Lansche Audio No.7 Loudspeaker

Smitten!

Robert Harley

Loudspeaker designers constantly strive for lower and lower moving mass in their cones and panels, but what would a driver sound like if it had *no* moving mass—or *no moving parts* at all?

The massless driver is the holy grail of loudspeaker design. It's the moving mass of speaker cones, domes, and panels that introduces a whole host of distortions—distortions that designers devote an inordinate amount of time, money, and effort combating. A diaphragm, no matter how light, has inertia that, when it is at rest, makes it want to stay at rest. It's not just the diaphragm that moves in dynamic loudspeakers, but also the voice-coil former, voice coil, and suspension. And when all those parts are moving, they tend to keep moving after the drive signal has stopped. It's not hard to imagine how inertia plays havoc with a loudspeaker's ability to faithfully reproduce music's dynamic structure: Transient leading edges are not as steep as they are in life, and notes don't end as quickly and cleanly as those produced by live instruments. Moreover, loudspeaker drivers misbehave in a whole host of other ways—breakup modes, temperature-dependent dynamic compression, non-pistonic motion, non-linearity at high excursions, and magnetic eddy currents, to name just a few. To be sure, great advances have been made in these areas during the past twenty years, particularly as a result of exotic-materials technology. But at the end of the day, we're still listening to cones, domes, electrostatic panels, or ribbons moving back and forth.

Enter the corona-plasma tweeter, a device that produces sound with no moving parts. As explained in more detail in the sidebar, an electric arc stretching between two electrodes causes the air around the arc to become ionized. By modulating the arc with an audio signal, the ionized plasma around the arc is made to expand and contract, creating sound—no diaphragm, and no diaphragm-induced distortions.

Plasma transducers have a long history dating back to 1900(!) but have never gained much traction in audio (see the sidebar). One company committed to the technology is the German firm Lansche Audio. The speaker company bought the rights to a corona-plasma tweeter in 1999 and has since offered many loudspeaker models built around this exotic driver. Lansche redesigned the corona-plasma tweeter in 2006, and currently every product in its lineup is based on this unique driver.

After hearing something quite special from the second-to-top-model Lansche No.7 loudspeaker at the 2012 CES, I asked for a review pair. The No.7 is a three-way, seven-driver system employing four 8.7" woofers, two 4" midranges, and the horn-loaded corona-plasma tweeter in the baffle's center. The $108,000 No.7 is a tall, narrow design finished in exquisite woodwork. It is distinguished from conventional loudspeakers by the side-panel vents that are required to cool the corona-plasma tweeter and its integral electronics. The No.7 also departs from typical loudspeakers by incorporating an AC power jack (the corona-plasma tweeter needs a power source) and a rear-panel on/off switch. The rear panel also houses dual ports (the woofers are reflex-loaded), two sets of binding posts, and small jumpers that allow you to adjust the woofer and tweeter levels, respectively. The woofer adjustment is limited to flat or a 3dB cut, and the tweeter level can be set flat, increased by 1dB, or cut by 1dB or 2dB.

Lansche has fitted the narrow enclosure with outrigger "pods" that not only stabilize the loudspeaker, but allow for fine height adjustment. You simply turn the knobs to raise or lower each corner until the loudspeaker is level. The pods also incorporate vibration isolation, although I found that placing Stillpoints Ultra 5 Isolators beneath the pods rendered a significant improvement in sound quality.

The corona-plasma tweeter is crossed over at a lowish 2.5kHz, meaning that a significant portion of the audio spectrum is

reproduced by this transducer. The dual 4" midranges handle the range from 200Hz–2.5kHz. The crossovers feature a wide range of slopes, all the way from third-order (woofer low-pass) to first-order (tweeter high-pass), and all are made from premium components such as Mundorf, Duelund, and EPCOS capacitors. The tweeter high-pass circuit comprises a single Dueland CAST capacitor. This Danish capacitor is quite exotic and expensive, and its makers claim that it is the world's best for audio applications.

The No.7's enclosure is fabricated from a composite that combines MDF with a ceramic material, coated internally with heavy foam. The large enclosure is reinforced with seven horizontal braces and two vertical braces, then veneered with gorgeous wood (the review samples were Indian Applewood). A knuckle-rap test on the side panels reveals an enclosure that is less inert than that of many six-figure loudspeakers. Sensitivity is a highish 92dB, but the No.7 is harder to drive than the sensitivity would indicate.

When powered on, a pinkish-blue glow can be seen in the tweeter horn's throat. This light is created by the corona discharge between the two electrodes of the corona-plasma tweeter. The metal horn and the surrounding baffle get rather warm from the intense heat inside the driver. A corresponding blue Lansche logo at the baffle's bottom illuminates when the loudspeaker is powered on.

Lansche's U.S. importer Brian Ackerman of Aaudio Imports visited for the setup. We positioned the No.7 in the usual spot in my listening room, about 85" from the rear wall (measured to the front baffle), a location that has never failed to deliver smooth bass. Toe-in was moderate, with the speakers' axes crossing a few feet behind the listening position. We found that sitting farther away from the No.7 made the sound more coherent, so I moved the listening couch about a foot toward the back wall.

Listening

As Nelson Pass said of his massless "ion-cloud loudspeaker" described in the sidebar "[the speaker] gave new meaning to the word 'transparency.'" And so it was with the Lansche Audio No.7. This loudspeaker's midrange and treble reproduction was absolutely sensational, and different from that of conventional loudspeakers, whether cone, electrostatic, or ribbon. The Lansche simply disappears as a sound source, not just spatially (which it, along with many other great loudspeakers, does), but also *mechanically*. By that I mean the physicality of the loudspeaker's operation—the mechanism by which is creates sound—disappears, replaced by the physicality of the instrument it is reproducing. It's the kind of sound that produces a "fool-you" realism of timbre, as well as "fool-you" palpability and immediacy. There was an ethereal character to the sound, as though the music existed independently of any electro-mechanical contrivance—"conjured out of thin air" to use Jonathan Valin's wonderful description.

These qualities were nothing short of magical on female vocals, particularly with LP playback. Jennifer Warnes' voice on *The Hunter* (Impex LP reissue) crossed a threshold from sounding present to startlingly lifelike—almost eerily so. So great was the reduction in coloration that the impression of being in the same room with another human being was suddenly and vividly unmistakable. For some reason, trumpets were also particularly well served by the No.7. They were reproduced with a full measure of treble energy, sheen, blat, and dynamism, but without the hardness of timbre that we've become accustomed to in reproduced music. This sheer realism of trumpet sound spanned a wide range of instruments and recordings. Listen, for examples, to the stunningly recorded muted trumpet on Count Basie's *88 Basie Street* (engineered by the great Alan Sides), Roy Hargrove's liquid tone on Jimmy Cobb's *Jazz in the Key of Blue*, or Conti Candoli's burnished flugelhorn on the Chiz Harris CD *Confirmation* (which I recorded live in the studio to two-track). On each of these instruments, the timbre was vivid yet at the same time smooth. In fact, despite an overall presentation that leaned toward a lively treble balance, the No.7 was remarkably relaxed and unfatiguing. I think that the No.7's reproduction of trumpet was so beguiling because the loudspeaker didn't add a glare to the instrument the way most conventional loudspeakers do. A trumpet has a complex harmonic structure with lots of energy in the upper partials, characteristics that exacerbate the audibility of treble distortion in conventional drivers. With this distortion non-

existent by virtue of the corona-plasma driver, I was able to hear a more natural rendering that, although lively in treble balance, sounded more like the way a trumpet sounds in life—a rich density of high-frequency energy without the edgy glare.

The treble had the wonderful quality of being highly resolved without sounding bright. The No.7's reproduction of cymbals, and of brushes on snares, was revelatory. The corona-plasma tweeter beautifully resolved the transient detail of the stick hitting the cymbal, the shimmer that changes character slightly as it decays, and then revealed the finest inner detail at the end of the decay. This lack of smearing of fine transient detail was spectacular and alone worth the price of admission. When combined with the top-end openness and transparency, this treble resolution produced a stunningly lifelike feeling of actually being in the same room as the instrument. All these qualities were taken to their ultimate when the No.7 was driven by the 18W Lamm ML2.2 SET amplifiers. This combination produced perhaps the greatest midrange and treble realism and palpability I've heard in my home, but it's not a combination I would recommend. The No.7 isn't quite the right load for the ML2.2; the bass was soft and dynamics somewhat compressed. (The Stella Utopia EM is a much better match for the ML2.2.) I spent a brief time with the No.7 driven by the ML2.2, but most of the listening was through the outstanding Rowland 725 monoblocks.

The No.7's transparency to sources was so high that I could easily hear very fine differences in recording techniques, microphones, and microphone placement. The differences in spatial perspective, separation of instrumental lines, clarity, and timbre between recordings were amplified. Great recordings were revealed in all their glory, but poor recordings were left with nowhere to hide. This is what a loudspeaker should do, rather than impose a sameness over a range of recording qualities. This observation confirms my view that this is one highly transparent and un-editorializing loudspeaker.

These impressions were made with the corona-plasma tweeter attenuated in level by 2dB via the rear-panel jumpers. At the flat setting I thought the treble was pushed too far forward. This not only made the speaker sound a bit bright, but also caused the midrange to sound somewhat subdued and "hollow" by juxtaposition. Moreover, the upper midrange through the top treble had a bit of a "silvery" tint. That is, timbres were overlaid with a luster that was not entirely natural. It wasn't the typical sound of a hot dome tweeter in which the sound is simultaneously hard and bright, but rather it exhibited just a hint of gloss without the hardness. These characteristics were ameliorated by reducing the tweeter level, although the treble still had a tiny hint of the "silvery" character mentioned. It wasn't offensive the way an aggressive dome tweeter can be, but rather it sounded like an extra measure of an instrument's natural brilliance—like a violin that naturally sounds brighter than another, equally fine instrument. I must stress that this description of the treble is by no means pejorative; the top end was stunningly great, with a slight bias toward incisiveness.

As impressive as these virtues are—and believe me, they are glorious—they present quite a challenge to the designer. Specifically, How do you create a full-range loudspeaker around a massless tweeter without the system sounding discontinuous? How does the designer hand off a treble that is so transparent and ethereal to a cone midrange, and then to a cone woofer, and still achieve some semblance of coherence from the full-range loudspeaker?

The answer is that Lansche has done a masterful job of creating a complete system that is seamless from top to bottom. The wonderful treble integrates well with the midrange, which then blends into the bass, without any abrupt changes in timbre or dynamics. That, in itself, is an amazing achievement. But that coherence comes at a price, namely that the No.7 has a "light" character that favors quick reflexes and transient fidelity at the expense of weight, heft, punch, and gravitas from the lower midrange down through the bass. The corona-plasma tweeter crosses over to two 4" midrange drivers (made by Audio Technology in Denmark) that were specifically designed to integrate with the massless tweeter. The midrange drivers have very light diaphragms, and based on the appearance of the surrounds, not much excursion. These two drivers reproduce the range from 200Hz to 2.5kHz, a range that encompasses much of the body and weight of instruments as well as their dynamic expression. It's asking too much of a pair of 4" drivers that have been optimized to blend with a massless tweeter to deliver the visceral, whole-body involvement that many other loudspeakers in this price class offer as a matter of routine. They simply can't move

SPECS & PRICING

Driver complement: Four 8.7" woofers, two 4" midrange, one 0.3" corona plasma tweeter
Crossover frequencies: 200Hz, 2.5kHz
Loading: Reflex
Frequency response: 25Hz–150kHz (+/-3dB)
Maximum SPL: 114dB/1m
Sensitivity: 92dB 1W/1m
Impedance: 6.8 ohms nominal, 4.9 ohms minimum
Dimensions: 12.5" x 69" x 24"
Weight: 286 lbs. each
Price: $108,000 (as reviewed with gloss finish)

AAUDIO IMPORTS (U.S. Distributor)
4871 Raintree Drive
Parker, CO 80134
(720) 851-2525
aaudioimports.com

ASSOCIATED COMPONENTS
Lamm ML2.2 power amplifiers; Jeff Rowland Design Group 725 amplifiers, Corus preamplifier, and Aeris DAC; Berkeley Audio Design Alpha DAC Series 2; iMac server with Berkeley Alpha USB interface; Basis Inspiration turntable with Basis Vector 4 tonearm, Air Tight PC-1 Supreme cartridge; Aesthetix Rhea Signature phonostage; Simaudio Moon 810LP phonostage; Shunyata Triton and Talos AC conditioners, Audience aR6TS power conditioner; Shunyata CX-series and Zitron Anaconda AC cords; Audience Au24 and PowerChord AC cords; Shunyata Anaconda interconnects and loudspeaker cables; AudioQuest Diamond USB digital cable; AudioQuest WEL Signature interconnects, Transparent XL Reference interconnects; Transparent XL Reference loudspeaker cables; Stillpoints SS equipment racks, Stillpoints Ultra SS and Ultra 5 isolation, ASC 16" Full-Round Tube Traps. VPI 16.5 record-cleaning machine; Mobile Fidelity record brush, cleaning fluid, stylus cleaner

enough air to convey the full measure of a cello's rich sonority, the "purring" quality of a Fender Precision Bass, or the dynamics of that Fender bass as the attacks of the bass notes lock-in with the kick drum to create powerful whole-body involvement.

Similarly, the woofers have been designed to blend with the lightweight midranges. The challenge of integrating the tweeter with the midranges has a parallel in the transition between the two 4" midrange drivers to the four 8.7" woofers. Again, the approach has been to value coherence and a seamless transition over ultimate weight and authority in the bass. The bottom end, although satisfying on much music, didn't have the weight, power, and dynamic impact that one normally expects from a six-figure loudspeaker. Orchestral climaxes were diminished in intensity, sounding lighter than life or than comparably priced loudspeakers. Timpani lacked the startling sense of musical punctuation as well as the center-of-the-earth solidity in the bottom end that is available in far less expensive loudspeakers. Don't expect to feel an orchestra's physical power, the visceral thrill of unfettered dynamic impact on orchestral climaxes, the feeling of a kick drum's attack striking your chest, or the body-involving rhythmic power of rock. That's not the No.7's forte.

The bass was, however, highly articu-late, tight, and precise, with outstanding pitch definition and good resolution of smaller-scale dynamics such as subtle rhythmic inflections on acoustic bass. The bottom end became progressively more weighty as the frequency decreased, making up somewhat for the lighter presentation through the upper bass and lower mids. In fact, it is remarkable how seamless and coherent the No.7 is when considering just how different the octave from 40Hz-80Hz sounds compared with the top octave. Despite the profound change in the nature of these frequency extremes, I was unable to identify any transitions within that continuum.

I should emphasize that the overall tonal balance isn't thin, lightweight, or threadbare. Rather, the No.7 simply lacks heft and oomph, particularly when the music is big and dynamic.

Lansche has not only made wise tradeoffs in this design, but has also executed those tradeoffs masterfully to produce a remarkably engaging and involving overall sound. The glorious midrange and treble could have easily been rendered irrelevant by a presentation in which the bass sounded like a detached weight lagging behind the music—a constant reminder that the listener is hearing a loudspeaker. It's a testament to this design that the whole thing works so well. I was never aware that the No.7 features a radical mixture of technologies—I simply enjoyed music immensely through them. The No.7's presentation is powerfully compelling, and exquisitely beautiful in a way that most loudspeakers are not.

An experienced listener who visited used an interesting word to describe the No.7's overall character: "feminine." It fit perfectly: lithe rather than muscular, emotional rather than visceral, affable rather than assertive—and delightfully charming.

Conclusion

With its massless corona-plasma tweeter, the Lansche No.7 ventures into rarely charted territory. This driver has many compelling virtues including world-class transparency, airiness, lack of hardness and grain, and the ability to make instruments and voices sound eerily lifelike. It simply sounds unlike other loudspeakers, bringing music to life in a way that's wonderfully enjoyable.

The tweeter is not only at the speaker's physical center; the entire design flows from this transducer's dictates. That means coupling the massless tweeter to small and lightweight cone midranges to avoid an audible discontinuity. The woofers, in turn, must then be matched and tuned to the midranges. The result is a loudspeaker that forsakes weight, power, slam, and big dynamic contrasts for a seamless and coherent overall sound that doesn't detract from the tweeter's magic. It's not just a wise tradeoff, but one that's been beautifully executed. The No.7, remarkably, sounds "of-a-piece." But it's not a loudspeaker that will satisfy all tastes.

Nonetheless, I can't imagine anyone sitting down in front of the No.7 and not being as captivated and charmed by its unique allure as I was. tas

A Brief History of the Corona-Plasma Driver

In 1900, British physicist William Duddell examined the phenomenon of unwanted sound emitted by the new technology of incandescent lamps. These lamps would buzz, hiss, or hum when an electric arc was created between two charged electrodes. The arc caused the surrounding air to become ionized, creating a small field of plasma around the arc. Variations in the arc's strength caused this plasma field to expand and collapse, modulating the air surrounding it and producing sound. (The same principle creates thunder from lightning.) Duddell exploited this phenomenon, driving the arc with a tuned electronic circuit connected to a keyboard. He called his creation the "Singing Arc." Duddell demonstrated what must surely be the first electronic musical instrument by playing *Rule Britannia* before the London Institute of Electrical Engineers.

But the plasma transducer was impractical compared with ribbons, electrostatic panels, and moving-coil drivers, and the technology was largely forgotten until the 1950s when it enjoyed a renaissance. Between 1955 and 1957, several articles about the "Corona Wind Loudspeaker" were published by its developer, Dr. D.M. Tombs, in a variety of magazines including a technical paper in the *Journal of the Audio Engineering Society*. Tombs later sold his Corona Wind Loudspeaker to one Gerald Shirley who planned to turn it into a commercial product. The burgeoning field of hi-fi in the 1950s encouraged others to experiment with this "lost" technology. In 1954 DuKane began perfecting a plasma transducer based on a French design, and six years later demonstrated a production loudspeaker at a New York hi-fi show. The "Ionovac" went out of production less than a year later, with about 1600 units sold. In 1965 a company called Fane Acoustics created a reproduction of the Ionovac. The company produced a complete loudspeaker system based on the plasma transducer (with a 15" woofer and 5" midrange), and also licensed the driver to other companies. None of these designs was successful in the marketplace.

Perhaps the most famous application of plasma drivers to music reproduction is the Hill Plasmatronics loudspeaker. Created by Sandia National Laboratory physicist Dr. Alan Hill (who for many years lived just a few miles from me), the Hill Plasmatronics Type 1 loudspeaker was the first commercially available plasma loudspeaker. The Plasmatronics' operating principle was a little different: the transducer required a supply of helium (the helium was ionized rather than air), and was based on the "glow discharge" principle rather than corona-plasma discharge. The Plasmatronics created quite a stir for a couple of years, but very few were sold owing to the high price and the requirement that the user periodically replace the large helium cylinders.

Nelson Pass explored massless driver technology in his "ion-cloud loudspeaker" of the early 1980s. Although not a corona-plasma driver, it is one of the very few massless transducers. Here's his explanation of the device. "The 'ion-cloud loudspeaker' used photocopy-machine ionizing nichrome wire strung in a flat array a bit like a window screen, but with more space between the wires, and charged to a variable DC potential of about 10kV. This screen developed a layer of ionized air [around it], and was enclosed between two stators, much like an electrostatic speaker, except that instead of a charged plastic diaphragm, you had a charged semi-flat layer of gas, and you could push-pull it with high AC voltages on the stators.

"It worked fairly well, and gave new meaning to the word 'transparency'.

"It also had several flaws, one of which did result in a trip to the local emergency room with breathing problems similar to those sometimes experienced by arc welders and caused by extended exposure to ozone. The *Wall Street Journal* printed my comment: 'It was the perfect high-end audio product: Exotic, inefficient, expensive, unavailable, and toxic.'" (Pass experienced breathing problems because of the large amount of ozone that the speaker created, and the fact that he was testing the loudspeaker in an unventilated room. This is *not* an issue with the Lansche's corona-plasma tweeter.)

At about the same time as Pass' ion-cloud loudspeaker, a German named Otto Braun developed a self-contained module based on the Ionovac that included a corona-discharge element, a vacuum tube, transformer, and electronics, along with a small horn to more efficiently couple the pulsating plasma to the surrounding air and increase the device's sensitivity. Braun sold the rights to the "Corona Acoustic" driver to Rüdiger Lansche in 1999, who has been incorporating corona-discharge tweeters in commercial loudspeakers ever since.

This is by no means a complete history; a number of other inventors toyed with massless loudspeaker drivers, but few were commercialized. It's a shame, because the technology is quite intriguing. **RH**