

# Filter ahoy!

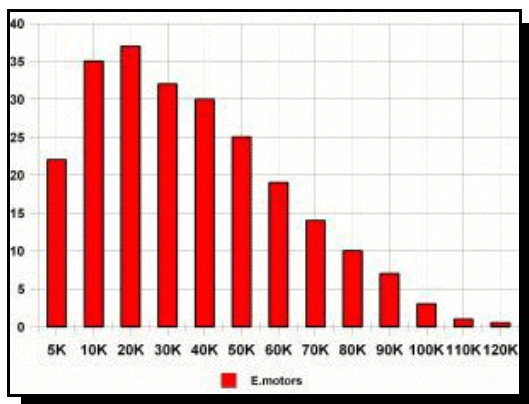
## Part 1

### A Small Intro

Line filters are more often called "conditioners", which is a pompous name for what is essentially a filter. How it does its job has nothing to do with what it does, and ultimately, no matter which approach is taken, their only function is to filter out the rubbish in our power lines. Therefore, when you see something like "power conditioner", be aware that you are in fact facing a line filter, with a few options added, the most popular being a surge suppressor.

### Noise and where it comes from

Ideally, our power lines should contain nothing but 50 or 60 Hz, which are needed to make our supply alternating current, AC, as opposed to direct current, or DC. But we don't live in an ideal world, and our power supply lines in fact contain so much garbage that oscilloscope pictures are often hard to believe. To appreciate this, we need to look where does all that noise come from.



**Typical electric motor noise distribution**

Its prime source are household appliances which use electric motors. Upon turning on, every electric motor is in a short circuit, and thus sends back a part of the energy needed to start it back to the grid – this is known as "inductive kickback". Many such motors use brushes and commutators, and every time a brush is worn, it starts to create sparks on its contact, these sparks being signals sent back into the grid. Electric motors use so many poles, typically 4 to 16 poles, and each pole has to be connected and disconnected, thus creating a signal. Say your motor revolves at just 500 rpm – using the typical number of poles, it sends back a signal to the grid ranging from  $(500 \times 2)$  1 kHz to  $(500 \times 16)$  8 kHz – and that's just

the fundamental, and there are harmonics.

By far the worst power line contaminator are hair dryers. Their manufacturers are forever pushed into producing ever better looking, ever more powerful models, and since most of the money goes on heaters, design and advertising, electric motors used in them are typically of the worst possible kind and quality, but of course, very cheap. But they also rotate faster, typically at 1,000-3,000 rpm, and being generally 8 or 16 pole types, send back signals into the grid ranging from 8kHz to 48kHz, plus harmonics.

And if you should happen to have an appliance which still uses brushes, then you're really in trouble! They wear out fairly soon and their degraded contacts are a

miracle of line noise production, and at possibly intolerably high levels too if that happens to be a powerful electric motor, such as the one used in vacuum cleaners and fridges.

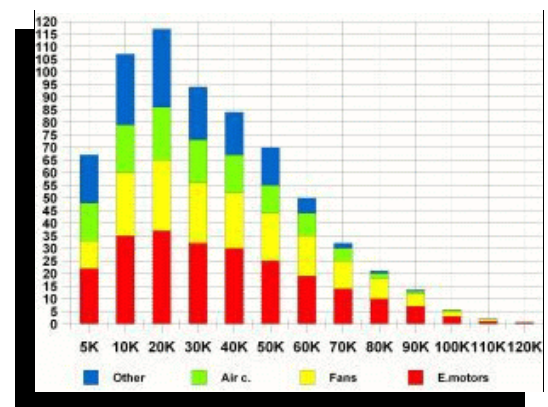
Speaking of fridges, ice boxes, deep freezes and such like, but also of any other appliance using a thermostat and a start-up capacitor, you really don't want to see what the initial start-up spike looks like. Quite normal – you see, once the motor starts, that capacitor has nowhere to discharge, nowhere except the power line, that is. So it discharges, and you could easily see lights flicker, or your TV blink at that moment. I have seen a few cases, really bad ones, when that spike used to cut the PC out, simply reset it, much to the joy of their owners.

Now, think – how many electric motor powered appliances do you have in your home? I know mine – fridge, deep freeze, dishwashing machine, laundry machine, vacuum cleaner, two air conditioners, hair dryer and three PCs. Not very different with you, is it? Actual numbers may vary, but basically, most have some arrangement like the one above.

PCs are also a very bad source of pollution, for two reasons. One is their switchmode power supply, which rarely has a filter to prevent signals being sent back (I have seen them built-in no more than 3-4 times over the last 16 years), and the other are a multitude of electric motors inside (CPU fan, PSU fan or fans, hard disk drive motors (2 in each), CD ROM drives), and of course, many local oscillators, few of which (if any) are buffered.

Finally, we come to the cables. To get power to where we want it, we routinely use cables. These cables also act as aerials, antennas, picking up anything that's in the air. Radio and TV signals, GSM signals, cordelss telephones, and such like are usually mentioned, and all that's true. However, what is usually lacking is mentioning the fact that the relative POWER of these disturbances is very low, and hence not too much of a problem – how powerful is your mobile phone? Not very, believe me. These can be a problem if our power cables are long, say 2 meters (app. 6.6 ft) or longer, simply because the longer they are, the better aerials they will be, picking up more and more stray interference, until even small signals pile up and start being a very real problem.

But what you will rarely find said is that the relative distribution of line disturbances is in the 5-50 kHz range, simply because that's where most of the on-line sources are and because these are the sources with the greatest relative power. To us, audiophiles, that's about the worst possible news, because obviously, most such problems occur exactly where we DON'T want them. It's also bad news because it's very hard to filter that out, very hard but not impossible. Finally, line noise is typically assymetrical in nature (i.e. it does not behave as a perfect sine wave), has a random pattern, and worst of all, tends to intermodulate among sources in addition to building up



**Household noise sources shown as cumulative series. Note how noise adds up.**

(adding noise upon noise lifts the noise floor). Terrible, huh? And we talk about great sound ...

### **A few notes on filters/conditioners**

Obviously, line filters have not one, but several contradictory jobs to do. They should not touch our basic 50/60 Hz signal, but should act as brickwall filters right after that – not easy, or even possible to do. They should be as steep as possible, yet should not cause our large current devices, namely amplifiers, to drop in dynamics, which can happen with poorly designed filters/conditioners. They should filter well, yet have sufficient power handling to satisfy at least most of us; making a high quality low power filter is easy, but making a high quality, high power filter is very hard (“high power” being a very relative term, in my view anything over say 600VA is high power).

That much is obvious; now let’s take a look at the less obvious aspects. A filter/conditioner should be transparent, meaning you should plug it in and never bother to look at it again, while it does its job. This means it should be designed to do its job for a long time with no trouble. If it is a typical passive filter, it will have something, whatever, connected to the ground plane – and that’s bad. You see, ground planes are just another unpredictable variable – are they really on ground potential or not? Most are not. And when something comes along, where does the filter send it? To the ground of course, but due to a large power nature of whatever has just been sent to the ground, its potential changes and it is no longer an ideal ground; this effect is known in broad terms as “ground modulation”.

Basically, there are three types of filters used for power lines today. One is of the kind Nels recently reviewed, which uses large power transformers to divide the incoming voltage into two halves, phase inverts one half, sums them up again and loses most of the junk in the process due to cancellation between “plus” and “minus” phases. To be sure, this works, but has many drawbacks as an approach – it’s bulky and very expensive to make, it assumes high precision of matching for effects, it assumes top quality transformers which will not saturate easily, it requires heavy duty shielding once you start passing many amperes through large transformers (yes, even if they are toroidal), their effects, while indeed very linear, are limited by the precision of the transformers, etc. So, good but bulky, heavy and expensive, and if they are to pass along really large currents (say, 10A and above), they need to be very heavy, and therefore even more expensive.

The second type consists of one or another arrangement of classic filters, using inductors, resistors and capacitors in some arrangement. These can be made quite easily (which is why they are by far the most popular type), can be cheap, are easily tweaked for any desired effect (filtering slope) and can be very compact (within power receptacles mounted on cases). But their faults are also many – their slopes are usually uselessly high, with any meaningful action starting at 120 kHz (way above where we really need them), their effects vary wildly from low to nominal power (typical losses can be as much as 6-10 times!), their filtering slopes are too slow (typically 6 or at best 12 dB/oct), their power handling is doubtful, and since they rely on the ground plane, they do in effect modulate it. In short, they are the cheap’n’dirty solution by and large, though there are

some good ones around (and it probably won't surprise you to hear they cost an arm and a leg). And I haven't even come to the subject of phase shifts, which are murder on high dynamics expected from our power amps.

The third type are so-called floating or symmetrical filters. These have many advantages over both types described above, but also some disadvantages. Their power handling can be anything from low to incredibly high, 100 Amperes and more being no problem at all (if designed for it, of course), they can be much better as filters than the second type, and can be as good or even better than the first type, they do not use ground planes and hence neither depend on nor modulate the ground plane, and last but not least, need not be bulky and/or expensive. However, they also need to be made with some precision, ideally they should be calibrated for the desired effect, and cannot compete on price with the second type, even if the price difference is not too great, but are price-wise way better than the first type for the same power handling.

The last aspect you should bear in mind are specifications. Generally, audiophiles do not trust specifications because of their poor correlation with actual audible effects, but in case of line filters/conditioners, they should demand to see some specs. Ultimately, these specs do tell you how much any given unit will suppress line noise, and while that will not automatically make it a good audio choice, it will tell you what you are asked to lay out your money for. If you see something like say "-6 dB at 120 kHz", you will know that filter/conditioner is not doing anything worth mentioning where you need it, and if there is no explanation of the conditions of measurement, you won't even know at what power level that measurement was taken - very probably at very low power, to obtain better figures.

How much suppression do you need? Quite simply, as much as you can get, no two ways about it. But you need it at or below 20 kHz, where most of the electrical noise sources in from of electric motors are, not at 1MHz, where the relative power of any disturbance is incomparably smaller than at say 10 kHz (easily smaller by a factor of 1,000 or more). In short, look for specs covering the 5...50 kHz region, with the accent placed at the 5...20 kHz segment - THAT'S where you need it most.

Will you see such specs? Not at all likely. I've been researching this field for several months now, and I have seen actual specs stated only a few times for anything below 120 kHz. But they'll trip over themselves telling you what it does at 1 and 10 MHz, a region totally outside your audio equipment range.

But there are problems with line filters which cannot be avoided. One is speaking of their effects in absolute terms, which is virtually impossible, simply because it depends on how clean or polluted your own power line is, in itself a totally unpredictable factor. Another is that all line filters, no matter how they are made, will introduce some phase shifts. We don't know how much phase shift, perhaps much, perhaps very little. Depending on the type and quality of your power supplies, this will be a great problem, or no problem at all.

To give you an idea, C-core transformers are very sensitive to phase shifts, and even a small value may offset them, causing slowing down, lack of power and loss of dynamics. These are cheap'n'dirty transformers, which hardly anybody uses these days -

but I have come across them in some Japanese products, some of which were not cheap at all. By contrast, Chinese manufacturers, always assumed to be low quality, all seem to have turned to E-core transformers, just as Europe and USA did. Finally, toroidal transformers are generally not susceptible to this too much, but even then, much depends on how well they have been made. Point is, if you suffer a degradation, don't blame the filter first, rather investigate your power supplies before blaming the secondary cause of problems.

Fine, that's all talk, let's see some specifics now. So, I did some serious measuring before listening, and I won't bother you with what I've heard (usually little enough to make me wonder who but the totally misguided would pay that kind of money for that kind of next to nothing in terms of effects).

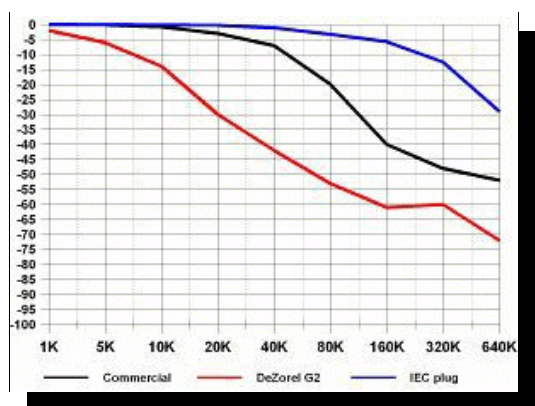
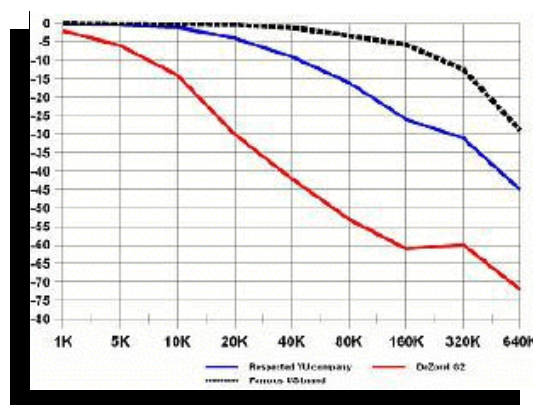


Figure 1 shows the filtering curves of so-called commercial filters, i.e. units not specifically made or advertised for audio use. As you can see for yourself, their effects were compared to the black box that started all this, the subject of this review, DeZorel's LFH-2 filter. Look carefully over the audio range, i.e. 5...20 kHz, then on to 40 or 60 kHz, where most of the powerful disturbances usually are. I think I can make no meaningful comment once you look over the picture. "Commercial" refers to a respected Swiss company, "plug-in" refers to a typical IEC power receptacle which also has a filter built in, and "DeZorel" refers

to my sample of the test unit. At 10 kHz, the commercial filter is down by  $-0.8$  dB (1.1:1 attenuation), the plug/filter by just  $-0.2$  dB (1.02:1 attenuation), and DeZorel is down  $-14$  dB (5:1 attenuation).

Figure 2 shows the curves of three filters specifically advertised as audio filters. Prices range from Euro/\$ 80 to 600. Dotted black line is a product from a very famous US manufacturer (\$600), blue line is a famous Yugoslav manufacturer of high end audio (\$200), and red is my own sample of DeZorel LFH-2 (\$ 199 or less, see third part of test). I think any comment is superfluous here.



Well, folks, that shows you how things stand in general. Please bear in mind that there are many line filters/conditioners on sale in the world, and the above results are not conclusive, only indicative. If you want to read what I heard from this filter and how it's made, read the second part of this report. If you have had enough of me, and want to read what our editors and readers from around the world had to say, read the third part of this report.

# Filter ahoy!

... Goodbye, noise and pollution! Hello music!

**Product:** DeZorel LFH-2

**Manufacturer:** DeZorel, Yugoslavia (<http://www.dezorel.com> )

**Serial No.:** -

**Price:** Euro/\$ 199, or Lstg 132 (but see end of text!)

**Reviewer:** Dejan V. Veselinovic & TNT World gang (see part 3)



DeZorel may be a new name to you, and on the world market in general, but it is a trademark of a much older company called ELZO, now in operation for 12 years. These people have been into professional electronics ever since their inception, and their business now requires that they separate lines of production. They have been making line filters/conditioners for – hold on, now! – 26 years, ever since 1975, decades before most others even

realized they needed them (but not the professionals, they have been using them for a long, long time). However, they have been locked to the Yugoslav market, and only now want to branch out.

Their lineup is rather impressive, and ranges from home models to full Life Support System (LSS) models, and people, it just doesn't get any better than that (see their site for details). Notwithstanding that, I was most impressed by their published specifications and their, in my view, very sane and down-to-earth approach. No fancy stories, no fog, no smog, just hard, verifiable facts. And verify them I did, as did others from all over the globe.

Now, the problem with line filters/conditioners is establishing their effects in what we are concerned in, audio. In general, even within one city, not every location will be polluted to the same extent, or in the same way, and this is even worse when taken on a global level. So, the only thing I could come up with is to have people from around the globe do their own testing and send in their own views. To that end, I had filters sent to Italy, Holland, United Kingdom, USA (2 locations), Singapore and Australia. All the filters were of the same type, the one featured here. Two people, Stefano (Italy) and Scott (USA), are TNT editors, and the others simply music loving people on the TNT mailing list who agreed to take part. Their comments are given at the end of this text, in part 3 and in an unedited form, as you would expect from TNT (not a plug, a fact).

I did most of the footwork, such as measuring, comparing and initial listening test, though Graham Slee also did some measuring (two sets of independent data is MUCH better than one). The choice of model was mine, for better or for worse, simply because I

assumed most would be interested in models they can afford, but as you can see on their site, your choice is hardly limited. We may return to their more exotic models sometime in the future, if there is sufficient reader interest.

TNT has never done comparative test as such, though we did stray at times for logical reasons, such as my own text on three interconnect cables not long ago. Because of this policy on the one hand, and the need to substantiate both my own and TNT's finding, I did measure a few competing products, but decline to name them (as shown in Part One). The point is not in promoting any one make, but simply illustrating a part of what is on the market and clarifying some matters, so you know what's waiting for you – forewarned is forearmed.

## LFH-2

Model LFH-2 is rated at 10A/240V or 20A/120V, both of which means it will handle power of up to 2.4 kVA, though this will be less at lower line voltages. This is caused by the thermal fuse switch on the unit – it operates on current alone and disregards the voltage, so if you have 210 VAC, you will have 2.1 kVA power handling. Also, this difference in voltages makes it practically impossible to have a single power rating for the whole world and not either overdo it or fall short. For you, it's simply ten times your supply voltage, whatever it may be 210-250V, or twenty times the 100-120V brackets.



Inside a nice black powder coated aluminium case, which is good because of aluminium's inherent non-magnetic properties, you'll find another aluminium block, this time a cast one. The one inside houses the actual filter/conditioner, the net effect being that of a double Faraday cage. This is, in fact, highly desirable, because with double shielding, nothing, but nothing gets either in or out. No stray fields, and I verified this by placing the filter case squarely on top of my CD player – and nothing happened. Still not satisfied, I took it to the labs of a Belgrade FM broadcast equipment manufacturer (1 kW pure class A antenna power amplifiers and stuff) and put some instruments to it – still nothing to speak of, what I got was an even chance I was watching instrument noise or some EM radiation.

The unit's specifications are very impressive, and that for two reasons. First, they are given across the really interesting spectrum, 5...600 kHz, i.e. where we need to know and have effects most, and second, because they are given as minimum guaranteed specifications at full rated power, which is such that you will probably never run it at those levels, but conversely, this also means you will have better specs in actual operation. Not too long ago, everybody did it this way, but most gave up on it in their search for better, if not wholly truthful and/or representative, numbers.

On the back, you'll find one IEC 320 three prong male input socket, and one or two (depending on the market being served) IEC 320 female output sockets. Alternatively, you can have it with a single German standard industrial grade Schuko socket, probably the best solution for most Europeans. Europeans can also order a power strip distribution box with it at a small surcharge, which contains three Schuko sockets and seven Euro sockets, also in matching black. Everything mentioned carries a CE certificate.

On the front, beside the lettering, all you have is the top of the resettable thermal fuse, which you need to push on only if it just did its job and tripped because you overloaded the unit – a most unlikely situation, which I had to test by purposely adding more and more devices until the fuse actually did say “click!” and cut me off. But by then, practically all my electronics were turned up all the way and were connected to that one single line. With a better than 2 kVA rating, you need extra beefy home power lines to take it to the top (I have only one such line I had installed at considerable extra cost).

Also, its initial turn on current surge is much greater than its nominal rated power, since it never blew during my initial switch on tests. Just how greater, I don't know (actually, I do know, I spent a whole week measuring this and similar devices, and I know where each of them saturates, but I'm not telling, because people will start getting potentially lethal ideas, like bypassing the thermal switch fuse).

And that's about it – you plug it in and forget all about it. You don't even need to see it.

## **Microdynamics**

Well, listening to what comes out of your system after the filter can be a very interesting experience. In most cases, you will hear an improvement straight away, and where better than in microdynamics? My experience was that I simply heard more silence, the black got blacker so to speak, and some fine nuances, like natural reverberation, were easily heard now. Before, they were either not heard at all, or were less discernible from whatever else was in that power, but now no longer. The natural decay now seemed much more natural and definitely much more easily heard.

I was particularly impressed with the “new” sound of stringed instruments, and of those, with the mandolin in particular. I could now hear on good recordings individual strings being plucked or stroked, as the case may be, and the whole was considerably more life-like than it used to be. It's as if my entire system had a weight lifted off its shoulders and was now free to REALLY get into it.

In an attempt to discover whether I was really hearing something different or just being a victim of the expectation to hear a difference (knowing a few things about technology can be a problem sometimes), I performed the test suggested in the user manual. I took a 60W light bulb, but also a Philips super saver light tube rated at 21W (equivalent to a 100W classic light bulb), and tried them without the filter/conditioner and with it on line. Sure enough, I wasn't imagining things, the light appeared brighter with the filter on line – of course, it didn't shine brighter than its specifications claim, it



just shone cleaner, and with a slightly changed color of light, now a little whiter. Good test that, simple and easy to do in one's home, no particular skills and measuring devices required, just your ears and eyes.

I couldn't resist the test with the TV either – and it worked there too. In fact, I was surprised at how better my overall picture turned. While not stunning, and hardly competitive with HDTV, it was clearly better. When using DVD as the source, the viewing was truly memorable as far as picture quality went (but I still dislike Hollywood's usually overblown sound effects).

## **Macro dynamics**

Well, if microdynamics were very good, playing music at higher levels really rocked the boat. Dynamics seemed very open and almost liberated, as if there were no longer any constraints placed on them. Concert hall levels were possible before, but with the filter/conditioner I got concert ambience as well as loudness. There was no mistaking the place where the music was being played, in a concert hall, or an open stadium in case of some rock concerts.

I suppose the best way to put it is that music assumes a finesse, a high quality polish it didn't possess before. Loudness stays about the same, the Karan KA-i180 will still rattle my windowpanes easily (well, with better than 250W/8 Ohms before clipping, what did you expect?), but it can now deliver a level of finesse I didn't know it had, good as I thought it was. You find yourself turning the volume up more without being aware that it's now way past the place which used to be the limit before.

## **Marching on**

That got me thinking – fine, that's with using my not at all cheap system, but what about lesser systems? So I repeated most tests in my son's room, with his much cheaper and simpler system, consisting of a 1994 Harman/Kardon 6550 integrated amp (2x50W/8 ohms), a 1997 Philips CD721 CD player (with OP275 for output), a 1991 Technics ST-G570 tuner, and a pair of 2001 B&M Acoustics AP17 floorstanding speakers.

If anything, the effect was even more pronounced there. The gain in music polish and overall quality was pretty well larger than in my own case – which is quite logical, if you think about it. Cheaper gear will have cheaper power supplies, which will be all the more sensitive to line dirt than expensive gear like the Karan, which by default has better power supplies.

That system which I know well, profited much from the line filter/conditioner. It started producing sounds as I know I've never heard coming from it before – no startling revelation, to be sure, but a very marked difference, quite easily heard. More ambience, greater clarity, more detail, better coherence, better perspective – that about sums it up.

Lastly, my wife's system. It consists of a Harman/Kardon HK680 integrated amp (2x85W/8 Ohms), H/K HD730 CD player and a pair of JBL Ti600 speakers, to which a Marantz 4100 DVD player is also connected, all via van den Hul cables, all on SoundCare spikes. Again, ambience grew considerably better, more coherence, greater silence in quiet passages. But what did surprise me was the treble range I got from HK680; while solid but hardly exciting before, it now sort of opened up, as if a door partly closed was now being opened as wide as it could go. It still didn't match the Karan of course, but it definitely left the run-of-the-mill territory and went up a peg or two into the good part of Hi-Fi. Something like producing a better balance, I think, with extra ambience thrown in. On the other hand, I'm hardly happy to realize the H/K design team didn't exactly shine in the power supply department.

The DVD picture also showed easily visible, though not startling, improvements. Here, black got literally blacker, the deep digital black that no analog could ever hope to produce. Colors seemed more vivid, better nuances, sharper detail. The TV set also profited, but being locked to TV stations, which in Yugoslavia are hardly even good, let alone great, I noticed the differences mostly in receiving some borderline stations; without the filter/conditioner, they are not really viewable, but with it, they look at least viewable, if not enjoyable. A bad one, with plenty of snow, not could actually be discerned, and stayed so until the filter/conditioner was removed. A funny effect here – some stations were lost after the filter was switched in, so I had to retune the TV set (easy routine on Philips sets), but when I did get them, they looked better than ever before. Obviously, line dirt influences your TV tuner much more than is generally realized.

## **Overall**

Very impressive, I have to say it, though I'm not quite sure what to stick that tag onto. It's really deplorable what we're being handed as nominally clean power, but I suppose we can't pin the entire blame on the power companies, there are the housing developers too, who skimp on every corner, and the incredible multitude of household appliances, which are made well below par beneath the great looking exteriors. They all combine highly reactive (reactionary?) forces and conspire to prevent us from hearing what our systems are in fact capable of giving.

But problems with the power we do have, no doubt about it. The DeZorel LFH-2 line filter/conditioner goes an unexpectedly long way in resolving these problems at an admirable level, in view of its relatively modest price. They publish very good specs, produce a filter with no connection to the ground (and hence no variables in either or both directions there), it's double shielded, a great rarity usually reserved for top army and NASA class of equipment (you know, the-price-is-of-no-consequence gang), and hence totally impregnable to radiation in both directions. Looks I won't comment, that's far too personal, I like them, but you may not. It's small, which I like because I can tuck it out of sight, I really don't want yet another case piled up, I have too many already. It adds an extra layer of safety with its thermal switch fuse, probably the best possible solution, as it requires no replacement. And it comes as a product from a company

involved with such products much longer than 99% of everybody who's in that field today.

The price is, I feel, the next thing after a giveaway. Wait, you say, Euro/\$ 199 or Lstg 132 is no joke, to that I need to add shipping costs (app. Euro/\$ 15 in Europe) and whatever my local customs authorities decide to hit me with, so the final price is probably more like Euro/\$ 230-250. Well, compare what this gives you with anything you can find on Internet in terms of effects and power handling for the money – I did, and found nothing. Either no filtering data at all (why is that, I wonder?) and similar power, or similar filtering at much lower power levels, typically up to 2A, and in both cases, for more to much money. Of course, I could be wrong, there is always somebody I didn't see, but if anyone can offer a reasonable alternative, I'd be glad to hear of it.

As things stand, LFH-2 is probably the best thing you can add to your system, bar none – whatever your system is composed of. Unbeatable price/performance ratio, but if you want it, better hurry, as they are negotiating dealers throughout the world, and once they have set them up, there will be no more Internet sales. And remember, this is their smallest model series – now imagine what their audiophile filter/conditioners must be like.

## **And now, a TNT special!**

Well, I let the DeZorel people know how we feel. We talked, I consulted with Lucio and we came up with a special deal for TNT readers – that's you, folks!

The deal is really simple. All you have to do is print out this text (whatever the printer, but no copies, please), put it in an envelope and mail it to DeZorel at:

ELZO  
C/o DeZorel  
Gospodarska 8  
11080 Zemun  
YUGOSLAVIA

For the available options, see their site. Regular Internet price of this unit is Euro/\$ 249, and special introductory price is Euro/\$199 (Lstg 132 for credit card owners).

**But by supplying proof that you are a TNT reader, your price will be Euro/\$ 170 – only on TNT!**

This offer is good until 25 December 2001, i.e. until Christmas, but is applicable only to those who wire the money in a direct bank-to-bank transfer to DeZorel. Of course, the usual terms of trade, such as the 30-day money back guarantee, remain unchanged. But be warned - you have much more of a chance ordering another one than returning the original sample.

To this, you need to add shipping costs to you. I asked and was told that all of Europe is the same rate, specifically Euro/\$ 15. North and South America, as well as Japan, Australia and New Zealand are Zone 3, and shipping costs Euro/\$ 45, while Russia, Asia and Africa are divided between Zone 2 and Zone 3, and shipping is Euro/\$ 30...45, depending on actual location. Israel is Zone 2. However, this is by regular airmail, so the package will be delivered to you on your doorstep (no hassle, man, now that's what I like!). If you want something fancy, like DHL, you need to pay extra – lots of extra.

Banks usually take 3-5 days to transfer the money, and that's about how long it takes an airmail letter to get there, so if you go to the bank or e-bank it and then send the letter, the two should coincide and make things smooth. Don't forget to e-mail your address, so they can get in touch with you.

Experience has shown that customs are zero, i.e. nobody from the test crew paid any customs duties at all, but don't take that as the Gospel truth, you never know, and it does vary from country to country.

Whew!

Well, it's been tough work for the last 5 months or so. I think I deserve a break. This is DVV, over and out!

# Filters ahoy!

## Part 3

### Introduction

*Rather than take just my word for it, and bearing in mind different power conditions in different places, I only coordinated the TNT team who did some testing of their own. Here's what my esteemed colleagues had to say, in their own, unedited words. You can reach all of us via TNT's own mailing list. I made it a point to state their place of residence, to show that we at TNT have really tried to cover the globe; it may also be of help to you if you happen to live nearby, as you will know precisely what you can expect.*

*Dejan V. Veselinovic, Belgrade, Yugoslavia*

### **TNT's Most Massive Test (so far) editors and readers speak**

**Scott Faller, TNT Editor, St. Louis, Missouri, USA (audiophile who triumps with three 2x125W amps in a custom built room):**

I got up this morning, typed a few email responses, surfed a little to see what's going on in the world today, then decided to give this black box a whirl. I went

downstairs and turned on the system then came back upstairs. I let my wife know I was letting the system warm up, which further confirmed the possibility that I might soon be institutionalized.

I went back downstairs about 45 minutes later and plugged in some of my favorite music. I spun a few CD's first, Buena Vista Social Club (BVSC) and Bobby McFerrin. Both are just great recordings. Layers of music on music. In a lesser system, those layers get lost, easily. With a few songs fresh in my music memory, I decided to install the DeZorel LFH-2.

The first song I listened to was Chan Chan from BVSC. From the first notes, I noticed something different. The sound seemed to extend further from the sides of my speakers. To confirm this, I unplugged the DeZorel and gave it a listen again. Sure enough, it was happening. My speakers disappeared even further and the soundstage became wider. Cool.

I plugged the DeZorel back in and sat down for some serious listening. Next I noticed far better positioning of the instruments on the stage. Maybe positioning isn't the proper word. That's more of a broad-brush statement of what occurred. What I am hearing is better definition of everything coming out of my speakers, top to bottom. This definition is at a micro level.

Perfect example. Compay Segundo sings backup vocals to Ibrahim Ferrar on Chan Chan. Before, Compay would, kind of blend into the background, his voice getting lost in the music. Now he is there. His voice is well defined within this same song. I can now isolate and focus clearly on his voice through the entire track. Now that's one hell of an improvement. If you have this CD or piece of vinyl, give it a spin. Do you have to listen hard to distinguish his backing vocals? Can you hear his completely separate vocal track? If not, read further.

Moving to another piece of music, Bobby McFerrin, the song Don't Worry, Be Happy. My wife and I have listened to it dozens, maybe hundreds of times before. Both of us have asked the question, what is that sound he is making? It sounds like either a snap (of the fingers) or a clap. Well, now I know. It's a clap, clearly a clap. He is clapping just his fingers without the use of the hollows (or palms) of his hands. His fingers when they strike are perpendicular (90 degrees) to each other. It is a very shallow sounding clap, more of a smack or slap almost, rather than a clap. This is the kind of micro details that are now readily apparent with the DeZorel LFH-2.

Now this isn't subjective or some psycho-acoustic mumbo jumbo, it's real and completely audible. Anybody could hear just exactly what I am talking about, not just somebody with "golden ears".

I haven't even begun to talk about the black hole that has been created behind my rig. Dead silence, and I do mean dead silence.

OK, I'm sure you've read all kinds of stuff regarding line filters and how they color the sound of systems. This one doesn't. That's not to say some might, but his one doesn't. In fact it's absolutely neutral. All it does is clean up the power. It's a passive

(pass through) unit. My system sounds the same as it did before, just infinitely more defined. That's a pretty strong statement, but I'll stand by it. Bass lines are firmer, vocals are clearer, instruments are far better defined. The DeZorel brings out the true fine details that exist within the recordings you have.

Understandably, DeZorel has taken great care to seal their product from prying eyes like mine, not to mention the safety aspect of the product. Much of the product costs reflect the research and development costs, forget about the nifty case it comes in and marketing costs. The DeZorel filters (on the whole) are far less expensive than their competitors making the investment into a line filter much more attractive and attainable for the average audiophile.

So.....

Well, as I told Dejan, possession is 9/10 of the law. DeZorel can't have it back. In fact, I'm holding this one hostage until they send me another one for my second system. Then I'll hold that one hostage too :-)

The pricing scheme for these is very reasonable considering the competition. I recently listened to the passive version or Transparent's line filter. It was \$2500 and didn't do any better job. Actually, I think it didn't do quite as good a job at more than 10 times the cost.

Bottom line, if you have what is considered a "high end" system that reveals fine details and you don't use a line conditioner, you are missing out. The DeZorel will definitely bring out more of those fine details that we audiophiles live for. If you think you have clean power straight from the grid, you don't. I'm living proof. I've probably got cleaner power than 99% of you out there and I definitely heard the improvement.

I'd rate it an 8 or 9 on the Darryl Scale. A 10 on the Darryl Scale is reserved for things like the invention of penicillin, the birth of children (especially your own), and simple picnics with your wife in desolate areas.

**Stefano Monteferri, TNT Editor, Rome, Italy (audiophile, computer professional):**

DeZorel people say that, in a few cases, you can hear nothing about benefits introduced by G2 filter utilization. This could be because of your good luck: in fact, you have a very good power line at home, so there is no need to clean anything in your own electric power line section. Or it could be because of the very poor performance of your equipment, that it is too poor in quality, is it? Let me clearly say: I hope not!

Well, I'm going to tell you something about my experience using the DeZorel G2 electric power line filter. First of all, let me say that introducing the G2 filter in my reference system something happened, and it was something good and really interesting.

A few minutes of listening are enough to perceive how the DeZorel filter works (and it works fine!). I can say that the most obvious effect is the improved fluency of the

middle and middle-high frequencies. These frequencies immediately seemed cleaner and clearer, and with more "heat" at the same time. This means that you can enjoy your favorite music with more of a sense of presence and a sense of realism standing out. Female voices, for example, astonish for their grainlessness and liquidity, in a way that I never heard before using my equipment. Honestly, I must say that the overall sound performance seems to be more natural, less hard, with a sound that assumes something like a "golden outline". As a result, you often discover yourself inclined to listen music using a volume level higher than usual.

The little musical nuances spread more easily in the air, and the dynamic performance seems to be more fluent and natural. Speaking about the sound holography, instruments and singers come across very well outlined and with more air between them. The virtual image seems sometime wider and with a particular sense of, shall we say, dense "inter-instruments black", if you understand what I mean. The images focus is improved too, so that you can improve your capability to "read" inside the architectural sound infrastructure of the musical box.

Something good also happens during the "sound start" and especially the "sound end", with a really improved sense of silence between the sounds themselves. A very good performance, I must say, so that I surely recommend the use of this excellent DeZorel G2 line filter to anyone.

Finally, some advice: if you can buy a couple of filters (after all, DeZorel filters seem to be downright cheap in view of their performance...), please keep separate your analog devices from your digital ones. Otherwise, I suggest definitely connecting all the analog devices to the DeZorel filter, carefully listening with digital devices connected to the same filter, and only then deciding what definitive connection layout you prefer.

Many thanks to the DeZorel staff for their courtesy!

**Gene Halaburt, Salt Lake City, Utah, USA (audiophile and audio industry veteran of 25 years):**

It's difficult to say what is the most outstanding feature of the new DeZorel Power Line Filter (Model LFH-2). When I first installed the unit, I wondered if in fact I would hear any difference, since I had been disappointed with some other power line filters I had tried. After it had been plugged in for maybe 30 minutes (with no music playing), I put a CD on my Ah! Njoe Tjoeb 4000 CD player. Within ten seconds I knew the DeZorel was a permanent addition to my system. It was like suddenly having a new system that cost maybe five times more than I paid for all of my components. The removal of the grunge caused by noisy AC brought a sense of ease and effortlessness to everything I played on it. The depth of field increased dramatically, as did the ability to follow individual instruments in complex orchestrations (think "Le Sacre du Printemps"). Voices are much less "electronic" and the sense of the presence of the performers is jaw-dropping. I have the feeling that my system gained about 20dB dynamic range over what it had. I "feel" the air move in the listening room when the music contains really deep bass and highs go well beyond the high frequency capability of my ears - but without the

harshness that often is a by-product of CD reproduction. Friends, this is a unit you MUST have. I rate it ten out of ten.

**Graham Slee, Yorkshire, United Kingdom (audiophile, engineer, designer and manufacturer of audio equipment, mostly for vinyl):**

As a designer, it is usually my products that are the subject of reviews, so it's a totally new experience for me to be sat in the reviewer's chair. But as TNT asked me for my opinions on the DeZorel power line filter from an engineering point of view, here goes.

The DeZorel LFH-2 is a passive filter housed inside two layers of aluminium screening, which I'd advise you to wire the provided mains earth. The first being a thick cast housing into which the PCB mounted components are potted (the filter block), the second being the smart functional cabinet it is presented in. To assist me in my investigations DeZorel kindly supplied me with a spare un-potted block, so I could whip the board out and subject it to any test I could think of.

Usually I test audio circuits, and this is very straight forward, but the mains filter presented a few difficulties for my audio based test gear. This gear is used to driving amplifiers, not virtual short circuits. You see, the filter has a massive capacitor straight across its input, which at high frequencies is the nearest thing to a short circuit for my oscillator stage.

It is this very capacitor that forms the first stage of high frequency filtering. At the mains frequency of 50 or 60Hz it presents no load at all, passing full power to subsequent equipment. But to any stray interfering signal such as RF it is a heavy load, and with the impedance of the preceding mains wiring, forms a nice 6dB/octave filter at some particular high frequency. The farther away you are from the electricity sub-station the earlier this filter will cut in.

For the tests, however, this capacitors effect had to be compensated for by switching in some resistance on the oscillator, effectively removing it from the test. Thus my measurements will be somewhat of a worst case (always good from a review point of view).

The subsequent stages of this filter provide a quite steep roll-off considering its passive nature. The steepness of the slope is determined by the filter's Q (quality factor), and this filter's Q is high, as demonstrated by its relatively large pass-band ripple near its turnover frequency. Once it passes that point, it falls like a rock (for a passive filter, that is)! This is exactly what is needed to stop RF entering your equipment. And by RF, I not only mean radio station signals picked up in the mains wiring, but high frequencies generated by electrical appliances sharing your mains supply anywhere between you and the sub-station.

So how well did it work? It started to roll-off with a vengeance at just over 10kHz and was a full 20dB down at 20kHz. At 40kHz it was down 33dB, that's 7dB better (just



over twice as good) than the nearest commercial offering. At 150kHz (the lower end of the long wave band) it was 12dB (or 4 times) better than the competition, at -54dB.

150kHz is just about my measuring limit on the audio gear. Unfortunately, but understandably, my RF generator used to measure higher frequencies, just could not drive the filter, as, at the frequency it operates, the input capacitor was virtually a dead short to it. So here I have to fill-in the gaps with my experience and knowledge.

With the measurements I had made indicating a slope of about 12dB per octave, I calculated -78dB at 600kHz, exactly what the manufacturer claims, which tends to confirm they know what they're doing. This means it will be -87dB at 1 MHz, a 22,000:1 reduction, quite impressive!

So how does your equipment benefit from such power line filtering?

Well, anything containing a mains transformer should benefit less from power line filtering, because transformers are poor at passing high frequencies anyway. But somehow, medium wave radio frequencies (600kHz - 1.6MHz) do manage to find their way in via the power supply, and hence must pass through the transformer. The bridge rectifier makes a handy little detector circuit and big electrolytic capacitors can allow the passage of tiny signals onto your power rails, and hence onto the signal. Now, the superimposition of this hardly audible interference can, at the very least, blur (alter) the sound. So it will come as no surprise to find things sounding sharper and clearer with the filter in line, provided the equipment you are using has the capability.

Any circuit not containing a transformer should benefit even further. TV sets, for example. Many circuits inside TV receivers use high voltages derived directly from the mains and operate at very high frequencies. Having high frequency interference superimposed, the resulting picture stability can be noticeably degraded. Removal of the interference should therefore result in greater stability, appearing as a sharper, or clearer, or much more vivid picture.

The above are the things I noticed using the DeZorel filter, but the most noticeable results were with vinyl, where the signal is tiny and at its most vulnerable. Much of the shrill harshness associated with old 60's commercial pressings was replaced by musical sounds, and decaying notes were perceived to continue longer, containing the vibrations of strings rather than a smoothed sound you'd get with blurring.

To conclude, this product lives up to the claims its manufacturer makes, both measurably and in the sensory results that were noticed. I don't have "golden ears" nor "golden eyes", and most of all, the test gear never lies.

**Neil Bolton, Canberra, Australia (audiophile, private company owner):**

When Dejan asked me to review a line filter I agreed, but told him not to expect much feedback. For lots of reasons I reckon the power I'm feeding my gear is pretty good - we live in a new house in a new estate, we're close to the transformer, there's no heavy

industry in Canberra - so I didn't anticipate much difference. Though having got quite an improvement out of some simple TNT-style power cords I wasn't totally skeptical.

So I wasn't eagerly anticipating the arrival of the new toy, and it actually sat around for a week before I plugged it in. I pulled the lid off, of course - I am a bloke - but found there was an impenetrable brick inside, so gave up at that point.

First to get tried was the TV. There was a lot of difference there but I put it down to the computer being plugged into the next power point. All channels became perfect. The DVD player didn't jitter at all, either, for the first time. Still skeptical, though.

So I finally got around to feeding the stereo some filtered power.

Amps: AE-1 single ended triode with either KR 2A3s or Sovtek 300Bs. A massive 3.5 watts with the 2A3s, an even mightier 5 watts with the 300Bs.  
Matching 6SN7 preamp.  
Musical Fidelity XA-1 50W SS amp.

Speakers: Sonus Faber Grand Piano floorstanders.

CD: Rega Planet

Vinyl: Rega 25 with Denon DL160 cartridge, with the phono stage of a Quad 33.

Cables: Van den Hul interconnects, Nordost Blue Heaven speaker cables, satellite cable style power cords.

Muddy Waters Folk Singer CD went on through the AE-1 running the 300Bs and I sat back to listen. From my notes: Rhythm, pace - now I know what those hi-fi reviewers are talking about. My foot was tapping! This is crazy. Maybe it's just me - back to straight AC, I look down at my foot and it's not moving. Back to the filter - the foot's tapping again. All by itself. I also had to turn it down - it was louder than before, at the same 11:00 o'clock on the dial. Now something's going on here that I just don't understand . . .

Next CD: Chris Rea Dancing With Strangers. I know this CD. Well, I thought I did, anyway. Track 5 - The Curse of the Traveler: the flute intro had a breathiness I've never heard before, I could hear every string when the acoustic guitar was strummed, not just the one chord I was used to. I could hear the upstroke and the downstroke of the pick in the electric guitar solo. The voice had a breathiness I've never heard - and I heard it coming from his chest. The slight "honkiness" of his voice disappeared. The layering of the instruments was amazing - I could listen to just one instrument - not for long, though. The music came back to me - I was trying to review this piece of hardware and I wasn't doing my job - I was getting transported by the music.

Charlie Hayden and Chris Anderson was next - a beautifully recorded Naim CD: I could hear the fingers on the strings of the bass that I've never heard before. The ambience of the hall was more marked than ever before.

Vinyl time: Albert Collins Cold Snap. I tried really hard this time to concentrate on the hi-fi, not the music. After 30 seconds or so I noticed I was swaying in time. Damn - failed again. How can I review this thing when I can't stop listening to the music?

Then I took the DeZorel out, sat down to listen to some more CD stuff. About two minutes into listening I noticed that the vinyl was still playing, got up, took the arm off, sat down - and I realized I wasn't as engaged by the music now. I just wouldn't have noticed that five minutes ago. Went off, made a coffee, came back.

The filter goes back in, and I was entranced again.

Next up was Nirvana Unplugged. Alexandra hates this - but I could play it because I was doing an important job (!). I'm grooving, and then I notice she's dancing to the music! If there was ever a recommendation for something I just saw it.

So I don't know what's going on here, guys. I'm supposed to be reviewing this high-tech black box and all I can do is goof off and listen to music. Sorry about that.

Here's my summary, and a strange one it is too:

I heard more music that I've ever heard before in any recorded environment. My hi-fi is not - it's mid-fi, and I've heard stacks of higher-fi setups. But I've never been drawn into the music like that before. I've read reviews that talk about pace, microdynamics, layering of instruments - and by the adding of a simple little black box I heard it myself. No, it didn't give me another octave of bass extension, I didn't get that holographic imaging that I've heard Dynaudio Countours do, I didn't get the shimmering transparency of Quad ELSs, I didn't get the bass slam of a big SS amp. I've still got a long way to go before I'm into the top end.

But I got music. I was more emotionally involved in the music that I could believe.

By any analysis this was the single biggest bang-for-the-buck that I've ever had, by miles. And no, the thing isn't going back. I'm actually lining up for the high-end one - this one has been grabbed by Alexandra for the TV . . .

And this is from someone who was skeptical, and we really do have damn clean power here. I'd like to find out what this thing would do in an industrial city, or an apartment block . . .

**Daan van Rooijen, Heerhugowaard, Netherlands (audiophile, PC software expert)**

I'm very happy about the performance of DeZorel LFH-2 powerline filter. I've had it in my audio system for a week now, and a critical listening session that I just completed confirmed my general impression. I use a dedicated power group for audio, and my amp (Karan KA-i180) and CD player (AH!Tjoeb) have excellent power supplies. Even so, the differences were clear. I used Joan Armatrading's "Love an Affection" for my test. The metal guitar strings in the beginning sound cleaner and have a more crystalline sound. Joan's voice becomes more fluid and natural, and small ambient details are more apparent. The same effect is also heard in the saxophone and even in the bass. Now all of these changes are quite subtle, but their overall effect is one of a cleaner, more natural and more effortless presentation. Another effect that I'd previously noted, with

Eva Cassidy's live album, is that performers and instruments lose some of the 'fog' around them. My Newform Research R645 speakers throw a large soundstage. With the filter in place, individual performers became slightly smaller, but they were more clearly defined in the soundstage.

I am at least as happy with what the LFH-2 did NOT do! It is often said that amplifiers lose some dynamics or even sound congested when hooked up to a net filter. Fortunately, the LFH-2 doesn't seem to limit the amp in any way; it sounds just as dynamic as before. With the additional benefit of protection against power surges and spikes (which I consider essential!), the LFH-2 is definitely staying in my system. I had not expected this level of performance, versatility and quality for its very fair price before.

## **Manufacturer's comment**

We would like to thank the TNT team for their comprehensive comments. It is most important for manufacturers to hear things like this, because by being involved with any product, they necessarily become attached to it and lose some objectivity; that's where independent reviews, and especially ones as large as this one, can play a vital role.

We would like to remind readers of the fact that we manufacture a line of audio-specific filters, which are more expensive than the basic models from the LFH series. If there is sufficient interest among the readership of TNT, we will be glad to submit them for review.

At this time, we are negotiating national distributorships in several countries around the world. When a critical mass has been gathered, we will stop selling via Internet, or will adjust our prices to our dealer network. As of this writing, we will pursue our current Internet sales policy until the coming Christmas, which should allow readers of TNT to make use of the really unique opportunity we have created for them – at Euro/\$ 170, LFH-2 will never be more easily accessible to the general public, and still with our full five year warranty.

We regret the inconvenience Mr Bolton had, it is sad to have your new filter kidnapped by your own wife, but for what it's worth, this duplicates exactly what two of our design team members also went through. The third was really out of luck – his unit was kidnapped by his brother-in-law, a total unrecoverable loss, he tells us. We are now considering producing a Family Pack of filters, essentially three separate units shipped in a single carton box, at of course a special price. Another idea directly suggested by user comments.

We wish all our users many years of trouble-free service from our products.

**The DeZorel Team**