

Power Struggle - a personal view

JULIAN MUSGRAVE DESCRIBES AN AUDIOPHILE'S GUIDE TO POWER CONDITIONING EQUIPMENT (AND OTHER QUASI-MEDIEVAL BELIEF STRUCTURES)

Part 1: The Back Story

Let's go back in time. Quite a long way back in time.....To AD 1221, in fact, which is way before the era of recorded music (which is exactly the point of going back to 1221). If you wanted music in 1221, you either did it yourself, or you listened to others doing it – in real time. In 1221, music was live or it didn't exist at all. No replay equipment to buy, no distortions to give you the willies, and no stressing about set-up, reliability or tweaks. Play; listen; enjoy; 'twas an age of musical innocence in which musical interactions were simple and direct – just you, the music and the musicians. (Or if you were in church, Mr God might muscle in on the gig.)

Here in 2018 we don't play, listen or enjoy live music anywhere as often as we should. Our musical interactions *via* replay equipment are complex and indirect, and all too often the music and the musicians are squeezed out. Instead we get all angsty about stuff like interconnects, equipment racks and (yes) the subject of this article, which is about the delivery of power to our equipment.

The result is a constant conversation with ourselves on whether all as is it should be – or whether adding box A or box B to The Big Rig will remove a layer of distortion that we were not only unaware of before being told about it (and that may not actually be there in the first place), of which more below. (Not an age of musical innocence, then.)

It all starts to make 1221 strangely attractive – musically at least. Maybe that's why my wife & I often seek out Choral Evensongs. We don't do the Mr God bit either, but a bit of medieval naval gazing in a gothic cathedral while a choir makes *mea culpa* wailing noises does that Age of Innocence thing really rather well.

Deus, Dimitte Peccata Mea

Most of us don't really do religious devotion nowadays. Instead we audiophiles worship in the Temple of the High End. We genuflect before The Altar of The Original Sound; partake of The Service

of Set Up and The Mass of Loading; and say lots of prayers and light many candles to the HEWB (High End Worshipful Being) to deliver us from distortion. (For ever and ever, amen.)

The most recent additions to our catechism are the Purification of the Mains and the Earthing Box Miracle. These arrive on a wave of incense while Bishop Bollocks chants: "Repent, O Ye Audiophiles! The Mains are the True Source. Purify, purify, purify. Then audiophile heaven shall be yours." (in a rather shouty and commanding voice). Yeah, right mate. "May HEWB forgive me my sins" (or "HEWB, dimitri peccata mea", as we oiks might put it).

So despite being told by all and sundry that this stuff is now *de rigueur* for the aspiring audiophool, our inclination is to approach the topic of power conditioning with the sort of enthusiasm one might employ in answering "No Thanks" to the question: "I think I've got the Black Death: Shall I sneeze in your face?"

Put it another way: I am pretty certain that if I want to play an LP I have to have a turntable (because running round an LP in circles with a pin is so tiresome). Ditto a CD and a CD player. An amplifier of some description seems advisable and owning speakers means you don't have to plug the speaker cable into your ears any more. These boxes are necessary and I can just about deal with the ritual angst that comes with them. Mains conditioning kit? Not really sure about that.

The Church of the Slightly Converted

Not that I'm not a user and thus a believer - of sorts. Since my days as a dealer I've had a Vertex AQ *Taga* block in my rig doing distribution duties. Does it do anything sonically? Well, once I left it out (long story); forgot I had left it out and wondered why the music sounded a bit grey and grainy. Putting the *Taga* back restored normal service. So, yes, despite our testiness with the whole topic, experience does suggest that something is going on.

Just like you, I have sat through very persuasive demonstrations at shows where upgrading cables, blocks and various conditioning gubbins does indeed

make things better. But so they should: a hotel room that's chock full of electronic equipment going bing, bang, bosh is probably the worst possible electrical supply scenario. The flaw is that we tend not to live in hotel rooms while an audio show is in full swing.

So a lot of us feel that there is more than a faint whiff of 'medieval indulgence-selling' about some of the claims made for this stuff: is this now the High End Orthodoxy as true believers claim? Or can we do without it? That might depend on the quality of the mains supply. Given perfectly stable 230V 50Hz AC supply, no DC, little or no RFI, no feedback from other household items, no mechanical noise coming down the metalwork, kit that doesn't feed noise back into the rig and good quality connectors are used, then all this kit is going to be redundant. Isn't it?

But that is quite a long list of 'ifs'. So the question that must be answered is where on that continuum between 'perfect' and 'hotel room' does our own domestic supply lie, and how will that feed into our decision making?

The Cardiff Inquisition

To investigate this, I plugged my multi-meter into a wall socket at Musgrave Mansions. Then I left it there for days and recorded AC voltage and DC voltage until I had several bits of paper brimming with frightfully meaningful numbers.

It seems that, in our house, the AC voltage never drops below 226 and never goes above 230 - that's a less than 2% variance which clocks somewhere between 'good' and 'surprisingly good' on the Quality-O-Meter. DC offset (the latest hell-fire bugaboo used to frighten us audiophiles) flickers between +0.3 and -0.3V, which is, frankly, negligible, clocking a maximum score of 'Phew!' on the Quality-O-Meter. I didn't have an instrument handy to test the frequency but I'm pretty sure it's going to be bang on (see below).

According to the text books, that's a pretty clean bill of health. And, for the record, Musgrave Mansions is (ahem) a mid-market terraced Victorian house in Cardiff, and is utterly ordinary in every way.

In addition to what appears to be a good basic AC supply, I run the music room rig from a separate consumer unit that is earthed through its own spike. I have also treated the walls of the listening room to reduce RFI (about a 50% reduction, I'd estimate). Nothing here that is out of the ordinary for an audiophile set up then, and the result is sound that does not vary during the day and has no audible hums, clicks, buzzes, or radio breakthrough.

Which is probably not a lot different from your situation then. Because unless you live in a block

of flats, next to a pylon, with a radio mast by the back door, in the middle of an industrial estate, with neighbours growing weed under arc lights, then the UK law governing electrical distribution virtually guarantees a good basic supply.

This was brought home in a long conversation I had with my neighbour Sunil. He works for Western Power Distribution, as an engineer designing substations, and probably knows what he is talking about. (Well he would, wouldn't he?) He plays with 11,000 volts on a daily basis and gives a very convincing appearance of being alive for most of the time.

"Is mains treatment even necessary? Is our household supply so poor that this kit makes an audible difference? If it does, is it good value for money? Or might we be better off buying a better amplifier, more music, or just going down the pub?"

He maintains that, on the Western Power Distribution patch at least, voltage and frequency are always within the statutory limits; that there is no DC on the line under normal operation; and that the distribution equipment is up to spec and well maintained. We have a huge distribution facility (33kV down to 11kV) about a mile away and our domestic step down (11kV to 415kV) is just over the road. It supplies three phases; a house being attached to one of those phases so reducing house to house interference. Sunil doesn't agree with the audiophile proposition that power and frequency sag during peak demand. He insists that they are pretty good at predicting these and make sure all parameters are maintained. (Apparently a power company can be asked for an analysis of its performance which it monitors and records all of the time. This could be a useful tool if an audiophile notices significant quality problems that could be power related.)

These comments tie up with the measurements that I took myself, and I can't help thinking that we may be trying to solve power supply problems that barely exist - if they exist at all. But it still leaves us with some potential problems: specifically RFI, self-induced noise, DC residual with third harmonic, and transmitted vibration.

All the above are summarised by questions that this article will try to answer: Is mains treatment even necessary? Is our household supply so poor that this kit makes an audible difference?

If it does, is it good value for money? Or might we be better off buying a better amplifier, more music, or just going down the pub?

Part 2: The Kit

Which brings us onto the equipment under test. There basically seem to be two ways to improve our mains supply. The first is ‘passive treatment’ that removes unwanted artefacts as the AC flows, more or less unimpeded, through the kit. The second way is ‘regeneration’, where the incoming 230V AC is rectified to DC then regenerated to 230V AC again. The products in this article only deal with passive treatment equipment, and in alphabetical order are:



Isol-8 Substation LC

Isol-8 Substation LC (£2899)

This chunky box from UK maker Isol-8 contains filters that deal with DC on the line, cross-contamination between equipment, and surge protection. Wiring is silver-plated and the unit is fitted with good quality connectors throughout. A supplied cable takes power from the wall, and the unit is fitted with four regular UK outlets, an earth lug and a circuit breaker. Made to fit easily into an equipment rack, it comes in silver or black finish.



Isotek Aquarius EVO3

Isotek Aquarius EVO3 (£1495)

Isotek is probably the biggest power specialist company in the UK, with an impressive spread of products over five ranges that go from humble power cables through to regenerators. This *Aquarius* sits pretty squarely in the middle of its line-up and is a silver box intended for rack-mounting. On the rear is an IEC input and six output sockets, including two with high-current capability for amplifiers. The unit claims to remove up to 60 dB of RFI, removes common and differential mode noise, isolates components, but does not remove DC.

Nordost Q-Base 6 Mk II (£1199) and QX4 Quantum Mains Purifier (£1799)

The US company Nordost is best known as a cable company but also has a significant *QRT* power products range of which the *Q-Base* is a distribution block and the *QX4* a ‘Mains Purifier’ (left).

Nordost does things differently. Neither of these components use electronics to treat the incoming AC supply in the way that all the other companies employ. The *Q-Base* is a high quality, six-way aluminium distribution block mechanically tuned to enhance performance, presumably by reducing structural resonances. It features a star-earthed topology with one output socket designated for the primary source. It has an IEC input and an earth terminal. No filtering or isolation electronics are in here.

The *QX4* is something else entirely. Dubbed a ‘mains purifier’, a *QX* contains either two (*QX2*) of

four ‘field generators’ which are claimed to reduce RFI and timing errors. These generate an alternating magnetic field at selected frequencies, which Nordost claims preserves more of the original signal than passive filtering. Plug a *QX* into the supply chain before the *Q-Base*, place it physically in the middle of your rig and switch on for maximum effectiveness.

Shunyata Research VENOM UK6 Distribution Block (£1800)

The US-made *VENOM UK6* looks, on the outside, like a regular distribution block. Not according to Shunyata Research, however. Premium components and vibration control are merely the starting point for the *UK6*. In addition a *Trident* module controls noise and transients and a *KPIP* (Kinetic Phase Inversion Processor) that ‘significantly improves sonic performance’ is built into each *UK6*. Also, many parts are cryogenically treated. It’s therefore quite a package. All user elements are mounted on the top with an IEC input, on/off switch and 6 easily accessed sockets.

Vertex AQ (now Quiescent) HiRez Taga & Balanced HiRez Taga (£1830 and £2700)

Another UK-based company, Vertex AQ’s (now known as Quiescent’s) technology comes from a military background in vibration control, and applies that to the problem of cable connections. The *HiRez Tagas* contain premium components, RFI and EMI treatment, absorption modules and Quiescent’s proprietary vibration control ‘labyrinths’. These take out mechanical vibration that travels along the wiring that stretches from the power station to our audio kit. The *Balanced HiRez Taga* adds a transformer that splits the AC into two 115 VAC phases and should be more effective at common mode noise filtering.

This is all contained in a substantial aluminium block with an IEC input, earth tag and six UK-type outlets. On the *Balanced HiRez Taga* two of those outputs bypass the moderate power transformer and are intended for power amps. The other four, which go through the transformer, are intended for lower powered source equipment.

Test Methods

To gauge the effectiveness of each piece of equipment, we tested them in two rigs; an entry level example with a retail value of about £3000 (Rig 1: Cambridge Audio *Topaz CD5* CD player, Exposure *3010S* Pre- and Power amps, B&W *686* speakers), and a reference system with a retail value of about £55,000 (Rig 2: T+A *PDP3000HC* SACD player,



QX4 Quantum Mains Purifier

T+A P3000HV pre-amplifier, ATC 100 Anniversary active speakers).

For Rig 1 all the equipment was placed on an Atacama stand and the plugs simply moved from one to the other, keeping volume on the preamp the same. Very basic cabling was used throughout except for the Isol-8 and Shunyata Research, both of which did not use standard IEC input cables and provided their own.

Power was sourced from a household (not music room) ring main. Base quality was set by a QED *Conduit* (currently unavailable) distribution block (top shelf, third from left on page 26). Rig 2 testing used the music room supply described above with equipment under test feeding the SACD player and pre-amp only. The ATC active speakers were left out of the test because of compatibility problems.

Two CDs were used for most of the comparisons. The first was The Allegri String Quartet with clarinetist Jack Brymer in a recording of Mozart's Clarinet Quintet in A (Decca 450 0562). This is good for checking instrumental timbre and texture. The recording, even on the best equipment, is on the hard and flat side, though, and any equipment distortions are easily heard in the mid and higher frequencies. The second recording is Overtures & Marches by Franz von Suppe (Chandos CHSA 5110), a simply world class recording of full orchestra brimming with dynamics contrast and soundstage information.

As usual in these surveys, I was joined by Steve Andrews, first flute of the Cardiff Philharmonic and lifelong audiophile. (Our regular extra pair of ears, Farsi Najjar, couldn't make it on this occasion.)

The scoring methodology was to take base quality as 100 and then mark the equipment on how much percentage improvement it made to the sound; repeating until we were satisfied we had nailed it. I did my listening and scoring a day before Andrews did his. While Andrews was listening, I acted as plug man and was asked not to pass comment. No collusion, then!

Listening Results on Rig 1

Base quality (QED distribution block only) in the Mozart was judged to be quite crude. Grain, glassiness and soundstage flatness was evident from the first bar, and the cello was all but inaudible. The Clarinet entry at bar 7 was threadbare in texture and somewhat teeth-gritting. At bar 18 the two violins take over the semi-quavers from the clarinet and this entry turned into another 'Ouch' point - too bright and shouty. Any improvements should be both obvious and welcome!

Isol-8 Substation: A significant improvement in sound quality. Grain and glassiness reduced. Steve's comments: 'can hear vibrato for the first time. Timbre and bow on string better defined'. 'Ouch' points become listenable. Scores: 115 and 113%

Isotek Aquarius: A significant improvement very much along the lines of the Isol-8 but judged by us both to be a bit more relaxed and fluid. Instruments better separated with phrasing and micro-dynamics more evident. 'Ouch' points all but disappeared. Scores: 120 and 118%

Nordost QB6: Here we had a stark divergence of opinions. One of us judged it at 115%, with all the above parameters in place; the other felt it was indistinguishable from the QED (or possibly only very slightly above it).

Nordost QX4: See discussion below.

Shunyata Research Venom UK6: A significant reduction in grain and 'ouch' points, but not as effective as some of the others. Scores: both agree, 110% and 110%

Vertex Classic/Quiescent HiRez Taga: Mellow! Almost for the first time the recording actually made pleasing listening. Depth of tone and texture on all instruments went up a notch. The strings turned from bright and shouty to brilliant and musical. "More information. Sounds definitely better. Can hear the 'cello for the first time.'" Scores: 120% and 120%.



Shunyata Research VENOM UK6 Distribution Block



Quiescent HiRez Taga

Below is a summary of the various technologies each brings to bear

Maker	Isol-8	Isotek	Nordost	Nordost	Shunyata Research	Vertex Classic/	Vertex Classic/
Product/ Technology	Substation LC	Aquarius	Q-Base 6	QX4	VENOM UK6	HiRez Taga	Balanced HiRez Taga
Premium Components	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vibration Optimised Casework			Yes	Yes	Yes		
RFI/EMI Filtration	Yes	Yes			Yes	Yes	Yes
Surge/Trip Protection	Yes	Yes					
DC Offset Treatment	Yes						Yes, for the lower power section
Electronic Component Isolation?	Yes	Yes			Yes		
Sound Absorption Labyrinth						Yes	Yes
'Field Effect'							
Module(s)				Yes	Yes		
Balanced Transformer							Yes



Vertex Classic/Quiescent HiRez Balanced

Taga: An additional few percentage points (maybe 125%) over the non-balanced version, mainly in the depth and width of soundstage. This was, however, a brand new unit while the non-balanced was well run in, so the balanced version may well have still more to give over time.

Summary of Outcomes on Rig 1: We both noticed a distinct and definable sequence of improvements when these various treatment were put into the rig. First graininess was reduced and ‘ouch’ points were moderated, due to a subjective reduction in high frequency distortions. Next was an improvement in instrumental timbre, texture, musical flow and timing. Last was a broadening and deepening of the soundstage. There seemed to be little if any improvement in bass depth and definition.

The exception to this pattern was the Nordost *QX4*. This unit has an on-off switch on the back enabling on-the-fly sound comparisons which confirmed that the *QX4*'s processing didn't work like the others. On switching in the *QX4*, and after a two second delay, a noticeable lowering of the noise floor

is heard, allowing the music to come through more easily, while the mid and high frequency timbres, texture and timing seemed to have barely changed. The other advantage was a small but definable improvement in bass definition and depth. The overall result of the *QX4* could be termed an extra creaminess in overall balance and texture.

In so far as all the equipment made a difference, they all work as described, but when we compare improvement (as a percentage; averaging scores where necessary) with cost we get an interesting picture:

Equipment	£/1% of improvement
Isotek Aquarius	83
Vertex HiRez Taga	92
Nordost QB6	100
Vertex HiRez Balanced Taga	108
Shunyata Venom	180
Isol-8 Substation	207

(I shall discuss this further in the Conclusions section.)

Listening Results on Rig 2

The overall presentation of Rig 2 was very different from Rig 1. Instead of being hard and grainy, the Mozart now played with good instrumental textures, if rather too closely recorded and with little air or grace. The Suppe 'Light Cavalry' Overture, on a good system, is a gorgeously airy and colourful confection that explodes into the room with an orchestral C major tutti at bar 5. Would mains conditioning make any difference at all to equipment with sophisticated power supplies and an already refined, accurate sound?

Somewhat to our surprise, all the equipment did, indeed, make audible differences to the sound, and in very similar proportion to the differences made on Rig 1. We are talking about the removal of audibly modest amounts of residual HF hash and grain, the smoothing of musical flow, and the addition of a few percentage points of bloom and air.

As for Rig 1, the most effective conditioners were the Vertex Classic *HiRez Taga* and the Isotek *Aquarius*, with the Vertex Classic *HiRez Balanced Taga* being the most effective in absolute terms, albeit at a price.

I spent significant time playing with the Nordost *QX4* in the big rig; adding it to the Vertex Classic equipment to see if the two technologies employed were in any way complementary. I can't say I found anything startling here. The Vertex Classic did what it did and the Nordost added a little more air and texture but the combination was not noticeably synergetic.

Conclusions

Way, way back I posed two questions this article had to answer: Does this kit make an audible difference at home; and is it value for money?

The first question is easy to answer; mains conditioning does make an audible improvement in sound, at least on both the systems tried (and probably many others too).

The second question is more difficult. On Rig 1 adding conditioning equipment, though effective, is simply not a cost effective upgrade. The Cambridge Audio *TapaX CD5* CD player costs a mere £120. So spending, say, £350 for a better CD player is certainly likely to improve the sound by more than the 20% offered by higher priced conditioning equipment.

To be fair, Quiescent/Vertex suggests that its equipment only makes sense in systems over about £8-10K and we agree with that. (Perhaps less if you are using equipment that also spits pollution back into the supply; here the outlet isolation provided by some of this kit may well be telling.)

On high end systems, however, we have a different answer. Here the effects are more subtle, but if you are spending £50,000 on a system, taking out some HF glare and graininess and allowing the quality you have paid for shine through is considered worthwhile.

For high end systems then, the most cost-effective conditioning blocks were the Isotek *Aquarius* and the Vertex Classic *HiRez Taga*. Since they are of similar price, and assuming a system value of £30-50K, this equates to a percentage spend of around 3-5% for an improvement in sound of 15-20%, a ratio that seems to me both worthwhile and proportionate.

The other products reviewed, while somewhat effective, were not as *cost-effective* as these two, although I can see that in some circumstances this kind of outlet isolation and DC offset treatment might make a contribution.

Our experiments of adding still more conditioning into a system met with limited success, putting us well into 'am I fooling myself' territory, and suggesting that using a single conditioner that works best with particular equipment is as far as one needs to go.

Postscript

I realise that these modest and moderate conclusions run against the almost preternatural religious fervour this sort of kit has engendered in other writers. These people appear to be fully paid-up members of The Bishop's congregation. Well, good luck to them. For Steve and I, these high end rites were less of a baptism than a cold shower. We did not hear all that the True Believers hear.

And here we have the core of our audiophile conundrum. There has now grown up around High End Audio a cult of tweekery that too often adds little, if anything, to the quality of the cultural experience, but nevertheless adds significant complexity and cost. Because it is part of our hobby we fret about it all and that detracts from our innocent joy of music. This is, I suggest, not how it should be.

Let's go back to 1221. You and your wife are down at the tavern and the ale is good. A troubadour is in tonight, and as he starts to sing the music goes straight to the soft spot. Then you both join in the chorus and that pure, unencumbered joy of music swamps your mind and drives everything else out. You are the music and the music is you. This, I suggest, is how it should be.

Cable risers? Screw 'em!

NB: A tweak is defined as a modification to any part of a rig through which the signal does not travel.