# Sound man

## By Fred Kaplan

Vladimir Shushurin, age 54, sits in his basement in Sheepshead Bay, a section of Brooklyn dominated by Russian immigrants, building what the top hi-fi magazines consider to be the best amplifiers in the world. He doesn't sell many of these amps. They are expensive, ranging from $16,000 for the cheapest model to $30,000 for his top-of-the-line product. “I could build cheaper amps, worse amps," he says with a shrug. “I know how to do that. But why should I? I didn't leave the Soviet Union and come all the way here to compromise."

Shushurin is far from the only obsessive out there, scaling the heights of perfectionist sound. “High-end audio," they call the expedition, and the common aim is to piece together a tangle of wires, switches, capacitors, circuit boards, and other electronic contraptions in such a way that the resulting package reproduces the tones, timbres, and dynamics – the you-are-there thrill - of live music.

The art and science of attaining this paradise, unfortunately, requires prodigious research, ingenious engineering, and expensive parts – “stupidly expensive parts," as Shushurin puts it. Which is why, in this rarefied realm, it is not unusual to see the denizens hawking, and their best-heeled customers buying, $5,000 CD players or turntables, $10,000 preamplifiers, $20,000 amplifiers, $30,000 speakers, and $1,000-per-meter cable to hook all the components into a system.

Two remarkable things about this alternative universe: First, nearly all high-end companies - the ones that have been around the longest include Audio Research, Krell, conrad-johnson, Classe, VPI, Magnepan, Martin Logan, Wadia, Theta, Spectral - are based in the United States or Canada. A few more are in England, Scotland, West Germany, France but almost none are made in the Asian countries known to produce mass-market stereos. The second thing is, this stuff really does make a difference, and, faced with a properly set up system, anybody can hear it; there's nothing subtle about it.

I remember my own first exposure 15 years ago, in a store just outside Washington, D.C. The owner put on a good symphonic recording, and my jaw dropped. The whole orchestra was spread out across the back wall, violins on the left, cellos and basses on the right, winds in between – with layers of depth, the sounds of percussion and brass coming from way, way in the back. There was that silky bloom of the string section, the metal and air of a flute, the woodiness of a clarinet, the snap of a drum, the golden crash of cymbals, the ambient echo of the concert hall itself, and, when a singer stepped in front of all this, you could sense the heaving chest, the smacking lips, and the air that pushes a human voice out into the ether. With a smaller-scale recording - a jazz combo, a pop group, a string quartet – the players seemed to be right there in the room, 3-D and palpable.

Going from my name-brand stereo back home to this esoterica was like switching from grocery-store swill to Chateau Petrus, like tossing out the 14-inch black-and-white TV for wide-screen surround-sound. Or, as Shushurin puts it, after his young wife, Elena, flees the room, laughing with embarrassment, knowing what he's about to say, “It's like the difference between a doll from a sex shop and sex."

Shushurin got into hi-fi while growing up in Lvov, an industrial town in the Ukraine. He built his first amplifier, as a hobby, when he was 12. Later, he studied electronic engineering and physics at the Lvov Polytechnic University, then went to work for the Soviet military-aerospace complex, designing the monitors for optically guided bombs and simulator-training systems for the Apollo-Soyuz space project.

In the mid-1970s, Soviet Prime Minister Alexei Kosygin ordered the military industries to diversify and start producing consumer goods. Shushurin was appointed chief designer of the audio sector, which employed 400 workers, churning out a half-million units a year, most of them pretty terrible.

At night, though, he worked on his own theories of sound, which he knew he could never implement in the Soviet Union - partly due to the lack of a market for really sophisticated products, partly due to the lack of decent parts. In 1979, he applied for an emigration visa and, as a result, lost his job and underwent nearly a decade of harassment by the KGB. Finally, he was given permission to leave in late 1987, at the start of Mikhail Gorbachev's era of perestroika. He moved to New York, studied English intensively, and chased his dream.

Shushurin's basement - the production site of his high-end company, Lamm Industries Inc. - has something of the feel of Edison's lab, a weird juxtaposition of crammed whimsy and high-tech wonder. Desks are spilling over with blueprints, circuit boards, and metal chassis. Drawers are stuffed with screws, capacitors, tools, and vacuum tubes. (All of his amps, like many high-end products, use vacuum tubes for at least some of their power.) Components and finished products are plugged into oscilloscopes that display perfect sine waves. Three workers, also Russian emigres, assemble the parts. Shushurin tests the finished products, making minute adjustments. Elena, who works at New York University, does the books in their apartment upstairs.

The conventional wisdom, in the mass-market world, is that all amplifiers sound pretty much the same, as long as they have the same number of watts and the same levels of “total harmonic distortion" (THD). But Shushurin, like everybody else who has wandered into the high end, realized very early that this just wasn't true.

“For example," he says, “you can look at the ratings for a Japanese amp - the THD is 0.0001 percent - but you listen to it, and the sound is just terrible. It was hard for me to accept this, as an engineer, but the conventional measurements have nothing to do with what we hear."

Shushurin's ultimate aim, like that of many in the high end, is to build equipment that has no sound at all, that brings the listener as close as possible to the musicians and singers in the studio - or at least to what they laid down on the tape - with minimal interference from all the electronics in between.

This is harder than it may seem, because all electronics impose some sound, some distortion, some barrier. Take capacitors. These are the circuits that the musical signal travels through on its electronic journey through an amplifier. The more circuits along the way, the more degraded the signal becomes. (This is why most high-end preamps do not have bass and treble controls; they're just two more circuits that, if the thing is properly designed in the first place, aren't needed, anyway.) Capacitors have memories. When a signal passes through lousy capacitors, it lingers for a while, overlaps with the signal passing through a nanosecond later. As a result, the music you hear sounds smeared; it's missing a lot of the subtlety. When a signal hits excellent capacitors, it sails right through, with virtually no overlap. The music you hear sounds crisp, detailed, lifelike.

The problem is, excellent capacitors cost lots of money. So, cheap amps unavoidably use lousy capacitors, while excellent capacitors are found only in expensive amps. The same holds true for every part in a piece of hi-fi gear. At a place like Lamm Industries, each amp or preamp is a handmade product. It takes a full day to solder a circuit board, another two days to assemble the rest of the amp, a half-day to do the testing for quality control, three days of playing it on the stereo system in Shushurin's living room (to let the circuitry “burn in"), then another few hours of double checks, to make sure all the parts are still up to snuff.

“I match all the tubes in an amp to within 1 percent of their performance specifications," Shushurin says. “So, for every 100 tubes that I need, I have to buy 500 or 600. That costs money."

His amplifiers also employ “Class A power," which, most audiophiles know, is a particularly pure form of power, but it also makes an amp run very hot. “You have to use parts that can work in a very hot environment," he says, “and these parts are very expensive, too."

His costliest product, the $30,000 ML-2 vacuum-tube amp, uses “single-ended" circuitry - a type of design known to be seductively gorgeous in the middle octaves of music but a bit thin in the highs and limp in the bass. The ML-2 has the lushness of most single-ended amps but also sweet, strong highs

and staggeringly deep bass, because Shushurin designed a special transformer that keeps all the frequencies at the same level. "`There is no transformer like this," he says. "This transformer alone costs more than most whole amplifiers.

"All of this is a pain," he moans. "It takes a lot of time, a lot of trouble, it's expensive for me, it's expensive for consumers. But what else am I supposed to do?"

High-end audio has a trade exhibition every January in Las Vegas, as an obscure subset of the Consumer Electronics Show. While multibillion-dollar empires like Sony and Microsoft unveil their latest advances in television and Internet technology in the vast caverns of the Convention Center, the cottage industries of the high end get together in a maze of small hotel rooms to display how well their new wares play music.

In January, Shushurin shared one of these rooms with Kharma Loudspeaker, a company from Maryland, plugging his L1 preamp and ML-2 amplifier into Kharma's $65,000 Exquisite Reference speakers. (Kharma holds the distinction of having built the most expensive speakers in the world - a $1 million-per-pair model, commissioned by a tycoon in Belgium.)

Generally, though, this one-of-a-kind extravagance aside, Kharma, like Lamm, is not alone in the stratosphere. Dave Wilson, head of Wilson Audio, has been making loudspeakers in the high-five-figure price range for many years. The Wilson X-1 Grand Slamms, at $79,000 a pair, move out of his factory in Provo, Utah, at the rate of six a month. The pair he had on display in Las Vegas was serial-marked Number 507. Steve Jobs of Apple Computer owns a pair. Jim Clark of Netscape has two pairs. A lot of New York stockbrokers spend their bonuses on X-1s. "I sell more of these in New York than I do in any country," Wilson says.

A former recording engineer with his own (now defunct) small label, Wilson, somewhat like Shushurin, started building equipment in his garage. That was in 1973. Now, at age 55, he employs 57 workers, supplies dealers in 42 countries, and builds four models of loudspeakers, of which, incidentally, the X-1 Grand Slamms are not the most expensive. (A pair of Wilson Wamm VIIs goes for $225,000.)

Still, the idea behind the enterprise, the fanatical pursuit of perfection, hasn't altered a bit. Ask Wilson how it could be - and why, to what end – that speakers can be so expensive, and he'll show you. "The major goal of designing a speaker," he starts off, "is to make the enclosure" - the cabinet that holds the thing together – "vibrate as little as possible." Most speaker boxes vibrate at certain frequencies, matching musical notes and harmonies. "If you're playing a record, and it hits that note, you hear that vibration as a lack of purity in the music."

So Wilson makes his cabinets from composite materials, tested in brutal fashion. He takes a piece of the material being considered, hits it with a pendulum carrying a 2-pound steel ball, then measures the vibration with sophisticated laboratory gear. After much experimenting, he settled on high-density phenolic, a plastic with a fiberglass matrix that happens to cost 15 times as much as the medium-density fiberboard used in most high-end speaker cabinets. Each X-1's cabinet contains 270 pounds of the stuff. The speaker cones - the tweeter, woofer, and midrange drivers that produce the actual sounds (all of them custom-built) - are encased in a machined, concrete-filled baffle that weighs 48 pounds. Various ceramic materials are also employed here and there to dampen any extraneous vibrations. "The only vibrations should be those of the musical instruments," Wilson insists.

Most high-end manufacturers aim for more "affordable" products – a term-of-art roughly defined as anything with a four-figure price tag. Paul Hales, who owns the Hales Design Group in Huntington Beach, California, makes speakers that cost between $2,000 and $10,000 per pair, but his aims and principles aren't so different from Wilson's.

"The two big things for me," says Hales, who is 34, "are timbre and dynamics" - the tonal colors and textures of an instrument, and how they change in sound when they're played louder or softer. "That's what brings music to life." The trick to getting there, in Paul Hales's case, is better parts, thickly braced cabinets, smooth curves, and sculpted baffles - to eliminate unwanted vibrations, to make for a smooth, open sound.

Every designer has his own methods. ("His" is used deliberately here; the high-end industry is noticeably lacking in "hers.") Anthony Gallo, of Anthony Gallo Acoustics in Brooklyn - only a few miles

from Shushurin - encloses his speakers in spheres, the most vibrationless shape in the universe. Craig Oxford, of Nearfield Acoustics in Brentwood, Tennessee, makes PipeDreams - tall, thin speakers, each with 35 cones, all lined in a vertical array for the ultimate in dynamic ease and a tangible sense that the speakers have vanished and the musicians are standing there, playing right before your eyes.

Back in New York, a month after the Las Vegas show, Vladimir Shushurin is both pleased and nervous. …On the other hand, business in general is not great. And why should it be? Even in these flush times, not many people are in the market for $30,000 amplifiers. Lamm Industries has just seven dealers in the United States – one of them in New England (Goodwin's High End in Waltham) - and another seven abroad; one of them, ironically, is in Russia, the land that treated Shushurin so miserably in his youth but now gives him as many orders as any place else.

Many high-end companies started out just like Lamm Industries - one-man operations working out of a basement or garage. But all the others began heir journeys with equally modest goals, carving out a niche in the high-end market with relatively inexpensive equipment. Then, once they acquired some dealers, capital, and a good reputation, they could afford to expand their production lines and build riskier, costlier gear that reflected the outer reaches of their ambitions and talents.

Shushurin is unusual, perhaps unique, in trying to leap into the business with his ultimate creation - the best he can produce, cost-no-object, and nothing-but - right out of the box. When I note that he might attract more dealers if he offered a line of products - including, maybe, a $1,000 preamp or a $2,000 amp, as a starter unit, something to bring in a broader base of potential customers, to get his name more widely known - he looks at me as if I've suggested sending his daughter into prostitution.

Then he shrugs and lifts his eyebrows a bit. “I am working on a cheaper version of the ML-2," he allows. “It will cost $10,000, maybe $12,000, instead of $30,000. But for me, this is the bottom line." Shushurin will play with “the bass a little bit and a few other things," he says, “but I will not compromise the high frequencies. I cannot create a $3,000 or $4,000 amp and still have serious sound."