

sound technology

David Hewitt

sparstech



Come Out on the Road

I started out as a studio engineer many years ago, but I was hijacked by a remote truck and never looked back. The immediacy and excitement of live music still captivates me to this day. One of the most enjoyable things about working in the field with so many different acts for short periods of time is the sheer number of great people you get to meet and work with.

I've had the pleasure of hosting some of the best engineers on the planet in our remote trucks over the years. Some of them already have great chops for live work, and some have had very little exposure to the chaos of live work.

What I'd like to do in this article is encourage everyone to get out on the road more often. No matter what your job description might be, participating in a live show, even from the sidelines, can be a real boost to your enthusiasm for the career you chose.

Especially if you are involved in post work that has live music content, it behooves you to get out on location to see how it's done. This works to everyone's advantage because you may be able to impart some wisdom to the live engineers about post problems.

There are many ways to do it right and even more ways to do it wrong. Besides, it's fun to see all

the geek gear the video guys bring to the party. For you studio folks, it might surprise you how advanced the audio section is on modern entertainment video trucks. It's amazing how much gear you can pack in a space 8x8 feet or less. Watching a pro production mixer, like Ed Greene at the Oscars, handle several hundred inputs and outputs live to air will make your hair stand up!

Things are generally a little calmer over in our audio-only remote trucks. We usually deal only with the music elements. Of course, that may mean 10 bands in a row! You do have to scramble to keep up. Our Classic Silver Studio has the big Neve VR with recall and Flying Faders snapshots, and that works well when you have time to reset. But if you want instant global reset, our new White Truck with a pair of Yamaha DM-2000s is the ticket. The Neve works best for projects like Neil Young's recent film, *Heart of Gold*, and the Yamaha for TV shoots like Jazz at Lincoln Center's Gala, where you have maybe a dozen different sets.

One of my concerns over the years has been proper documentation of the media. At Remote Recording, our trucks are equipped with software to quickly document all the relevant information for

(continued on page 66)

soundInnovations: the manufacturer's view

Efficiency and Accuracy By Design Electro-Voice DVX Woofers

by Alan Babb

The DVX Series is the latest generation of high-performance woofers from Electro-Voice (EV). The story begins in spring 2005, when EV launched its ZX5 as the "world's most versatile loudspeaker": a 2-way portable powerhouse capable of filling large spaces with concert-quality sound, all while weighing in at less than 50 pounds.

Word spread quickly. The motor behind EV's offering was built into the ZX5's sleek molded enclosure: the EV DVX-3150—a brand-new, 15-inch woofer, based on the all-new DVX platform. It's not often that an experienced team of engineers is given a blank piece of paper and asked to develop a product that represents the very best in all aspects, without compromising on a single detail. With DVX, that was the mission. The DVX-3150 features an all-new cone and surround structure for very low distortion and high excursion, along with an all-new frame and motor structure for high output with very low power compression.

Having impressed everyone who heard it in the groundbreaking ZX5, the DVX concept soon materialized again in the X-Line Very Compact, the latest and smallest of the EV

line-array family. Shortly after the launch of X-Line Very Compact and its 12-inch DVX-3120 woofer-equipped, XS212-LF cabinet (the sub element in the XLVC line), the phone calls began: "The XS212-LF sounds incredible for its size, with tons of power. Are these speakers going to be available in the XLC medium-sized line-array format?"

EV has always listened closely to its customers, and these questions became the impetus for EV's engineers to put DVX at front and center in their transducer program, the result of which was the development of a brand-new, 12-inch LF driver, the DVX-3121, and a new mid-bass driver, the DVN 6.5-inch.

Which brings us up to date. Both speakers made their debut at InfoComm 2006 inside the XLC127DVX 3-way, full-bandwidth line-array element, based on the world-renowned XLC127+. The DVX-loaded XLC has all the sonic signatures that made its predecessor a favorite, but with extraordinary power handling and performance specs that surpass those on many full-sized line-array offerings.

So how was all this achieved? Allow me to explain some of the "sound innovations" behind the DVX concept, at the drawing board

stage and beyond. Woofers, like all loudspeakers, are governed by a complex melding of disciplines: mechanical engineering, electrical engineering, physics and acoustics. The DVX line has been optimized in all of these areas using the latest technologies. First of all, the DVX magnet structure, the motor that works with the voice coil to provide the drive force to the woofer, was optimized for strength, stability, travel and linearity. Nonlinearity in a speaker's magnetic field or suspension not only leads to added distortion but also greatly impacts the life expectancy of a speaker.

For example, if you have a speaker motor that is stronger when the cone is moving out of the basket than when moving in, the speaker will tend to offset itself to the outside. Since the suspension of the speaker (the surround and the spider) can only move a finite distance in either direction before being damaged, you are going to stress these components more in one direction than the other. It also makes the speaker limit (stop moving) too quickly in one direction, and that means you lose sensitivity and increase distortion. To further compound this problem, the magnetic field generated by the voice coil can cause the field of the permanent magnet to modulate. This is the

(continued on page 66)

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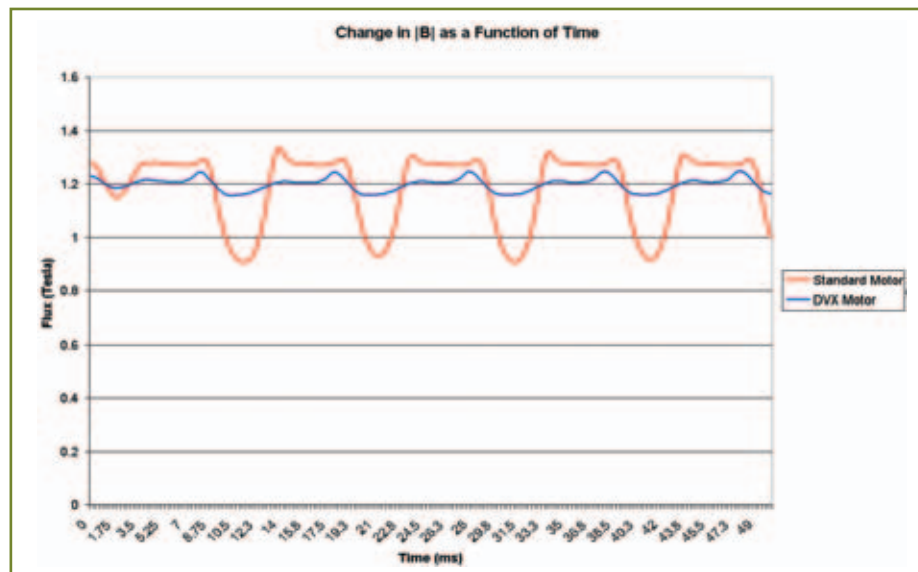
Innovations

(continued from page 59)

equivalent of your car motor losing power many times a second. It would be difficult to have a smooth, controlled speed ride.

To solve this problem, the woofers in the DVX line have been optimized via extensive computer FEA (Finite Element Analysis) to have linear magnetic fields that do not overly modulate. With the aid of a laser displacement measurement system, we can also optimize the suspension to not only have the right stiffness but also to stop the cone motion in a smooth and controlled fashion when the speaker is pushed to extremes. What does all this mean to the prospective customer? Quite bluntly, it means less distortion under normal conditions and no rude noises when the speaker is overdriven.

Another problem common to woofers is that the voice coil of the speaker, like any coil of wire, has an inductance. Place a hunk of iron inside a coil and you get even larger inductance. In speaker terminology, we call that hunk of iron a "pole piece"; every speaker has one. Most people understand the problems caused by inductance at high frequencies. Engi-



Graph plotting the variation in the strength of the magnetic field in the motor gap vs. time, using a DVX motor structure and a conventional ceramic motor structure. Drive signal: 75V pk at 100 Hz.

neers take advantage of inductance all the time in crossover design. The problem with inductance in a speaker is as follows: As the cone moves outward, it moves out of the magnetic circuit and the pole piece is no longer inside as much of the coil as when the cone is moving inward. This asymmetry in the inductance also causes an offset of the speaker's center position, just like a nonlinear magnetic field or suspension. Besides negatively impacting the life expectancy of a speaker, this asymmetry causes

distortions that are particularly audible and offensive.

To combat this problem, the DVX woofer uses multiple approaches. First, we computer-modeled the magnetic structure and optimized the geometry to eliminate asymmetries. After the FEA phase prototyping, the tests and measurements began. The use of multidimensional

measurements using acoustic and laser data further sped perfecting the design so we could very quickly identify areas to improve and the solutions. This enabled a final design that is far superior to using traditional design methods.

Unfortunately, you cannot simply eliminate the pole piece from the equation, so we did the next best thing. We have put a conductive but non-magnetic ring inside the magnet structure. Sometimes called a Faraday Loop, this shorting ring blocks the field from the coil that would interact with the iron core, without affecting the DC or static field generated by the large ceramic magnet of the motor structure. Another benefit is that it also counteracts the modulation of the static field that can be caused by the field generated by the voice coil.

At the end of the day, of course, all this adds up to a superior-sounding loudspeaker. DVX goes to show that there is still room for improvement in the world of loudspeaker design. It's not just about the greater overall output. In DVX, the level of sonic clarity—even for an arena-size system running extremely high SPLs—is unprecedented.

Alan Babb is a transducer engineer for Electro-Voice.

For a more highly illustrated version of this story, visit www.prosoundnews.com and click on "web bonus."

Soundcheck doesn't have to be so painful.



The great thing about the Aviom system is that it puts control in the musicians' hands. The units are easy to set up and troubleshoot, and they function great in day-to-day use. As a musician and engineer myself, I couldn't ask for more.

Matthew Peskie, Jars of Clay
Production Manager

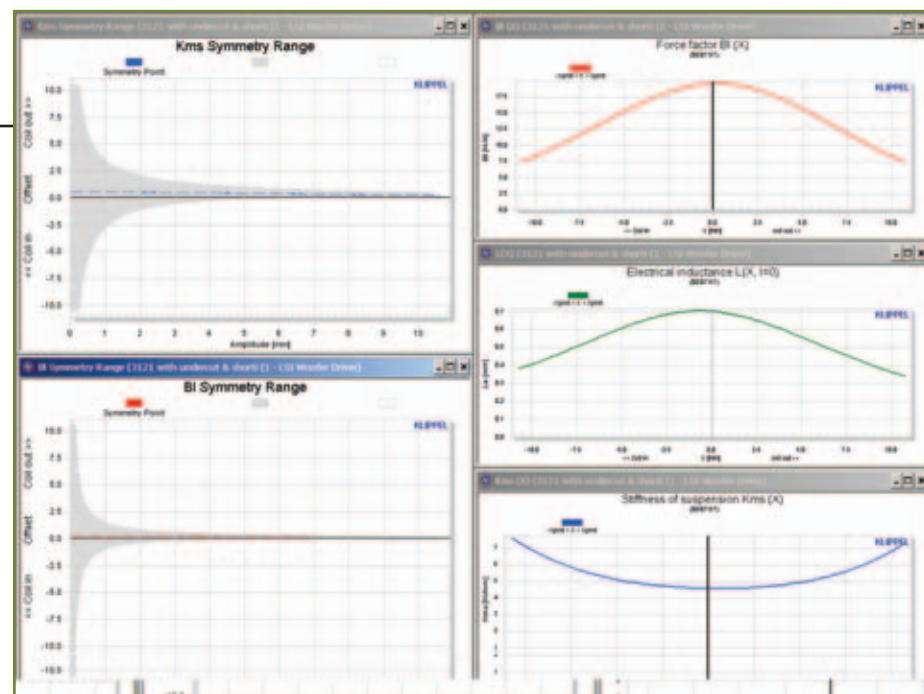
Musicians and engineers alike know that, even under the best of circumstances, soundchecks can be tedious and frustrating. By giving performers the ability to adjust their own monitor mixes, Aviom's Pro16™ Monitor Mixing System guarantees a smoother, faster soundcheck—with better results in less time.

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To learn more about Aviom's solutions for Live Sound, visit www.Aviom.com

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The Klippel measurement system is used to measure the symmetry of the magnetic field, the compliance of the suspension and the inductance.

SPARS

(continued from page 59)

many different formats. These days that's a lot, and it's getting increasingly difficult to find a place to store a paper trail of data. Our technician, Phil Gitomer, insists on having track sheets and take sheets for every drive or disc. How many times have you had a hard drive or tape show up with no documentation? Without wasting time mounting it and playing the material, you have no idea what's there.

Sometimes it's hard to get accurate information to document. Rehearsal time for live shows can be short or nonexistent. Getting titles for classical music movements without a score, improvisational jazz, or artists and production people that won't give up a set list (or who even change it without telling audio), and these days, even guns on stage are all elements that make obtaining this information difficult. I

would be very interested to hear from you post guys about what you like to see for documentation. What happens to the paper documentation? Does it get used or tossed? Would you like to have a CD with the docs on it?

Anyway, back to the theme about getting more people involved in the production of live shows and the business of recording them. One of the ways might be for you to attend a SPARS meeting in your area. I try to make them all, gigs permitting. You might just meet some interesting people and learn something from their forums. Karen Brinton is more than just Remote Recording's boss; she is the current president of SPARS.

David Hewitt is chief engineer and president of Remote Recording in New York City.

Membership in SPARS, the Society of Professional Audio Recording Services, is open to studio owners, producers, engineers and anyone else involved in professional recording. For more information, contact the organization at 800-771-7727, or visit www.spars.com.