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## An Interview With The Sages Of Wisdom Audio

Danny Richelieu

At the 2007 CEDIA Expo, Wisdom Audio introduced the attendees to their new Sage Series, receiving rave reviews from dealers and press on their limited demonstrations. In May 2008, Wisdom Audio began shipping the Sage series to dealers around the country. To mark the release of the loudspeakers, Mark Glazier and Jon Herron agreed to sit with us for an On Screen interview.

For those who are not familiar with Wisdom Audio, it was founded in 1996 by Tom and Debi Bohlender, with a mantra to deliver high-performance loudspeakers based on thin-film planar magnetic technologies in a line-source configuration. Within a year they had released their first products,



Mark Glazier, Wisdom Audio President

the M-50 Monopole and the D-75 Dipole. At the 2005 CEDIA Expo, Wisdom introduced their first in-wall concept using planar magnetic transducers, one of the starting points for what would eventually help fill out the Sage Series.

Mark Glazier is President of Wisdom Audio. He has been associated with the design, manufacture, marketing, and sales of audio products for more than 30 years. He is most well known for his 21 years at Madrigal

Audio, an industry-leading and award-winning manufacturer of high-end consumer electronic products, which eventually became a division of Harman International. For 16 of those years Mark served as president, focused on the development of worldwide sales and marketing efforts for their Mark Levinson, Proceed, Revel, and Audioaccess consumer audio/video and custom installation brands. Mark was a principal architect of the company's sales and marketing strategies, managed domestic and international distribution to over 40 countries, created customer support policies, contributed to product evolution strategy, and mentored and directed team development. Prior to Madrigal, Mark was engaged at Threshold Corporation and Dayton Wright Associates in sales management and production manager roles, respectively. Mark studied psychoacoustics at the University of New York at Buffalo.

Jon Herron, Wisdom Audio Vice President, Sales, brings 35 years of experience in both large and small retail operations, as a manufacturer's representative, and as a manufacturer to Wisdom Audio. Most recently as a national training director at Tweeter Home Entertainment Group, Jon led enterprise-level training and technology initiatives directed at both salespeople and installers. At Madrigal Audio Laboratories, Herron was the product development manager for Mark Levinson, Proceed, and other brands. As the director of sales and marketing of Snell Acoustics, Herron directed the company's efforts into the home theatre business in the early 1990s. Herron has authored a book that has been used as the core product-training program focused on the audio/video category for two industry trade groups in the United States, and is the most comprehensive textbook of its kind. Herron has an economics degree from Dartmouth College.

**Danny Richelieu, *Widescreen Review*:** Radiation pattern is one of the major differentiators between the many loudspeaker designs on the market today. Which route did you go with the new Sage series—point source, line source, dipole, bipole, omnipole,

etc.—and what were the benefits of choosing that type of design?

**Jon Herron, Wisdom Audio Vice**

**President, Sales:** The primary goal of the Sage series is to bring the performance and technology of the earlier Adrenaline series—whose models run from \$35,000 to \$600,000 a pair—to a form factor that today's market would gladly bring into their home. As a result, all Sage models are available in slim freestanding, in-wall, and on-wall forms to meet the varied installation preferences of today's customer.

In order to achieve consistent, reliable results across all models, our dispersion goal is to have wide and uniform monopole radia-



Jon Herron, Wisdom Audio Vice President, Sales

tion patterns. Obviously, dipoles, bipoles, and omnipoles would not be practical in the in-wall or on-wall applications.

As to point source versus line source: we make both. True line sources have some real advantages over point sources, in that they largely eliminate both floor and ceiling reflections, which are the most sonically destructive of all room reflections. Line sources let you hear more of the speaker and less of the room—which is always a good thing. Line

sources also dramatically open up the size of the “sweet spot” since the sound is concentrated where the listeners’ ears are, resulting in a much more uniform distribution of sound in the room. You can sit almost anywhere and each speaker seems equally loud, despite differences in actual distance.

**WSR Richelieu:** Are there any disadvantages to a line source over the other types?

**Herron:** The only real disadvantage is that line sources must, by their nature, be quite tall. Not everyone is prepared to have a 6-foot tall speaker in his or her room, even if it is also quite slim and elegant. Also, their large size also makes them more costly. But the results are quite remarkable. And with in-wall versions available, they almost disappear.

**WSR Richelieu:** From the point of view of a loudspeaker designer, how large of a role does a room’s acoustical properties play in the performance of a loudspeaker system?

**Herron:** The room’s effect on sound quality is huge. If you were to take a “perfect” speaker and place it in a typical room, you would introduce variations of 10 to 20 dB or even more in its frequency response. All serious speaker designers know this fact. Better designs typically have off-axis response that is quite consistent with the on-axis response. This is in an effort to make sure that the reflected energy in the room is as similar as possible to the direct sound. But below about 300 Hz, standing waves take over and the room just makes a mess of things.

**WSR Richelieu:** How can a loudspeaker designer help mitigate this role? Specifically, what can a designer do to better ensure that their high-end loudspeaker system will perform well in varied room environments?

**Mark Glazier, Wisdom Audio President:** We would argue that a high-end installation that does not include some form of room treatment and room correction is inherently compromised, which is why we included the latter in our speaker designs. We also provide advice in our manuals for a range of treatment ideas you can implement by way of improving the room’s acoustics even before you perform room correction.

**Herron:** Failing such a proactive approach, perhaps the best thing a speaker designer can do is to ensure that their on-axis and off-axis response is consistent. If you cannot limit the vertical reflections—which requires a tall line source—you need



Wisdom L75 In-room Sage Speaker

to minimize the response errors vertically as well as horizontally. Unless you are in the near field of the speaker, which is usually within 3 or 4 feet, more than half of the sound you hear is coming from reflections bouncing around the room. A conscientious speaker design pays attention to the polar response of the system to ensure that all these reflections also sound good.

Sage series speakers have excellent, uniformly wide dispersion. The planar magnetic drivers are generating more than half of what you hear, taking over at between 200 to 700 Hz, depending on the model. This results in a coherent sound that more traditional “cone-and-dome” speakers have difficulty managing.

**Glazier:** All Sage series systems include the SC-1 system controller. It is a balanced 7.3 channel in, 14.3 channel out, active crossover—all Sage speakers are biamped—and it also includes Audyssey™ MultEQ® XT room correction. We feel that it makes no sense to build state-of-the-art loudspeakers if you then ignore the room’s effect on their performance.

Note, however, that Audyssey’s room correction is not a panacea. You need to start out with great speakers, since it does nothing to improve many of the most important traits of a great

speaker, such as low distortion, low-power compression, transient performance, and inner detail. But it is extremely powerful and intelligent about correcting problems introduced by the room. Given the magnitude of these problems, it seems naïve not to address them.

**WSR Richelieu:** What does the room correction in the Sage series correct for? Frequency response only, or does it alter the time domain as well?

**Herron:** Our room correction looks at both the time and frequency domains. This is essential, since the time domain is where many of the problems in rooms occur. In fact, some of the latest academic research into the perception of sound indicates that temporal distortions are perhaps the ones to which we as humans are most sensitive—a point that will probably not surprise your readers.

Audyssey’s room correction uses between three and 32 microphone positions to measure what’s happening in the room. It then breaks this information up into hundreds of data points and clusters them according to similarities. This way, it can more

accurately define the problems that are most characteristic of the room, as opposed to those that might exist in only one spot in the room. Their approach allows them to intelligently prioritize their corrections, in both time and frequency domains.

**WSR Richelieu:** What are the benefits of correcting the time domain in addition to the frequency domain?

**Glazier:** Assuming that the speaker has good coherence and transient performance to begin with, correcting for room problems restores imaging precision and transient details in the sound that the room would otherwise obscure. Things sound more “alive” than they would otherwise, and take on a sharper focus.

Of course, the most dramatic difference is in amplitude response. Changing 10 to 20 dB room variations to only a couple dB is not subtle.

**WSR Richelieu:** What are the benefits of using an electronic crossover network?

**Herron:** The benefits are several: the most obvious are greater dynamic range and contrasts, lower distortion, and the practical ability to deliver far superior bass from a small enclosure than would otherwise be practical.

Since each speaker is being supported by two amplifiers, it is a simple matter to make sure that you never “run out of steam,” even in the most demanding movie soundtracks or large-scale music performances. The pros have been doing this for decades, as have audiophiles who wanted the best possible performance.

Distortion is lower for several reasons. The amplifiers themselves are presented with only a limited range of frequencies, making their jobs easier and reducing some of the more audible distortions—IM [intermodulation] distortion, for example. But the speakers also benefit from the separation of amplifiers. For example, any distortion in the bass amplifier cannot find its way to the midrange/ treble drivers. This both makes that distortion less audible—since woofers don’t reproduce high frequencies well—and makes the entire system more reliable. Lastly, the amplifiers are direct-connected to their respective drivers. Eliminating a bunch of capacitors, inductors, and resistors between the amplifier and the driver gives the amp far better control over what the speaker is doing.



Wisdom L75 In-wall Sage Speaker

As for deep bass, there is no cheating on the laws of physics. The only way to get deep bass from a small box is to compensate with EQ and more power. Biamping allows us to apply a lot of extra power at our woofers, which are specially designed to work in this environment. This is the same approach taken by almost every subwoofer on the market today. People prefer smaller speakers, but they still want deep bass. The answer is active EQ and more power.

**WSR Richelieu:** Why are all of the loudspeakers in the Sage series biamped?

**Glazier:** Virtually all Wisdom Audio systems since 1996 have been biamped using an external electronic crossover with some

while allowing appropriate power levels to be applied to each.

**WSR Richelieu:** Do you believe time and phase are audible parameters in a loudspeaker and do you correct for time and phase in your designs?

**Herron:** Absolutely. Fortunately, the nature of our technology requires less “correction” than traditional designs do, as they are naturally more time and phase coherent than cones and domes.

Take the L75 for example: the 48-inch planar magnetic section handles everything from 200 Hz up to around 50 kHz. By its nature, the thin film diaphragm has almost no inertia to overcome, and it is suspended in a

frequencies, the woofers and the planars are essentially in perfect phase with one another. It’s one of the reasons that people respond the way they do to these systems; they come across as completely seamless from top to bottom. Pitch definition in the bass is truly exceptional, and much of that has to do with the time and phase performance of the system.

**WSR Richelieu:** Is diffraction important in your loudspeaker designs?

**Glazier:** Diffraction is always important, much as speaker designers wish it weren’t so. Balancing the effects of diffraction against the realities of building something that people will want to live with in their homes and can be manufactured in a reliable, consistent way is always a challenge.

**Herron:** Interestingly, in most speakers the effects of diffraction are most severe within an extremely narrow window, directly on-axis. As you move off-axis—even by a little bit—the diffraction effects are mitigated because they do not line up in such a way as to reinforce each other.

What this means is that you really should look at a spatially averaged “on-axis” response that looks at a reasonably small window, where the listener is likely to be, rather than at any single point in space. After all, we listen at a minimum of two points in space, one for each of our ears. If you don’t want your head locked in a vise when you listen, you need to broaden your measurement window slightly to get a realistic picture of what’s happening.

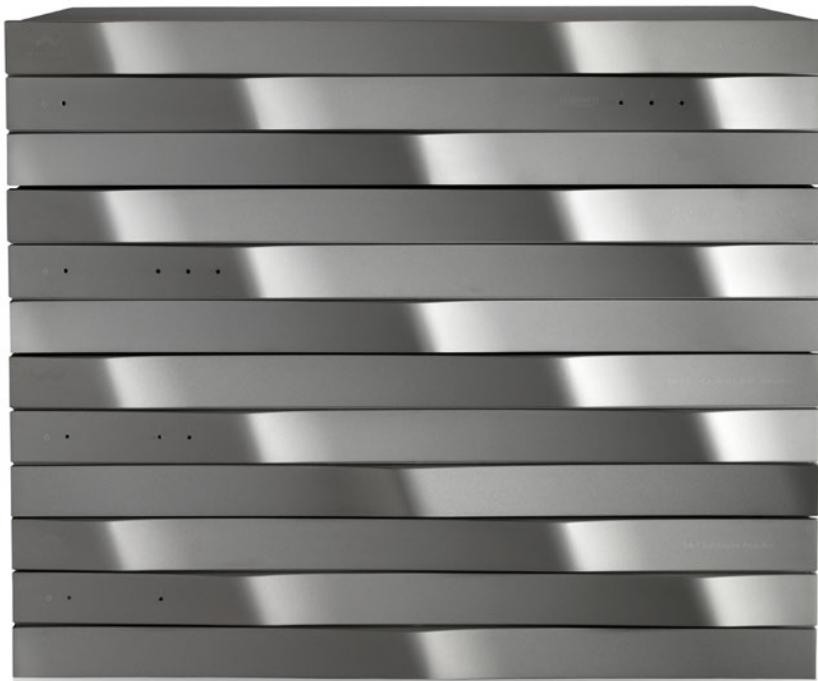
But diffraction is quite real, and quite easily measured and heard. Speaker designers ignore it at their peril.

**WSR Richelieu:** What do your designs use to affect diffraction?

**Herron:** If there is a single “magic bullet” to solve the diffraction problem, we wish someone would share it with us. In our experience, you need to use several complementary techniques to mitigate its effects.

In Sage, we effectively shift the lowest frequency at which diffraction becomes an issue to a higher frequency where the ear is somewhat less sensitive, by making the speakers themselves unusually slim. The ear is most sensitive in the 2 to 3 kHz region. Our slim enclosure allows us to move the first frequency of diffraction problems up to about 6 kHz. By contrast, most speaker enclosures are wider and thus have their first problems quite close to the ear’s most sensitive region.

We then mitigate the diffraction by laminating absorptive material to the front baffle to absorb some of the high-frequency waves that are moving laterally, as opposed to the sound coming directly toward you. At the edge of the baffle, we also include a thick boundary of heavy felt to further absorb the



Wisdom Sage Series Electronics

form of room correction. The Sage series was conceived from the outset in this tradition, allowing us the performance benefits offered by the electronic crossover as well as an opportunity to obtain extended bass response from the small enclosures dictated by architectural installation constraints.

All Sage systems utilize slim metal enclosures for all transducers to achieve similar results across all system variants and to ensure superior, consistent results from architectural installations. In order to achieve extended low-frequency response from woofers operating in small enclosures, equalization is applied, requiring considerable power. The ideal system configuration to address this need is to biamp the system, providing lowest distortion signal paths for the high- and low-pass speaker elements

powerful magnetic field supplied by neodymium magnets. So the film that makes the sound does precisely what it is told to do, without the inertial phase errors of the multiple drivers that usually handle these frequencies. Moreover, this PMD [planar magnetic device] handles everything from 200 to 50,000 Hz or so without any intervening crossovers to introduce distortion, and all from the same film, in the same plane. So it is far more coherent in the time domain than multiple traditional drivers could possibly be.

Of course, the woofers are more traditional—albeit unusually well engineered. But the L75 has four 6-inch woofers with 2-inch voice coils. The acoustic center of the 6-inch woofer is less than 1-inch behind the plane of the PMDs. Compare that to the 5-1/2 foot wavelength of a 200 Hz wave. At those

wave that might otherwise be diffracted at the edge of the speaker.

By these various means, the damaging effects of diffraction are largely eliminated.

**Glazier:** By the way, extensive, real-world measurements bear this out. In addition to our own testing, our speakers are tested at an independent lab. We will be publishing comprehensive data on this and other aspects of the speakers.

**WSR Richelieu:** Do you advocate using identical loudspeakers at each position in a multichannel surround setup?

**Glazier:** Ideally, yes. However, that is not always possible due to the chosen display device.

We have ensured that our systems are closely timbre-matched so that different models can be mixed without degrading the subjective results. Employing identical woofers helps, as does using thin film planar magnetic drivers for all mid and high frequencies in each system. Our planar magnetic drivers are all built using the same design concept and similar expression of materials. Whether they are a line source or a point source design, they sound remarkably similar.

When you add in Audyssey's room correction to minimize room-specific problems due to placement, you get tremendous consistency even when forced to use different models in different locations.

**WSR Richelieu:** How many models are in the Sage series?

**Glazier:** There are currently 15 speaker models, consisting of three basic configurations for main speakers, each of which is available in an in-wall, on-wall, or freestanding version (making nine), plus two center-channel configurations optimized for horizontal placement, also available in all three versions (yielding the remaining six models).

The Sage series also includes a system controller—the active crossover and room-correction piece—and two high-power amplifiers designed specifically for the needs of our bass systems, which use EQ and lots of power to make up for their small enclosure sizes.

**WSR Richelieu:** How well do the in-wall, on-wall, and in-room Sage loudspeakers perform tonally with respect to each other?

**Glazier:** You can freely mix and match in-walls, on-walls, and freestanding speakers in the same system to meet your specific needs. We know this sounds like marketing hype, but it's true.

**WSR Richelieu:** How do you accomplish this feat?

**Herron:** Each version of a given model uses exactly the same driver complement, and is voiced for its intended location in the room to compensate for the boundary effects that would otherwise increase the level of the bass when mounted on the wall or in the

wall. Because the SC-1 system controller is part of every system, we can do this far more precisely than is possible with passive crossover designs.

Of course, there will always be room-specific differences that cannot be predicted by the speaker designer. But since the SC-1 also includes the Audyssey room-correction system, those differences are also handled. The result is better speaker-to-speaker matching and a more seamless image than we have heard before. And some on our team have been doing this sort of work for a very long time.

By the way, this consistency holds up not only for mixing in-walls and on-walls and freestanding speakers of the same basic model, but also between small/medium/large models within the lineup. So you can use big speakers up front and smaller ones for the surrounds, and the result is still quite seamless.

**WSR Richelieu:** What types of drivers are used in the Sage series? Why were they chosen?

**Glazier:** Our unique planar magnetic devices produce most of the sound you hear from a Sage speaker. When speakers using this technology are implemented well, they reproduce tremendous detail and create an involving experience that is hard to forget. For people who like to "get away from it all" in the comfort and privacy of their home, it is tough to beat a quality system based on excellent planar magnetic devices. We have a white paper on Planar Magnetic Technology on our Web site if anyone is interested in more detailed information, at [www.wisdomaudio.com/home.html](http://www.wisdomaudio.com/home.html).

**Herron:** The bass, however, is reproduced by multiple, specially designed, 6-inch high operating pressure woofers. They have extremely powerful neodymium motors, which allow them to perform beautifully in the small enclosures necessitated by in-wall back boxes. To give you some idea of how unusual these speakers are, the "Figure of Merit" [FOM] of the systems that use four of these woofers in a single speaker is about 135. Compare that to a muscle-bound 10-inch woofer that might come in with an FOM of about 20. These woofers have a tough job to do, working in a small enclosure volume and having to "keep up" with the incredibly fast planar magnetic devices at and around the crossover frequency. But they are built to take it.

**WSR Richelieu:** Are your drivers engineered and manufactured in-house?

**Glazier:** We design and build all of our proprietary planar magnetic drivers in-house, in our Carson City factory. David Graebener



Wisdom P20M Sage Speaker

is our head designer, and he has been designing PMDs [planar magnetic drivers] for over 30 years, having patented quite a few innovations along the way.

We also design all of our low-frequency transducers—you cannot buy items like this off the shelf. We specify them in great detail, invest in custom tooling, and have them built overseas by a vendor that is specialized in constructing high-performance woofer designs. This approach is more cost-effective for our customers and allows us to focus our manufacturing expertise where it has the greatest value.

**WSR Richelieu:** How different are your criteria for designing in-wall loudspeakers, on-wall loudspeakers, and in-room loudspeakers?

**Herron:** Aside from the obvious physical constraints of having to fit within a 2 x 4 stud space versus mounting on the wall versus a freestanding design? There is no difference.

Remember: the goal of Sage was to

produce the world's finest architectural loudspeakers, by bringing Wisdom Audio's tradition of no-holds-barred performance to new form factors that would allow people to have their performance, and their décor, too.

**WSR Richelieu:** Who is the Wisdom Team and what is your in-house expertise?

**Glazier:** Wisdom underwent a restructuring beginning in 2006 that led to the addition of staff, resulting in the current management team. This team has unique expertise in planar magnetic transducer design and their manufacture. Leading the design group is David Graebener, who co-founded Bohlender Graebener Corporation (now called BG Corporation) and Dave Michno, who also worked at BG Corporation. Together, they have worked on hundreds of planar magnetic designs for consumer, professional, automotive, and military applications. Their most evolved transducer designs are found in the Sage series. David Graebener also founded Speakerlab in the early 1970s and brings decades of experience in designing high-performance consumer systems. Robert Smith, our production manager, has built thousands of planar magnetic transducers and hybrid speaker systems and is our longest-serving employee.

The team also has commensurate experience in the areas of financial, manufacturing, sales, and marketing—all specific to the audio industry. Ed Jaeger, the CEO and CFO, brings with him over 23 years financial and manufacturing operations experience and joins the team following 12 years at BG Corporation as their CFO and President. I came on as President and bring over 35 years experience in design, manufacturing, sales, and marketing of audio products. I am probably best known for my 21 years at Madrigal/Mark Levinson, most of which were served as president. Jon Herron, Vice President Sales, has been in the audio industry for 35 years, contributing to product development at Madrigal, sales, sales training. Eric Graul, Vice President Manufacturing, recently was Director of Manufacturing for BG Corporation for seven years and previous to that was in a similar position for North Sails. Todd Sutherland, Director of Sales Operations-Western Regional Manager, brings over 22 years experience in the audio industry and joins us following five years at Kaleidescape where he served in a range of sales management capacities, and prior to that worked at Madrigal for eight years in sales, marketing, and product manager roles.

This team has over 90 years cumulative experience in designing, manufacturing, and voicing planar magnetic hybrid designs, which is more than any other consumer audio company in America.

**WSR Richelieu:** Is there anything else you would like to add about Wisdom Audio or the Sage series?

**Herron:** The Sage series uniquely addresses the need for genuinely high-performance architectural loudspeakers, offering in-wall, on-wall, and in-room placement options combined with the performance advantages of an electronic crossover, bi-amplification, and Audyssey room correction. We developed these sophisticated systems for customers who do not have the option of placing large floorstanding systems in their rooms, or who simply prefer not to do so.

The result is a series of systems that offer a level of musical performance on par with the finest large-scale systems made, yet do so in handsome, modestly-sized enclosures that even architects and interior designers can love. Not to mention the people who hire those architects and interior designers.

**WSR Richelieu:** Thank you Mark and Jon for an enlightening On Screen discussion. **WSR**

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