his or her "soul great gusts". And in this respect, such individuals have to be true **maximalists**: they should never use the others for any outside purposes, including pleasing their own vanity or placing their "business interests" above this "love foundation".

Most of the negative trends within our industry for the last years are the direct result of its ignorance of this last maxim.

*Possibly, because we let too many "weakest links" to infiltrate our chain, even the golden links didn't save*

*it from being broken.*

Coming back to my own effort, it's been getting harder and harder for me to put my **own** hands on anything to advance the home High End Audio in the last several years. Despite the whole field of dedicated audio was ploughed back and forth, in some distant past, from a time to time, our StereoPravda team, under my supervision, managed to provide some solutions still not found elsewhere. But neither three band active tube crossover designed by Anatoly Devichensky in 1997, nor StereoPravda PSA 312 battery power supply for digital components in 2005 (reviewed in "Audiomagazine"), nor StereoPravda USB-I2S convertor in 2006, both designed by Alexei Malanin, pulled off the ground due to the lack of the local demand.

Because of the fiasco with these and other projects of my own, being aware how much time, effort and money they take, I, finally, stopped to even think about any new serious production projects for the "big" High End Audio.

The fact that after all these "burns", I got in the past, I still could gather my inner strength and resources to carry out my "kitchen table" portable earphone project to its logical conclusion, might be taken as the best example of the difference between the resources you need to achieve anything in "big" audio vs what you need to do the same in the "small" one.

In earphones to get immediate results I need to spend just tens of dollars, while in "big" High End it would cost me an order of magnitude (or even two) more to indulge in my strive for perfection.

In my last project I got an inspiration from numerous successful home High End manufacturers, whom I knew personally, and who lacked any formal training. I had a chance to ascertain many times that their enthusiasm and pursuit for perfection, accompanied by a "correct" vision and adherence to the High End Audio "Charter" Faith, even without that solid background, led them to some extraordinary results.

Realizing the futility of competing with the Goliaths at their own turf, I didn't see much sense in "home-brew" imitation of what was already done by "the proper" manufacturers.

That's why I find more than two hundred pages long DIY thread at the head-fi.org forum about self-made "custom" earphones mind boggling. To me, considering waste of time, the cost of the broken transducers, and inferior quality and appearance, compared to the "branded" models, it is not worth the money saved this way. Why would anybody try to spend all this time and effort for **pure imitation**, for something that the others can make much better?! I've got no idea...

Instead, I tried to put my hands on what the other companies wouldn't touch even with a long stick.

Or, putting it in a better way, I wanted to make a portable noise insulating transducer of uppermost quality, "honed" the way to meet my own needs, requirements and sonic preferences.

I see more sense to spend the time and effort on elevating the highest standards, on something that nobody, possibly, except me, tried to do before.

By that time, it was obvious to me that due to the requirement of portable use in external noise environment, limitations of the individual drivers, and theoretical possibility of individual tuning, because all the other headphone technologies are not doable either at the absolute level of quality required, or are not usable in the IEM case, the only option I had was to design and built multi-driver insulating in-the-ear monitors based on Balanced Armature technology.

As I already had a pretty extensive and a very positive experience with the Etymotic Research ER-4S', and knew their innards, I knew that the dynamic driver technology, due to the size limitations, would not allow to me to implement several active ways' crossover design. At the same time, BA technology with all its advantages requires multi-way to achieve **both** wide dynamic range, **and** wide frequency response. Passively you can get either one or another. Yes, as a compromise, you can do multi-driver design, like in "custom" models, but I saw "Holy Grail" in doing both multi-driver, and multi-way "active".

Plus, I wanted to explore some other ideas, which I describe in more details below.

With the purpose of tapping on High End Audio "Charter"'s potential, I used all the knowledge and experience I gained in the last twenty years of building home High End Systems and implemented it in this project.

You can read in details about my "big" High End Audio systems in the last summer's "Personal Opinions".

[In the context of my personal requirements and with a goal of reaching the IEM's "Holy Grail", from my](#)

previous experience and some background research, I identified a number of tasks I have to deal with to bring this project to its conclusion.

They are found below:

**First:** from all the above, the IEM's performance benchmark should be positioned at the most **absolute** level and should comply, as much as possible, with the "big" High End Audio "Charter's" system of values.

**Second:** the final **visual appearance** of the product **does not really matter**. What does matter is the mechanical and electrical reliability of its construction, which is very important in intensive and long term portable use with its constant mechanical stress on the IEMs, its connecting elements, and its cable.

**Third:** As I will be using the IEMs in excessive external noise environment, their design should provide maximum ear channel acoustic and mechanical (that means the noise generated by the connecting cable) **isolation**.

**Fourth:** The IEMs should be positioned as deep as possible in my ear channel, preferably, **at its second bend**, the spot of transition from cartilage tissue to the bone tissue (it's a well established fact in audiology, that such position allows to avoid pain when touching the thin skin further down the bone part, and, at the same time, provides minimal "occlusion" effect).

**Fifth:** All the drivers in such an earphone should be positioned **at the same axis**, and this axis' direction should be, as much as possible, parallel to the direction of sound waves propagation along the ear channel.

**Sixth:** From the twenty+ years' worth of "big" audio experience and seeing through all of them the advantages of working with the active systems, I set up a goal of building, at least, a **two way active** earphone system to be used with a specially designed and built dedicated DAC/two way electronic crossover/two dedicated balanced amplifiers (a separate offshoot from the IEM project).

**Seventh:** If I have to use the IEMs with a portable audio player, that is when I can not use the dedicated DAC/crossover/two amps, I wanted to avoid the use of any passive crossover on the IEMs to avoid the passive filters' inherent distortions. Besides, speaking of absolute, I was aware of complexity of the passive crossover's implementation within physical dimensions of a portable device, so I was reluctant to even consider using it.

**Eighth:** I was anticipating that the drivers' selection process is going to be long and painstaking, and has to be performed only after all seven previous conditions are fulfilled. And I was determined to consider all the driver options available.

**Ninth:** Initially, the connecting cable should be selected only based on its sonic virtues, not on mechanical or practical ones. At the same time, as its mechanical properties still do matter, the final version of the cable should be applicable to its "tear and wear" status.

**Tenth:** And last, but not least: to be 100% honest, if the project goes well, it would be nice to share the pleasure from using this device with others, who, also, might become interested.

## – The treatment process

### 1. The Earphone Initial Concept

As I mentioned before, from the onset of this project I didn't have any doubts that only balanced armature drivers, widely used in hearing aids and IEMs, would allow me to meet my expectations sonically. The main reason I thought so, was due to the fact that a BA driver is a direct mechanical inversion of a human hearing apparatus, with its mechanical parts of very similar functioning and comparable physical dimensions to those of the human organs.

Another reason was that this technology is the product of some very serious scientific and technological pedigree in the field of audiology and related subjects.

So, if a typical dynamic driver, used in an earphone, is made "in a garage" by a small company, Knowles or Sonion, the most well known manufacturers of balanced armature drivers, are huge corporations. The latter's technological capabilities, scientific potential and production conditions allow them to implement their designs with such a complication and a precision that the "garage companies" can not even dream about. I have heard rumors that Knowles was sold some years ago for several billion (!) of dollars.

Anticipating a criticism, I don't think that there is a contradiction in what I have stated previously about an

inverse correlation between the size of an audio manufacturer and the sonic quality expectations from it, and, now, my praise to the products from some huge vendors.

Initially, I've been referring to **completely built** products from some small High End manufacturers, and now I'm talking about a necessity of acquiring the **parts** and **components** from some big companies. There is a big difference.

The creator of the complete product, which expresses his idea to get the end result can and should use any means possible, while for a particular component or part production, to reach the highest quality, there can be some **minimum production requirements** that call for such immense resources and production capabilities, that no small manufacturer can pull this off. And then to ensure the ongoing production and the proper quality yield some minimum quantities requirements must be met. And this "minimum quantity requirements" can be huge for a small manufacturer.

That's why a miniature balanced armature driver, a direct heated triode, or even a mere resistor, can not be made in a garage, and you can get them only from a big company. In High End Audio, on a **parts/components level**, the correlation between the size of a company and its products' quality level is, as a rule, fully inversed to a finished "no-holds-barred" product correlation law: the bigger the manufacturer, the better the products they make.

Exceptions from this rule, probably, do exist. I wouldn't mind to place my hands on a garage-made High End balanced armature driver. But so far this is only a dream. Who knows, maybe, one day someone will create an audiophile version of such driver. But for now, the only choice we've got is to be content with the options available from, basically, two huge companies which dominate the world, even if their drivers' portfolio stays the same for many years.

Small size of a balanced armature driver allows us to assemble an IEM with many different drivers in it, with some of them completely fit **inside** our ear channel. So, we're good with a possibility for a deep insertion (the prospects for which, alas, still depend on individual anatomy).

This small BA drivers' size also lets us to achieve a good ear channel isolation in front of the assembly, where we need it to maximize the efficiency of the drivers assembly due to minimal playback air volume, and to minimize the "occlusion" effect. The same small size also allows us to experiment with different drivers' combinations and positions, implementing all the different driver combinations using either on-board passive, external passive, or electronic active crossover.

*There are numerous IEM designs and implementations on the market. My only leverage over them, and my only hope to avoid all my efforts going down the drain was to find a way to apply my 'big' High End Audio background and experience (according to its "Charter"), so, in the context of it, to set the sonic goals as high as possible (the higher, the better, so can to "diversify" over others.*

*And pray God that I'd stumble upon a sonic golden nugget.*

*In hindsight, hoping to build a foundation stone for a project from a hope to find a nugget is a very old-fashioned and an arrogant way to behave, considering that the **alchemist** days, allegedly, are long, long gone.*

*And from the onset of this project I've been setting up to prove otherwise.*

## 2. An Audio "Cigar"

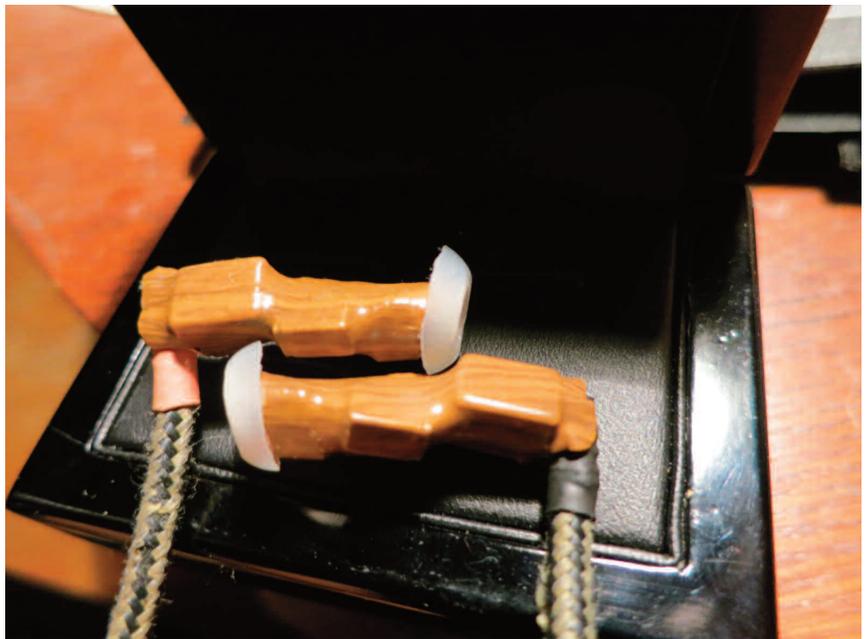
The final appearance of my "home brew" IEM turned out to look "kitchen made" (see the picture attached), but its form comes from its content. This is not a "branded" product, it's an artistic statement, a "piece of the audio art", and as it's not intended to be considered as a "commercial product"(yet). I would, really, doubt, if any earphone "proper" manufacturer would see in it a commercial opportunity. But, I'm afraid, that any attempt to change its appearance, to make it "nice and neat" would simultaneously damage its content, so I would never do it. Still, even if I see some residue commercial opportunity here, it was not a priority to me.

According to the analogy with cigars I often use in my "Personal Opinions", the IEM I wanted to make, I'd compare to the best **hand made** cigars, while typical mass produced earphones on the market could be compared to the **mass produced** cigarettes, even the most expensive and "elite" ones, with some "golden" filters and the beautiful packages.

The fine cigar is an example of a High End tobacco product. Not unlike High End Audio, cigar marketing is based on its creator's personality, individual history, ideology and, even, some unsubstantiated mythology. The cigar production numbers are tiny compared to the cigarette ones, yet the companies producing cigars

could be quite successful. The same rule exists there too: the smaller the company, the more reasons to expect an absolute product from it. This rule becomes even more apparent, if we would expand our view and would compare the production volumes of cigarette tobacco giants over the volumes from microscopic manufacturers of the “boutique” cigars.

Paraphrasing Gertrude Stein, “the cigar is the cigar is the cigar” (although Freud remarked that “sometimes a cigar is just a cigar”), its appearance compared to a cigarette appearance, is, definitely, a “homebrew”, but it can’t be improved much, because it’s a **completely** handmade product, an average of fifty pair of hands are applied to a cigar taking a shape from a tobacco seed to a finished product. And not a single machine.



But what really matters, in this context, is that to compare a cigar to a cigarette is just like to compare a glass of a good cognac to a bottle of a cheap beer. Do we need to say more? I don’t think so.

*Not even thinking of trying to compete with mass-producers of “cigarette earphones”, I have **consciously** decided to come up with a “cigar-earphone”, absolutely unacceptable for respectable manufacturers neither by the production method, nor by its “shabby” appearance, nor by its possible marketing.*

*Nor by its superlative sonic qualities, as paradoxical as it sounds.*

### 3. The Acoustical Isolation

This IEM’s acoustic isolation requirement conflicts with the diversity of individual anatomies. The ear channel isolation in the area of its second bend, where I wanted to place my earphone, is a “sweet spot” for many reasons. While at the very entrance to it, where the vast majority of manufacturers, following the path of the least resistance, want to place it, the IEMs not only leak the external noise but also move around on and off the ear channel axis, therefore, interacting with these ear channel resonances in more **unpredictable** ways.

Also, isolating smaller volume of air with the earphone’s silicon tip in front of it, and the IEM’s been deeply inserted in the ear channel, preferably, at its second bend, allows the IEM’s drivers to be located closer to the ear drum, so you don’t need to play music as loud as in badly isolating IEM, positioned at the entrance to the ear channel. In my case, you need to move less air, which lets the drivers to operate within more optimal dynamic range.

I tested that this is true by placing at the back of my IEM a separate air reservoir connected with a tube to the ear tip opening, thus slightly increasing the effective volume of the air being moved. The sound immediately lost its punch and weight at the bass region, so, in the end of this experiment, I had to get rid of the additional reservoir, proving that, for sonic results, the smaller the air volume, the better.

After multiple attempts, my efforts to find a way to position the IEM at the second bend of my ear channel brought a solution. It was defined by the improved resolution, wider frequency response, and the excellent dynamic range. In the accompanying process of preserving the maximum acoustic isolation between the IEM/s ear tip and my ear drum at all stages of trial and error, I found out that a “creative” dose of “slit leak”, provided by specially treated silicon tip, allows you to tweak the sound “damping” degree.

*But due to the IEM’s substantial physical dimensions, subjective feeling of a comfort from such a deep insertion is highly individual. Therefore, I can not imagine that a “proper” earphone manufacturer would even think about such an approach for their product, for there is no algorithm which might help to tell the manufacturer what’s going to happen to the sales of such product, if it’s taken to the **mass** production. Actually, may be, there is, and it’s why they don’t do it.*

A **single** driver IEMs of this kind did have some presence on the earphone market in recent years – a

deep insertion Klipsch X-series earphone come to mind as an example, but they were discontinued pretty quickly, apparently, after examining the sales volumes. I would imagine that there happened to be not too many music lovers who'd like to shove foreign objects **deep** into their body orifices. To do this on a constant basis you, really, have to be a hard-core type.

The available solution of using the custom ear molds, however clever it is, is still not good enough for me. It did introduce a convenient and efficient logistics for the mass production, and it's got some definite advantages for me over all the other headphone and earphone approaches, both practically and sonically. In the absence of my own efforts, it'd be, no doubt, my second choice for a no-holds-barred technology for my personal use.

Nevertheless, because all the **critical** drivers in "custom" IEM are positioned outside of the ear channel (only less critical, the tiniest ones, can, or can not, be inside), and especially, because the drivers in the "custom" IEMs are not "on common axis" not only within their group, but, also, not, necessarily, on-axis with the ear channel's effective" axis, I don't think that this technology fully allows to get the most of what you can get from the BA drivers. I position my drivers where the "custom" technology positions the "passive" material of their custom shells. I see more sense in occupying the precious space within the ear channel environment with the "active" drivers, bringing them, in such manner, as close to the ear drum as possible.

And, by the way, my goal was not only to shove the **suitable** drivers as deep into the ear channel as possible, but also to **correctly** place them there too. By "correctly" I mean not only on-axis between themselves, but on-axis "with" the in-the-ear sound propagation. That's another strong reason for the deep insertion.

All the details above are necessary to explain that the single issue of acoustic isolation during the unraveling of the project was impossible to separate from **all** other aspects of the design (even including the connecting cable's mechanical qualities, as they affected the way the earphone "sit" in the ear).

The last, but not least, was to find a correct physical configuration of the appropriate drivers' combination, which would not only preserve the acoustic insulation, but will also be convenient and comfortable to use.

Yes, it does take some effort to get accustomed to the IEM inside your ear channel, but, at least, in my own case, I find the procedure of insertion and removal of my earphones much more fast and convenient that for the most of the IEM I auditioned, including some of the "custom" earphones.

Regarding the comfort, again, with my ear channel size bigger than average, to me, the earphones are more than acceptable.

#### 4. The Deep Insertion

There are a lot of reasons to believe that the closer the driver placed to the eardrum, the higher the sound quality can be achieved. But there were some issues that I had to consider.

First, some bad news. Operating in a much smaller volume of air, we remove a good deal of longitudinal low frequency resonances, which will be excited if we would place the IEM's isolating tip at the very entrance of the ear channel, and which are, together with the bone conduction, increasing at low frequencies, the two main culprits of what's commonly known as the "ear occlusion" effect, characterized by the aural perception that the sound becomes "darker" and less clear.

At the same time filling the ear channel with either a shell material (like in "custom" models) or decreasing the operating volume of air by isolating ear channel very close to the ear drum (like in my case) would not allow to develop **naturally occurring** open ear channel resonances, which will make the sound, obviously, less "natural".

So I had to **compensate** the absence of these naturally occurring resonances, as much as possible, by "voicing" of the IEM drivers' assembly.

Second, there are some good news: moving the driver closer to the eardrum, we obtain a possibility to **increase its efficiency** significantly: both by driving smaller isolated air volume (see the previous paragraph about my experimenting with additional air reservoir), and second, due to the smaller distance to the ear drum.

And, finally, the positive side effect of deep insertion is that the coaxial drivers in the IEM become coaxial to the sound propagation in the vicinity of the eardrum due to the straight narrowing shape of the ear channel close to its very ending.

Due to the channel's subsequent curvature profile, it becomes impossible to make the sound propagation from an earphone placed at the entrance of the ear channel coaxial with the eardrum's on-axis reception pattern.

I would draw an analogy which shows how drastic, in the case of IEM, I have heard the difference in sonics between on axis and even slightly off-axis. I would compare this sonic difference to the difference between listening to music in the near-field in a room where the speakers are set up in front of you vs listening to it from your kitchen via a long corridor. Listening to music via loudspeakers in the “near field”, just like listening to music via a pair of IEM inserted at an appropriate depth, compared to compromised listener’s positions (that is, either sitting in the kitchen, or placing the IEMs at the entrance to the ear channel), would provide us, for **the same basic reasons**, with additional layers of increased clarity, depth, and resolution.

*The vast majority of “proper” audio manufacturers will be frightened by such a deep IEM insertion in the ear channel. Having seen one of my prototypes, one of them told me: “This thing will, definitely, require an ADA waiver of some sorts (ADA refers to American Drugs Administration). To this I replied: “Just go to a sex shop, and take a look at what stuff people buy there with an intention to shove it to the body parts, which, in your right mind, you would, rather, not think about. And none of this paraphernalia requires an ADA license”. Flabbergasted by my reply, he couldn’t find any further arguments against the deep ear channel insertion.*

There is no doubt, that the deep insertion, in some cases, might cause, initially, a feeling of some discomfort, but “no pain, no gain”, right? Only when an extraordinary effort is taken by **both** sides: by the manufacturer and by the consumer, the latter might have some hopes for some extraordinary results. Remember, The Beatles sang “You can’t buy me love”. Likewise, the great sound can’t be bought **just** with money.

Because I was going to insert the drivers as deep in the ear channel as possible, I couldn’t use the ear molds, like in “custom” models, for at the second bend of the ear channel, where I intended to place the IEM’s drivers, in case of “custom” option, would be the shell material with the holes drilled for air ducts. In this case there would not be the place left for the drivers **completely inside** the ear channel. Admitting its nicer appearance, and despite numerous friendly advises, I decided that the custom ear mold technology, which would not allow for the deep drivers placement, is not for me.

So, I had no choice, but to discard it from consideration. Also, why would I compete with the established Goliaths of the industry on their home turf? Deep multiple drivers’ IEM assembly insertion is the key element in my “**sling**” list. To learn to implement it properly is to master a shot between their eyes.

Figuring out the drivers’ configuration, I had to figure out where and how I should install my own universal silicon tip for acoustic isolation.

After several months’ worth of experiments a suitable procedure for the tip preparation and installation was found.

Given that the ear channel keeps contracting near its end, and that the remaining distance to the eardrum in my construction is no less than 6-8 mm, I strongly believe that the use of this ear monitor is safe enough.

I am using it for several years now without any noticeable detrimental effects on my hearing perception, and no somatic symptoms of any kind.

## 5. The On-Axis Priority

I began this project many years ago with various Etymotic Research ER-4’s modifications. For instance, installing their driver into an enclosure made out of titanium, I was immediately struck with an effect of different frequency responses in left and right channels. Promptly I found out that it was caused by the driver slight shifts inside their new bodies. This result pointed out to the high sensitivity of our hearing to the directivity of the sound waves, especially, when the acoustic radiator is in the close vicinity to the ear drum. Since then, on more advanced prototypes it was confirmed over, and over again.

This was one of the reasons I wasn’t totally satisfied with any of the “custom” earphones: their drivers and sound ducts are positioned not only at different angles towards each other, but, also, towards the “effective” ear channel axis. This lack of mutual on-axis operation, exacerbated by the off-axis behavior of the drivers assembly in the ear channel, leads to obvious sound degradation.

As an analogy, as in a typical IEM, this discrepancy in radiation directions for individual drivers can be up to 90 degrees in difference, just imagine what would have happened to a loudspeaker sound if all its drivers would had pointed out in such a completely different directions?!

In the most of the universal tips’ and custom mold IEMs, it’s exactly what’s going on.

Being aware of this, I tried to position all the **seven** drivers on the single axis. And to direct this common

axis, as close as possible, at the “sweet spot” on my ear drum.

*The bottom line is that none of the IEM manufacturers, I know of, are determined to position all the drivers inside their earphone on the common axis, for their design's ergonomics and mass market appeal are of much higher priority than the absolute sound quality.*

*And I see no reasons why this typical attitude would change in the foreseeable future.*

## 6. Advantages of Two-Way Active Adjustable System

The balance armature drivers were initially thought out and designed for medical (audiological) purposes to be used in the hearing aid devices. I presume, their nomenclature hasn't changed much for many decades (except minor additions), because their production is extremely costly procedure dependent on huge sales. All these drivers are highly specialized by their application.

The intended application of a driver depends on its use either in hearing aid of a specific design (“Behind the Ear”- BE, “In the ear Channel”- IC, “Completely In the ear Channel” - CIC), the type of a hearing loss it's designed for (frequency band, magnitude of loss, presence of recruiting – when sensibility is non-linear or has an intermittent character, etc.), if it's got a DSP option, if it's got an amplifier on-board (!), its interface type, and so on.

As a rule, the hearing aid devices use just one driver for dealing with the most significant hearing problem, and, as a rule, it doesn't have to meet wide frequency band and wide dynamic range requirements **at the same time**.

It goes without saying, that the requirements applied to the hearing aid devices and the requirements for IEMs, intended for music reproduction, don't fully coincide. That's why the possible use of BA drivers for audio wasn't considered initially as a priority. As a result, despite Mead Killion's claims to the opposite above, **a single** BA CIC driver, suitable for full insertion in an average size ear channel, can not provide to us, spoiled audiophiles, all we need in sound quality. Even if some of these drivers can, in some rare cases, provide full frequency response, then the sound resolution or dynamic range would suffer. Then, with good resolution, you'll not get full frequency response, especially at low frequencies. Then, you can take a high efficiency driver, but it will make you to sacrifice wide frequency response, and so on.

Even if this comparison is not intended by the manufacturers, in common with the home audio, we can call the families of these BA drivers, mostly defined by their dimensions, as the “woofers”, the “midrange” drivers, and the “tweeters”. Uncommonly for “big” audio, “the midrange” drivers in the environment of the human ear channel, where you don't need to inform your neighbors about your last favorite song, are capable of (almost) full frequency response. Except, like with everything, you can't have your cake and eat it: using these “midrange” drivers, in audiophile terms, you can optimize their performance at the high frequencies, but then you sacrifice their bass extension and its weight, or you can target their potential reproducing deep bass, but then you're losing in its articulation and the perceived resolution on “top”. While in “big” audio you **can't** get away without two-way or three way loudspeaker to even try to appeal to the 99% of the market, in headphones and earphones, due to the different acoustics of the common size ear channel and the driver capabilities, it's the opposite, 99% of the market is catered by the single-way designs.

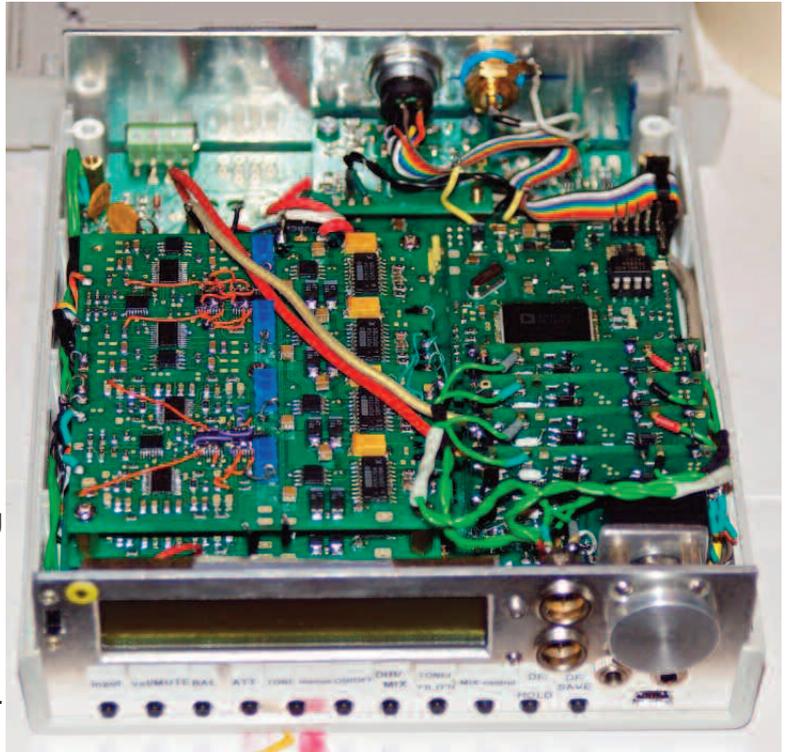
From the above it follows that I belong to the other 1%. So, to explore the untapped opportunities I figured out that the only way to get **both** the wideband frequency range with the highest resolution on top and bottom, **and** the best dynamic characteristics is to use an active electronic crossover where each section is individually adjusted. Also it means to use multiple driver arrays, where a single driver or an assembly of drivers would represent a single frequency “way”.

Using driver arrays, as a logical extrapolation of using a single driver, as I found out after many trials, allows you not only improve the loading characteristics of the separate drivers, but also such approach provides you with a tool to be creative with the arrays' “voicing”. If using the appropriate driver arrays is the most important design choice seeing the total **resolution** of the system as **the first priority**, then the two-way or three way configuration can not only provide you with improved overall system **dynamics'** capabilities, but, also, allows you to adjust the overall sonic signature of the complete multi-driver transducer in terms of its **full range** capabilities.

As far as I know, up to now, **the only** company which dared to implement an active three-way setup in **portable** earphone product is Jerry Harvey. But soon after the introduction they discontinued this product. I can only speculate why they did so, as I have auditioned it three years ago in Las-Vegas. To implement such system, including three band digital crossover, three stereo DACs, three stereo amplifiers, and all the

power supplies in a case smaller than a pack of cigarettes, apparently, they had to strike some severe sound quality compromises (that I heard there). So, the company, eventually, decided that it's not worth it. After they pulled the piece from the market, I can only wonder, what the customer response to it was.

Being aware of some minimal physical dimension requirements to no holds-barred sonically unit, I managed, to squeeze a similar unit in a single 100% portable case full of electronics: two DACs, two way balanced electronic crossover with adjustable filters, four balanced amplifiers, and battery powered power supplies (see the picture in my August column). Learning Jerry Harvey lesson, its dimensions, weight and innards (particularly, 8 Burr-Brown 1704 multi-bit DACs in balanced configuration and a DSP on the board) represent, in the context of its portability, an uncompromised design approach. It's designed and built for me by the engineer who's been working with me on many projects for the last twenty years. His name is Alexei Malanin.



I am sure there are some minimum physical size and weigh requirements for a devise like this. Otherwise, you can end up sitting between two chairs. With the current technologies, the cigarette pack dimensions simply don't allow you to implement a concept like mine at an acceptable quality level.

Shifting priorities from convenience towards the sound quality, this approach is nothing else but the legacy of my High End background. Personally, I see no problem in my headamp's **reasonable** dimensions and weight. It weighs about a kilo, which to me, is totally acceptable for a portable device. I can easily carry it around in my shoulder bag with all my papers and personal stuff.

*I am not wondering where the "cigarette pack" size and weight limitation comes from, and Jerry Harvey's "coitus interruptus" in the absence of others who'd like to do a similar product, proved with the absolute vividness, that its minimal physical dimensions, its weight, and its cost, of such a two-way active portable DAC/crossover/headamp are prohibitive to any company to even consider.*

*And I don't think that, until technology would radically change, any "respectable" manufacturer would be willing to even try.*

*Do I, really, have a time to wait? No, I don't think so. That's why I had no choice but to build the prototype on my own.*

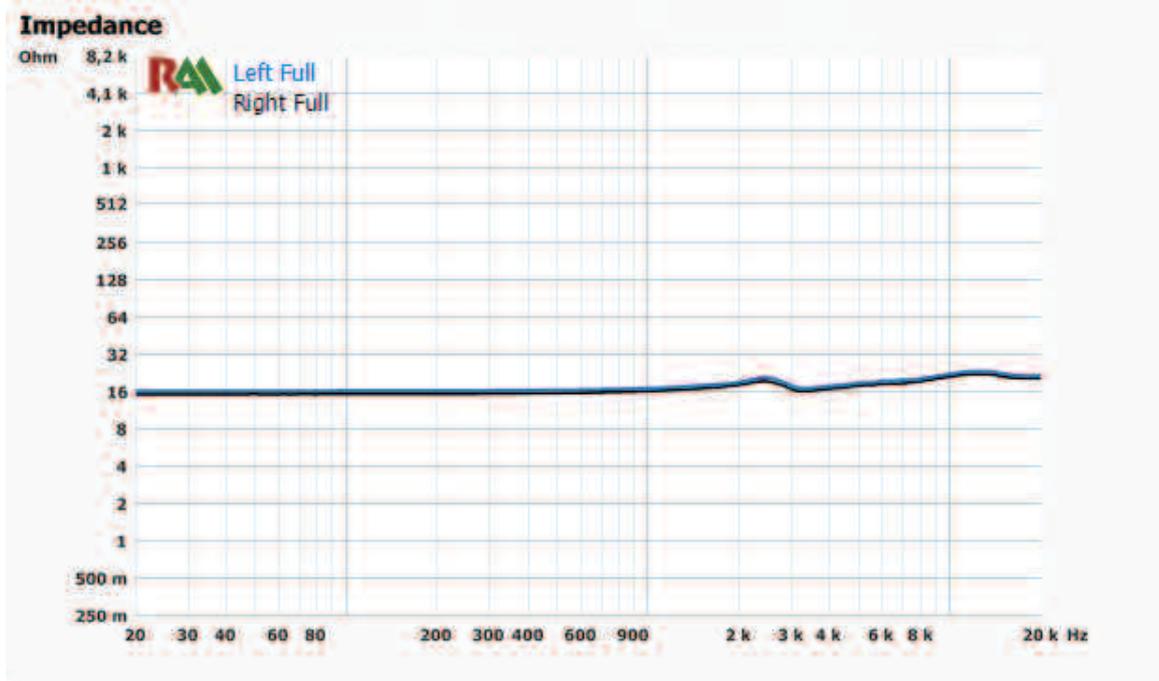
## 7. The Total Absence of a Typical Passive Crossover

I've been trying to experiment with various passive crossovers for these earphones, but didn't quite succeed. Maybe, it's just because I lack the necessary technical expertise. But, then, it can be my advantage **to lack** the technical expertise. As, on sonic grounds, having successfully completed my project by scrupulously building multiple driver array prototypes, simply combining their electrical and acoustical interaction with each other, and hearing what happens, I acted on a High End Audio premise, that a complete absence of any passive crossover is still better than even the very best one. Especially with the restrictions placed by the portable use.

*Why a typical earphone manufacturer would not strike this way? First of all, they can not afford to rely upon stumbling on a "golden nugget". Even if I don't see my method this way, from their perspective, they can look at my attempts, as if I've been trying to win a fortune at a casino.*

*To them, it's just an "old fashioned" way to do things. But, in the context of the High End Audio, and by judging by the results, to me, it's one of the ways, which is still valid. I see their way as using a vehicle, hopping on which, I could, definitely, move much faster. And, however arrogant it might sound, nevertheless, I'd pronounce this: driving in their vehicles, the current earphone manufacturers, still, **could have benefited a lot**, if they would had asked audiophiles, like myself, about the directions.*

Because respectable earphone manufacturers are unable to allow themselves to go beyond limitations due to, as they think, a necessity to follow the mass production's methods, they can not afford to do some risky stuff and end up striking the path of **the least resistance** and **lowest cost**, commonly using, in this context, cheap passive filters as the Band Aids to cover up the problems, which are not easy to solve, and which you can solve only the way I did: going through a huge pile of crap in the hope of finding a golden nugget.



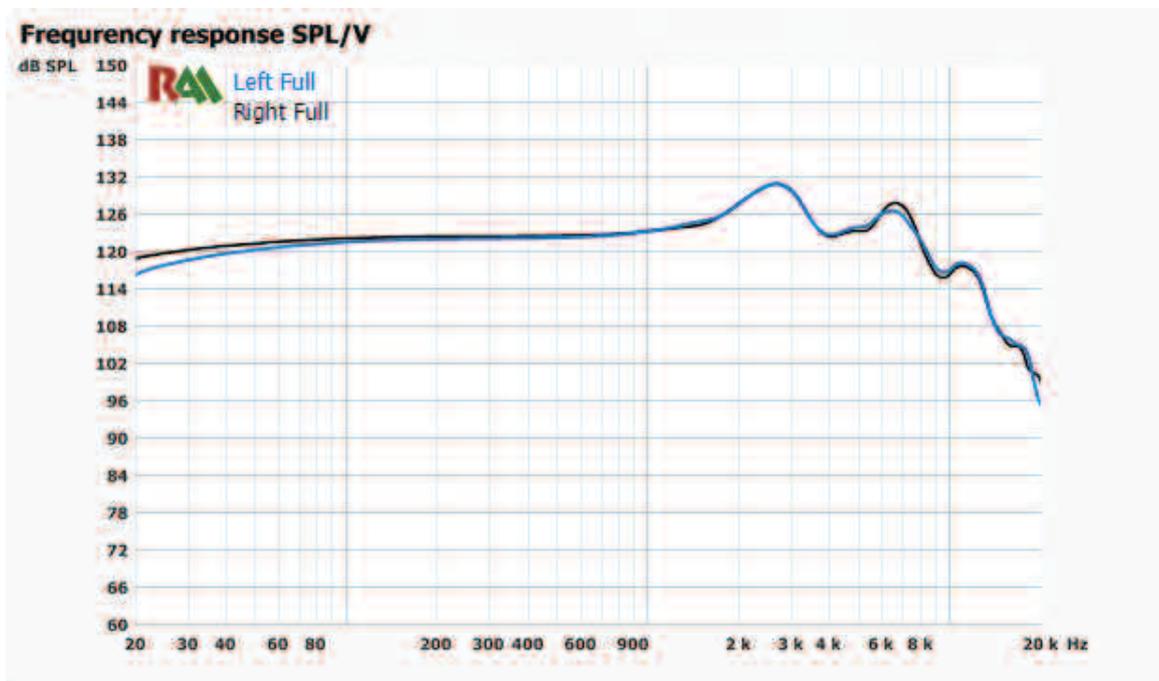
Again, High End Audio taught me that it's a part of Art, and a part of Science. Without its "artistic" side, all you're left with, is a can of "scientific" Band Aids.

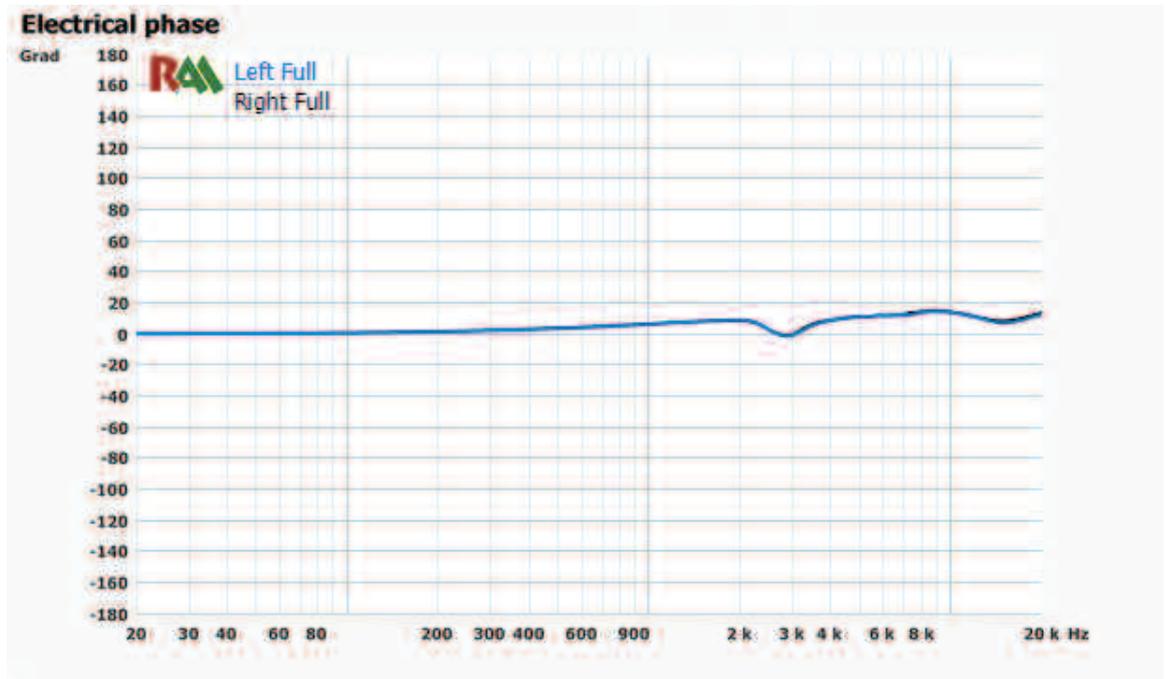
### 8. The Selection and the Physical Configuration of the Drivers

Yes, the drivers' selection process, their optimal drivers' positioning and configuration experiments, and matching their respective loads in interaction with each other, turned out to be a horrendously exhausting process, that took many years.

I read somewhere about guinea-pigs getting, literally, crazy in some experiments where their food was provided on totally unpredictable time schedule.

Likewise, it's hard not to lose one's mind making prototype after prototype hoping that, may be, one day,





the sonic reward would come. Or, may be, not.

There is no way a proper manufacture would work in such an unpredictable way. Even if they are determined to work hard, they still need, at least, some residue certainty. That's why they can work only with some tried and proved ideas. The ideas come from either some very expensive scientific research, which the most of the earphone manufacturers can't afford, or from the devoted alchemists like me. Very rarely a product comes, which can **harmoniously** unite these two sides of the High End Audio coin: its' **"technical"** side, and its' **"artistic"** side. In my humble opinion, it's what I've been trying to achieve with my IEM project.

*Dividing the development expenses and the effort by its' zero sales I worked under pressure of development costs reaching the infinity. I don't think that **any** manufacturer can afford the development costs to be so high...*

The initial problem I faced beginning the driver selection process, was the sound "darkening" after the earphone is inserted in the ear channel and a good seal is achieved.

So my task was, in the absence of the open ear channel **natural** resonances due to the isolation of untypically small operational air volume close to the ear drum, exacerbated by the ear channel "occlusion" due to the sealing of the ear channel and the sound bone conduction, to find a combination of the drivers which would, at least partially, restore these **missing** resonances and diminish the detriment effect of the "occlusion". The drivers' selection process went hand in hand with the drivers' assembly physical configuration, the positioning, the acoustical loads, the electrical loads, and the isolation procedures, where all these aspects would contribute their effects to each other, so I had to be persistent to spot the right solution making a prototype after a prototype.

To restore the openness and the clarity, and get rid of the aforementioned "darkness" of the IEM's sound, I had to come up with such driver combination that will not only mask their own resonances, but, on the opposite, that would resonate at frequencies, which would come close to the natural missing resonances. These "beneficial", that is, naturally occurring in the open ear channel, resonance peaks are easy to see on the earphones' amplitude versus frequency response (measured, of course, not inside **my own** ear channel, but in miniature camera simulating ear channel properties as close as possible – see the graphs attached).

In terms of the drivers' acoustical loading, to preserve maximal openness and clarity of the sound, I also had to get rid of the foreign resonances incident to the sound ducts, the drivers are loaded on. As I see it, one of the main problems of the "custom" ear monitors sound is that they've got long, thin, and curved sound bores. Without awareness of more things to come out of it, my initial desire to avoid these long tubes, or "bores" in a case of the "customs" monitors, was that first push in the direction of the deep insertion using a universal sealing silicon tip, so I can make the ducts as short as possible.

Because I didn't see a way to get rid of the sound ducts completely, in order to minimize their colorations wherever I needed them, I would use their length as minimal as possible, and their diameter as large as

possible. One of the drivers located on the very top of the IEM assembly, and the closest to the eardrum, is completely “nude”. With the exception of its own tiny nozzle, factory installed over the driver’s output slot, it operates without any external sound duct at all.

However hard I’ve been trying to make it smaller, the resulting IEM assembly’s dimensions are substantial enough to comfortably fit only bigger than the average ear channels.

But to make the assembly smaller, so it would fit fully comfortable to more people, I would have to introduce some significant sonic compromises, and, in the absence of any commercial pressure, I saw no reason to do so.

*Because they are always trying to cater to the lowest common denominator on the market, I doubt, if any “proper” earphone manufacturer would do a product, which is limited in its appeal by the required size of an ear channel, especially if this size is bigger than average.*

Some of the drivers I **had** to use, as far as I know, are avoided by the earphone manufacturers at any cost because of their “capricious” and unpredictable behavior.

For instance, in my design I am using some FED-series Knowles’ BA drivers. They employ ferromagnetic fluid for its armature’s **mechanical** damping. This driver is a real “icing on a cake” in the Knowles family of BA drivers suitable for good audio. It’s, at once, both technical, and artistic “tour de force”, a product of peaking performance showing an incredible audio resolution. But... its diaphragm’s ferro-fluid mechanical damping is temperature dependent, while its’ level of distortion, sometimes noticeable on a music signal, can be a magnitude bigger compared to some “orthodox” solutions.

Nevertheless, what it gives – electrostatic resolution and seducing sweetness – could be compared only to the same sonic qualities of single ended amplifier built on direct heated **triodes**. To continue this analogy, I would compare the sonics of best “orthodox” drivers, prone to some sharp resonance peaks, to a sound of a typical **pentode** tube amplifier.

Unlike respectable manufacturers’ background, typically, resting on fears of customer warranty claims, my High End Audio background (where we’re accustomed to **permanently** having trouble with our equipment) didn’t stop me from using the best (even “capricious”) parts I can think of. To the question of “What is better – to listen to some fabulous sound for 59 seconds and after that to some slight distortions for just, 1, or to listen to some impeccable, but boring sound for all the 60 seconds?”, my answer has, always, been: “If I can’t my cake and eat it too (and here we are talking about this exact situation), I’d univocally chose the former”.

As I completely understand their position, and even sympathize with it, still, there is no doubt, that a typical earphone manufacturer has no choice but to choose the latter.

That’s why I wasn’t surprised, recently, by receiving a notification from mouser.com electronic parts vendor, where I’d get the most of my parts, that they are about to discontinue carrying that Knowles’ FED driver. This notice is one more example of the fabled expression that “*The best always ends first*”.

*In terms of a design principle, if the “proper” companies’ activities mostly rely on fool proof and tested algorithms, and established procedures, in my case, on the contrary, sometimes the errors, which occurred during my quest for a better solution within a domain of well known alternatives, would bring me closer to a **completely different** scenario.*

*Most likely, these errors could pop up not accidentally, but as a result of unbridled desire to reach an absolute level in accordance with uncompromised ideology typical for the “big” High End Audio.*

*As I have already mentioned, the majority of earphone manufacturers are not guided by uncompromised ideology of the well established home High End Audio which, in spite of all the problems and costs, still allows, something like, the direct heated triodes to have their place there, and highly respectable place too. Obviously, the “proper” IEM manufacturers instead of relying on errors, as in my case, rely in their quest for a better sound upon **avoiding errors** at any cost, both in the drivers’ selection process, physical configuration, costs structure, and all the other matters relevant to the design and execution of their products.*

*In terms of their products’ sonic pretensions, limiting their design and its execution choices to the bare minimum of established procedures, they deny their “artistic” side to shine through.*

Selecting drivers for my IEMs I wasn’t stopped by the drivers’ costs. When some manufacturers speak about the number of drivers in their ear monitors, they don’t specify which drivers, exactly, they are talking about. If you just experimenting with some IEM prototypes, this is not an issue. They all cost roughly the

same (20-25 dollars each when you buy ten to twenty pieces). But if we're talking about tens of thousands driver quantities, I'd imagine, it can become a very serious issue.

Costs' matters aside, to obtain the "seamlessness" of sound with high resolution, wide frequency response and wide dynamic range, I had to use not only the best drivers in my earphone's assembly, but also which cover **the whole range** of physical dimensions and intended application in Knowles BA driver catalog:

- from the **largest** ones, originally designed to be used in BTE hearing aids: CI series and smaller BK series, "highest efficiency, but, mostly, for lower frequencies";
- through the midsize drivers, originally designed to be used in the IC and CIC hearing aids and later modified to be used for music playback: ED, FED, and GQ series, the "fullrangers";
- and, finally, the **smallest** WBFK (part of GQ driver), the one "with the most extended high frequency response in the whole Knowles' range".

Finding the right combinations of drivers, which interact within their group both acoustically and electrically, adjusting their acoustical loading, and finding the most optimal physical configuration of the whole assembly, took, during the whole of the project, **the most of my time and effort**.

All the drivers in the final assembly are connected in parallel; the total resistance of the earphone is defined by the master resistors connected to the earphones in series. The total resistance of one channel of the earphones, wired for balanced operation, is about 20 Ohms. It is high enough for good compatibility with all the music players and dedicated amps I tried it with (see the graphs attached - showing, again, that despite of acoustical **isolation** at the second bend of my ear channel, the peaks on the curves do correspond to the frequencies and amplitudes typical for the **open** ear channel resonances).

All in all, the drivers' selection is, apparently, the foundation of getting a good sound from the IEMs (with all the other requirements, like, good ear seal, and maximally deep insertion, fulfilled).

The absence of open ear resonances highlights the lower frequency resonances. Perceptually, with no dynamic head tracking, our hearing system projects the bass frequencies at the back of our head, the lower midrange frequencies between our ears, and the upper midrange and high frequencies in front of us. So, when the open ear channel resonances are absent due to the plugged ear channel combined with the "occlusion" effect, the lower frequency resonances start to dominate, and, perceptually, sound goes "inside your head".

Replacing the lost open ear channel resonances with **the appropriate** high frequency resonances of the drivers' assembly frequency response, allows you not only to achieve the clarity and vividness of music, but, also, to get rid of the sound "darkening", so typical for most of the IEMs, when sound goes deep inside your head. In my case, as the result of this correct open ear channel resonance pattern, the musical images are perceived outside my head, a few centimeters away from the head perimeter.

To get the full effect of outside imaging, like in Smyth Research "Realizer", you, really, need a dynamic head tracker, first, and then, possibly, an ear channel calibration (even if I doubt the effectiveness of which, in the IEM's case). But to get from the static correct frequency response any further, in terms of outside imaging, you do need a very resolving headtracker, both in time domain, and in 3-D domain. Period.

When I am listening to music via my earphones and compare this experience listening to music using my last (huge!) home audio system, I don't feel any significant losses in the joy I get from the music. The only difference is that via earphones I don't get the low bass tactile feeling, perceived by the whole body during listening to home audio.

In sonic returns, each dollar invested into my portable system equals to the hundred dollars invested into my last "big" system.

And it goes without saying, but the whole modus operandi of this project was to make sure that, as much as it's possible, both the sonic ideology, and the spirit of my creation is fully compliant with the system of values pronounced in the High End Audio "Chapter", which I've been discussing above.

The music perception difference between my room system and the earphones is a case of two different perceptual **conventionalities**. There is no doubt that using loudspeakers in the room provides more natural presentation of music, but riddled with a lot of unnatural artifacts, such method creates a lot of obstacles towards appreciation of **the meaning** of the music.

Earphone presentation with a well resolving source, correctly done, in my opinion, provides a shorter path to a music recording's emotional and intellectual thoughts. So, **its meaning**, like under a magnifying glass,

can become more obvious.

Comparing of these two methods provides a good example of dualism between the music playback form (loudspeaker listening has got an edge in sheer sonic impact), and its content (in good earphones I can hear more music “meaning”).

Some research proved that the stereo effect is a learned skill, small children don't hear it. It means that a type of conventionality, learned and unconscious exists, even, in two channel home audio. Mead Killion's quote above, where he claims that we hear the symphonic orchestra through his ER-4s exactly like in a concert hall, is, no doubt, an exaggeration, but not by much, if you compare it to the similar High End Audio manufacturers' claims. Both in former, and the latter, we, still, are talking about some conventionalities anyway, and each of them does have its positive and its negative sides, their own advantages and disadvantages.

The only issue to me is a **wish** to adapt your music perception to whether one conventionality, or the other, which should be followed by you determination to go through a necessary effort to adapt to it.

From my perspective, admitting a change in my life style through the last few years, with much less time spent in home, I don't have a very strong desire to listen to my favorite music via my “big” home audio. And, believe me, its “big”, not only physically, but in its audiophile pretensions. But I don't miss it.

It's because, having adapted my perception of music to the earphone listening, I do not find any additional musical information coming from the “big” system, **significant enough**, to justify all the trouble and expense of using it. Then, even if people like me, who spent my whole life in “big” audio, and who's got some vested interests in it, already don't want to do it, who would?! That's one of the main reasons why I am not surprised, that The High End Audio is in crisis.

Don't forget that historically The High End Audio was born at the time when the compact-disk wasn't even conceived. Back then, because you couldn't shove a vinyl turntable in your pocket, and because an appropriate, for good portable audio, battery would be of a car battery size, the only place where you could get a decent sound was at your home. Now everything has changed. The quality of DAC's in the best portable players is not just comparable, but, I know it, is even better than the quality of the home digital sources in the possession of the vast majority of those who's reading this story. While the charge capacity, dimensions and weight of the contemporary batteries allow using them in the most advanced and esoteric portable applications (including even vacuum tube amplifiers) for the duration of several hours.

Speaking of The High End Audio's “Sacred Cow”, the vinyl, my opinion is that, considering how much the records cost now, **having a turntable** in a home audio system, compared to a system which doesn't have a turntable, **would**, definitely, **decrease** the system's overall sound quality. Of course, I presume the same total budget, and presume that we're talking about the most up-to-date digital source. The sonic qualities of digital media are getting better and better, especially, the quality of the best Hi-Res files. Compared with analog, not even mentioning the digital's convenience and the digital recordings' cost, I just see in the contemporary digital more return for the same investment.

The High End Audio industry's condescending attitude towards outdated technologies, driven by some short term gains and by general “let the baby do what she wants as long as she does not cry” position, is another reason why we got stuck as the industry, and don't move forward. I don't question the value of the vinyl records as a carrier of music masterpieces recorded some long time ago, and which were not **properly** issued in digital format, but I see no sense in sinking into fetishism for “vinyl” per se.

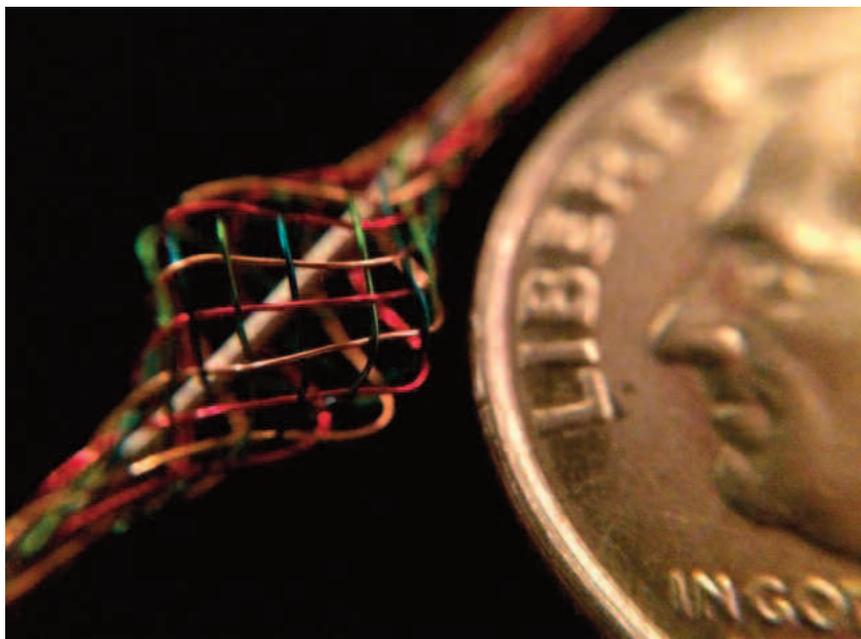
My skepticism to vinyl is also based on total absence of good demos. After each audio show, in my mind, I drew a score for the best sound there, and for the last many years it's been always digital. I heard some personal demos, on some very expensive systems and vinyl paraphernalia, and, again, was not convinced.

I have to apologize for the last digression. I started this section with the BA drivers' “mix-and-match” procedure's description and ended up standing on a soap box in a diatribe against vinyl. What's the connection?

First, I wanted to let the readers know my system of sonic values, so, they'd know how to, **personally**, relate to my **personal** description of my sonic priorities in finding the right combinations of drivers, and, then, “voicing” them to fit to my sonic references.

Second, I touched upon what my sonic references are in relation to the experience I got in the “big” audio via the systems I've had in my personal possession, which, in their turn, reflect upon my convictions and preferences.

And, third, I ended up proclaiming the superiority, in my opinion, for current digital technologies over vinyl. So, to people, who'd puzzled by my claims that with my portable rig I don't, really, lose a lot, sonically, over my "big" audio, and who still think that home audio is the only way, that the vinyl is the best, and who still think that- "if you don't carry a vinyl turntable in your pocket, then how can you dare to make all these exaggerated claims?!" - I just wanted to state plainly, that for many years I've been seeing an absolute benchmark for home source performance not in "the analog", but in "the digital". So, when the most up-to-date home digital technologies started to penetrate the portable market, I saw an opportunity.



Only because of the current portable digital technology advances, and because of the recent increased battery charge capacity, I saw a platform to start this IEM project. Without these accomplishments, which, combined, led to elevating the sonic benchmarks of what's possible in portable audio, the driver assembly design, which was a big part of the whole project, would be completely irrelevant, not only due to the practical reasons, but, also, due to insufficient level of expectations, I'd have for the sonic result of the whole project.

This platform built a strong sonic foundation not only to hear all the subtle differences in the sound of prototypes to choose from, but, also, allowed me, one fateful day, to stumble upon that sonic "golden nugget".

## 9. The Connecting Cable

My High End Audio background taught me how significant the cables' sonic differences can be.

For example, in a case of Grado's headphone line, the only difference between some of their products is the connecting cable; the headphones themselves are just the same. But, according to the manufacturer, the resulting sonic difference is significant enough to justify different designations for each of the models.

Provided that its sonic properties meet my goals, I was ready to experiments with **any** wire. In home audio we are accustomed to the wires as thick as a human hand, alas, for obvious reasons, I could not use such "statement" products for my earphones.

So I appealed to my friend Chris Sommovigo from The Stereolab and asked him for help.

Through the years he released, in my opinion, the best cables in each category I know of. "The birds of a feather are staying together", and we're staying together with Chris for the last 20+ years. In cable matters I believe in him like in God.

In several years' worth of tries and errors his tonearm cable, originally designed for Continuum Audio Labs Caliburn Turntable & Cobra Tonearm (\$ 150 000 MSRP!), after several iterations, was turned into an exceptionally high quality, reliable, and durable earphone cable. It's designed to conduct two balanced signals – in my case, the "main", wideband one, and "auxiliary", low frequency one, exactly, "like a doctor prescribed"!

A similar version of this cable costs 2 000 dollars for the one meter pair (see the attached picture; in my case instead of the solid silver core, depicted on the picture, there is a rubber core, covered with a Teflon/Kevlar braided shield, to prevent the cable's twisting and to preserve the layout of the conductors on its surface, but the rest of conductors' configuration is the same). The conductors are made from 16 strands of individually enameled OFHC pure copper. Outside the whole cable assembly is covered by another Teflon/Kevlar braided shield for its mechanical protection.

*Yes, I have to admit that at the "Loudhead" show with this cable, I had a case of severe problem, but I see it no more than a case of bad luck. Trust me; such hiccups happen to me no more than once a year. But such problems **do** happen to **all** headphone and earphone cables, and usually, with **my** level of tear and wear, in cases of other products I've been using, it would had happened, usually, even after a shorter period of time.*

*Still, not a single sane “proper” earphone manufacturer, due to Chris cable’s preparation complexity and its cost, would touch, a cable, like this, with a long stick. Even, despite its cost and complexity, they would still think about using such a no-holds-barred concept for a cable in their earphone, “The Murphy’s Law”, as a key concept to them, would not allow them to do so.*

*But we, audiophiles, are too idealistic. “The Murphy’s Law” is too “down-to-Earth” to us, so in our attempts to jump over our heads, we just don’t care!*

*The same goes for the dedicated cigar smokers: who’d, ever, think about the **long term** benefit (let alone the harm) for their health, when they’re smoking a great “stogie”?*

*I’ve heard somewhere, that we live in a “democratic” society - right?- so let’s them to be themselves, and let us to be ourselves.*

*The only thing is that we must to figure out, who we are...*

## **10. And Now Are...The Brass Trumpets!**

There is no doubt, that we never want our efforts to lay down to rest. As much as I satisfied my curiosity and my personal needs, I got some very satisfying results; and it’s a human nature to share them with others. They also might find them interesting.

I played with several different names for my IEMs. First idea was to call it StereoPravda SB IEM, i.e. StereoPravda Second Bend In The Ear Monitor, but, then, it will not, necessarily, be positioned at the second bend of somebody else’s ear channel. After that I thought of “DAVID” (like in David and Goliath), but, then, I need to find an appropriate deciphering for the DAVID acronym. Finally, I thought of a “Magic Bullet”(as some people would call my approach to its conception and design as a “silver bullet” one). And yet, I am still not decided... any suggestions?

*Contrary to “proper” earphone manufacturers’ position, where the “Sword of Damocles” of their bottom lines always hang over their head, because during the whole project the **monetization of all my expenses wasn’t an issue**, I wasn’t stopped in the middle of the road by their set of limitations and obstacles.*

*As I completed **the whole journey**, I saw a lot, that they didn’t see, or, even, never wanted to see, so, there is a lot to share...*

At one time, to recuperate some of my expenses, I even thought about delivering a commercial seminar titled, say, “How to Make the Best Earphone in the World with Your Own Hands in a Couple of Hours” (to assemble a pair of these earphones, even with my (limited) skills, does, really, take just a couple of hours; preparing all the cables takes twice as long).

There were some talks about a possible joint venture, but the opening line from the other side, usually, goes like this: “Look, this earphone wouldn’t fit **everybody’s** ears, so, I don’t know...”.

My answer to that usually goes like this: “Take, for example, a High End phono stage preamplifier, which costs, say, ten thousand dollars.

It is not for everyone either. It’s for those who:

first, needs a phono stage at all;

second, he still didn’t buy one;

third, he’s got ten thousand dollars to spare;

forth, he’s got nothing against this particular brand;

fifth, he likes the appearance of this unit;

sixth, his wife likes the appearance of this unit;

seventh, it’s technical features match other components in the system and the intended cartridge;

eighth, the dollar exchange rate didn’t hit the roof yet (the last one is for Russia);

- and so on...

Due to all the above factors combined, in reality, this particular phono stage, initially conceived as “a piece for every audiophile on the market”, sells only a few units a year.

*Possibly even in less quantities, than if I, theoretically, had taken my IEMs on the market.*

*The “proper” manufacturer always wants to produce the goods with universal appeal, but the inevitable system of **compromises** to reach this goal works only for the descending quality. In the context of reaching an absolute, paradoxically, this tendency will only limit a product’s appeal, and at its very inception. So an expensive product with a hefty price tag, by definition, targets a non-compromised market, and that it sells a few units a year, if sells at all, should be taken for granted. And, by the way, these sales figures are only a part of the story, too long to elaborate now...*

*As for me, on the contrary, I do see **a lot** of unsatisfied demand for some uncompromised products in some categories, especially, in relevance to this discussion, in High End IEM market. For products, which are designed and built for some very few discerning customers with sonic priorities in mind, and, yes, not too many people have got this same priority, and are ready for an extra effort it requires, and for some extra expense. Yet, even if all of these are tiny niches, but, still, there can be some tiny manufacturers to serve them. And they can still have some successful business ventures, but, if they know what they’re doing, they will be very careful not to expand their appeal **too much**.*

*As for the “elite” customers, they, also, have to be careful to expand their scope too much. At first, a product’s novelty can be overwhelming, but there is no way you can get to the sonic Nirvana without some effort and expense. But as a reward you can be a “lucky bastard”. “Lucky” in that you’ve got a talent to appreciate another talent, and double-lucky if you’ve got the means to support this “birds of a feather” **mutual attraction**.*

*So, the bottom line is: I do see a “bastard” segment from the whole IEM market, to which a product, similar to what I did, can appeal: to the lucky ones, especially, when they’re triple-lucky to have got their ear channels bigger than average.*

## **- Epicrisis**

The whole point of this “Personal Opinion” piece was to illustrate some untapped opportunities we still have got despite all the cries out about the sorry state of affairs in the High End Audio.

With the concrete examples of what we can expect from a typical manufacturer, and what we can not, I tried, step by step, to illustrate, using my IEM project, as an example, why it happens and what we, as consumers, **should** look for to explore new opportunities from our side, and which demands are placed **on us** to do so.

Speaking about the demands, and how many people can not stand up to it, I remember that during my stint as the Russian Grado distributor and during a time I’ve been trying to sell Audeze headphones, I saw a lot of my customers, taken by an impulse to buy a pair of headphone, didn’t, really, thought seriously about how and where they’re going to use them.

What usually happened is that, after some time, when I would ask them how they like their headphones, they’d say, that, “oops, sorry, the last time I used them was when I bought them”. A lot of these customers are reminded that they’ve got them at the time, when they need cash, and they need to sale something.

And the only reason it happens is because they didn’t think properly about the headphones “open” design, nobody helped them to figure out that their use is very limited due to the external noise susceptibility. But, still, nobody, both the manufacturers and dealers, seem to care.

To me it is an example of a vicious circle: in a situation when no appropriate products are available, there seem no demands for them. That’s why in a situation of bad **want** of portable solutions for the hard core audiophiles, headphones and earphones have got such a bad rap in The home High End Audio circles.

To reiterate, I see a lot of untapped opportunities for this segment, and that’s why, out of desperation, I decided to explore some of them myself.

This exploration, incidentally, provided me with a lot of new auditioning skills, which made me a more acute listener, and which I can use setting up “big” audio systems.

Of course, when I talked about an idea for my seminar, about the “best earphones in the world”, I bluffed. Seriously, I don’t, really, believe that what I’ve done is “the best earphone in the world”.

So far, I can only say, that for me they are the best. Considering my elevated sonic and “artistic” requirements, and the conditions, under which, I am using them.

In reality, there are some great earphones made by great companies that make some exceptional prod-

ucts that can possess some indisputable advantages over my own IEMs. But some of their peculiarities would preclude its use in my case. Be it, its “open” design, a huge power supply AC box, lack of noise insulation, or just insufficient sound quality. I am sure there are a lot of people, like myself, who are stopped at the doors leading to the portable sonic Nirvana, exactly for the same reason, as I was stopped there before embarking on my earphone project.

This story’s intention is to prick up such guys’ and girls’ ears to further up the relevant discussion.

For example, one of the threads for this discussion could be an MP3 issue. According to my own experience, and experience of other earphone listeners, MP3 recordings, even at low rates, can sound in the earphones even better than original wav. files. This does not mean that MP3’s are “better”, that might simply mean that the MP3 adaptive algorithms were developed for **particular** application of being used (with headphones and earphones), in contrast with the wav. files. That also might mean that some particular player works better with MP3 files just because nowadays these files are the main media being played through the earphones. High End Audio devotees dismiss MP3 for all the right reason, but to dismiss it in portable use doesn’t make a lot of sense, as it is specialized for this particular environment, despite its low rate.

The same way, the sound of my earphones could be inferior in relation to the earphones of higher class made by serious companies, but by narrowing down all the options for my particular application, in the context of my High End Audio background, I reached an absolute for **this particular application**.

For the fans of “big” High End Audio I see the relevance of this article in its look inside of the concrete implementations of the principle I proclaimed a lot of times before to the audiophiles, contemplating their purchasing decisions, in my “Personal Opinion” column: that **“you should not attempt to make a right decision, you should make a Decision, and then make it right”**. In this story I showed the examples of how and why I, without a concrete plan yet, took that “right” decision, and how, eventually, I made it right.

This piece, in my opinion, shows how effective the skepticism towards already existing ideas and the infamous “common sense”, combined with the Faith in your own ideal, might bring some amazing results.

High End Audio, as follows from its “Charter”, assumes **expanding**, elevating, and subsequent fixing of **new boundaries** of possibilities to reproduce and to react to music’s emotional and intellectual contents. The whole process is based upon both its creators’, and its admirers’ “soul’s excellence gusts”, and is **only helped** by the constant technical evolution.

After completing this project I see the latter as the only way it can be in High End Audio.

## – Remaining symptoms and syndromes:

There is no doubt that in the modern world there are a lot of issues, which are more important than building your own earphones, but I never had any doubts or regrets over the effort and expense spent, and, perhaps, that’s the only reason why I completed this project.

I already, figuratively speaking, mentioned that the whole industry of the “cigarette earphones” will never pay any attention to people like me, who smoke the “earphone cigars”.

My recent visit to Saint-Petersburg’s SoundPal portable audio store, once again, proved that last point.

I’ve spent about a hour there and have auditioned tens of IEMs and the best headphones, including the “Abyss”. I honestly wanted to discover some great stuff, so I can learn something new.

Unfortunately, some earphones wouldn’t fit in my ears because of the their cumbersome design, the others, however much I tried, would reveal poor ear tip isolation, some others wouldn’t please me with their sound, some I had to hold with my fingers, so, they wouldn’t fall off and would sound, sort of, decently, and some earphones’ cable just wouldn’t allow their proper positioning.

“Abyss” was stunning, Audeze were great, but I’ve got no use for them.

An old joke popped up in my mind: “A man comes to a store to buy a two-piece suite. First, he tries the pants and finds out that one of the trouser-legs is shorter than the other. The salesman suggests: “Just try to bend your left knee a little”. He does so, and the trouser-leg gets straightened, but his ass hangs down. Then the other salesman’s advice comes: “Just try to bend your back over a little”. He does so, and his ass gets tightened. Then he tries the jacket on – one sleeve is shorter than the other. The salesman says: “Just try to bend your left elbow a little”. He does so, and the sleeve gets straightened, but the jacket collar

ridges. The salesman goes: "Just try to bend your back to the right side and turn your neck to the left". He does so, and the collar gets straightened. So, the man buys the suit, gets out of the store, wearing it according to all the salesman instructions, and one of the passers-by says to her friend: "Oh, my God, hey, look at this poor crippled guy! I feel so sorry for him!" And the other woman answers: "True, but look at his suit, what a perfect fit!"

In my thoughts I was smiling at the joke, pressing a thousand Euros Sennheiser ie-800 with my fingers, so they would not fall off from my ears.

Walking out of SoundPal I, accidentally, spotted the Etymotic Research ER-4P earphones on the neck of a salesman guy standing at the checkout counter. Back in 1992 it instigated my first **serious** interest to portable audio, and through the years I've been coming back to it over and over again. I, even, tried to sale them locally, but never succeeded because people complained about lack of bass. Incidentally, the only reason I had to complain during those attempts, is to complain about these people, the bass was good, so, they, just, didn't know what they were talking about, being exposed all their life to some inadequate products with a bloated bass.

Anyway, as SoundPal didn't have ER-4s in stock, I asked the guy to listen to those.

What a relief! They say, "the genius is in simplicity", and ER-4P proved it immediately. I had no problems to insert them into my ear channels; I got a good isolation and comfortable fit, and heard, overall, the best sound quality in the store.

After leaving the store, I thought to myself: "If I came to this store, the best in the country, to buy some earphones choosing from hundreds (!) of models on display, what would I buy?! Assuming, that they didn't have ER-4Ps?! Maybe, I'm spoiled... but what would I do? Which earphones would "pump up" the music to me, then? Isn't it pathetic, that after that ER-4Ps auditioning, I found myself, if I needed to buy an earphone, to buy, again, a pair of ER-4Ps? Almost 25 years, I would complete a **full cycle**, and return back to the point where I started?! And what has the earphones' industry been doing for all these years? Wasn't it "ascending the stairways leading below"?!"

If I wanted to make an improvement on that original ER-4s' experience, would I had to be forced to do the "customs"?! But you can't buy them in a store... And, besides, I have heard many of them, and I can't say that they really excited me... They were good, but...

I've got no doubt that there is a strong correlation between the directions, the current mass market audio technology is taking us in, and the dominating music preferences. An apple doesn't come far from an apple tree, right?

The whole story above might look to somebody as an attempt to make a mountain out of molehill. But to me, this whole epopee wasn't just an endeavor of squeezing the last few drops of pleasure at my whim, it was, rather, an attempt, while the music being "poured in", to get rid of "holey bucket", in which only the musical equivalent of "a marshy glop" would stay with no leaks at all.

Those who like the latter type of music are not losing much from this bucket. But, as I'm interested in a different kind of music, a lot of it would be wasted away. And to me, every little drop is precious.

Though with some personal effort, I've refused to use this "holey bucket", and, instead, I've arrived to a crystal clear well of truly **inspiring** music.

Switching from this high prose mode to a down to Earth cigar analogy, I've been smoking cigarettes for 25 years. My average count for smoking cigarettes was just five a day, not much by an average smoker's standard.

The reason I quit was that I couldn't stay it anymore, feeling noxious. In six month after quitting cigarettes, I started to smoke cigars.

For the last 15 years I smoke an average of 5 cigars a day.

Don't take it as an advertisement for tobacco; take it as advertisement for being open minded, as I do feel great!

## – Post-clinical recommendations

Remembering, once again, that visit to SoundPal in Saint-Petersburg, I am thinking to myself now: "Isn't it time, for all of us, to come up with a new event, in addition to the very worthy The "Loudhead"?!"

And to name it, say, "The Smarthead"?!...