

AES Boston Section Newsletter

AUDIO ENGINEERING SOCIETY

MARCH 1999

Griesinger presents tips and tools for highly-enveloping surround recording and playback

By MICHAEL FLEMING

A diverse audience of engineers, manufacturers, broadcasters and students attended David Griesinger's presentation to the Boston AES section on 9 February, 1999.

As a longtime designer and consultant at Lexicon (Bedford, MA), Griesinger has made significant, industry-wide contributions in the field of musical acoustics, particularly the perception and simulation of reverberation. His discussion this evening included remarks on the reverberation radius of rooms and the impact of loudspeaker placement on the subjective qualities of envelopment and externalization.

His analysis of reverberation radii, he argued, has specific implications for music recording techniques, especially for multichannel surround presentation. Similarly, Griesinger's conclusions about the psychoacoustic performance of loudspeakers in rooms may help to influence both home and studio multichannel installations.

Since well-implemented surround techniques have the potential to overcome the well-known limitations of two-channel stereo, Griesinger proposed several fundamental criteria for multichannel production:

(1) Playback should create—and serve—a large listening area. In other words, mixing for a single sweet spot is a mistake. As a result, he asserted, a single source should be panned at most to two

playback channels. Furthermore, program material destined for the center channel should maintain at least 6 dBs of separation from the right and left channels.

(2) The system, at minimum, should consist of five full-range channels. Independent left and right surround channels are essential, and reverberant sounds presented in the surrounds should be uncorrelated.

(3) The system should be capable of producing a high degree of listener envelopment. Ultimately, Griesinger pointed out, this is a function of both loudspeaker placement and mix technique.

Within the realm of classical music surround recording, Griesinger also spoke strongly in favor of creating innovative audio perspectives such as a conductor's ear-view, with the orchestral string sections spanning to +/- 90 degrees or more with respect to the listener.

Capturing the elements for effective surround mixes, however, depends on a thorough understanding of microphones' relationships to their principle sources and to the local environment in terms of time, space and acoustic energy.

Drawing on a stump speech that he calls "Recording for Physicists," Griesinger reminded the audience that the reverberation radius is the distance from a sound source in a hall or room where the diffuse energy is equal to the direct energy from that source. This dis-

tribution is proportional to the square root of the room volume and inversely proportional to the square root of the reverberation time.

The relevance of this parameter is that it varies greatly from room to room, ranging for example from approximately 22 feet in Boston's Symphony Hall to less than six feet in some recital halls and studios. As a rule of thumb, Griesinger recommends never placing a microphone beyond the reverberation radius of a source. While most classical engineers intuitively understand the importance of balancing direct-to-reverberant sound through microphone placement, Griesinger points out that this important demarcation point in the sound field may be much closer to the source than expected.

Of course, capturing an adequate amount of direct sound energy from a source is only part of a well-balanced mix. Griesinger noted that lateral reflected energy arriving between 10 and 50 milliseconds after the direct sound helps to define the perceived size and distance of a source. The subjectively optimal level of these early reflections, which in a classical recording context are often captured by spaced omnidirectional microphones, is -6 dB with respect to the direct sound. Experimental results also suggest, according to Griesinger, that the early reflection delay patterns should be different in the right and left sets of channels.

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- Read the final installment of Bob Ludwig's comments at Parsons' Audio Expo 98. This special feature is on Page 3.
- See Pages 2 and 4 for news from the American Loudspeaker Manufacturers Association and the Boston Audio Society.

Looking Ahead

- Reserve these dates for the remaining meetings of the season:
13 April at GTE—David Moulton presents the Rasch method of statistical analysis using subjective data on microphone preamps.
4 May at Soundmirror (Jamaica Plain)—Facility tour and demos.

Member Alert!

- The term for the current slate of Boston Section officers will expire in June. Would you like to help plan the next season of meetings? Do you want to continue receiving the newsletter? Contact any officer to learn how you can get involved!

ALMA Symposium: Loudspeaker manufacturers plan test & measurement focus for April meeting

By CAROL BOUSQUET

The American Loudspeaker Manufacturers Association (ALMA) announces its second in a series of symposia on the "Test and Measurement of Loudspeakers," to be held on Wednesday, 28 April, 1999, at the Marriott Nashville Airport. Following on the heels of ALMA's successful Winter Symposium ("What to Measure and Why"), the spring meeting will focus on commercially available

measurement systems.

In addition to presentations by equipment manufacturers, the program features invited papers by Don Keele of Electro-Voice, John Murray of Peavey Electronics and Poll Sound's Deward Timothy.

The symposium will begin with committee meetings at 8:00 a.m. Exhibits open at 10:00 a.m., and technical presentations will start at 1:30 p.m.

In addition, a General Assembly meeting will be held at 12:30 p.m., and a net-

working cocktail hour will round out the day at 5:00 p.m. Members and non-members are welcome.

Registration forms will be mailed with the Spring issue of ALMANews (late February) and will be available on the ALMA Web site.

For more information visit <http://www.ALMA.org> or contact ALMA Executive Director Carol Bousquet at (978) 448-5658 (phone) or (978) 448-6851 (fax).

New psychoacoustic research emphasized in talk

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More dense sets of reflections arriving later than 160 ms create the actual reverberant "tail," contributing to the perception of warmth, richness and spaciousness. Griesinger pointed out that only a minimal amount of reflected energy is

required between approximately 50 and 100 ms to maintain the psychoacoustic connection between the sound source and its reverberation. Thus, a fairly shallow early reverb profile coupled to a decay tail can provide a natural sense of reverberant support. Rear-facing cardioids have proven to be an effective way to capture this type of reverb profile naturally and may be especially appropriate in smaller rooms where excessive early energy would be captured by any other ambience-mic technique.

In the case of both early and late categories of reflections, the "desirable" acoustic characteristics described here have become design features in many top quality digital reverberation algorithms. Griesinger remarked that he often uses the Lexicon 480 ambience and random hall algorithms in parallel to simulate the full range of optimally balanced reflections.

Returning to the subject of envelopment, Griesinger next explained that he has been exploring the factors influencing a listener's perception of envelopment by both high and low frequency sounds. This research has also investigated related factors influencing the internal and external localization of low-frequency sounds. A complete discussion of these subjects can be found in Griesinger's 1998 AES preprint #4860, "Speaker Placement, Externalization and Envelopment in Home Listening Rooms."

In summarizing some of his results, Griesinger again emphasized that reverberation in recordings must be uncorrelated and that a loudspeaker/room system must effectively transfer this decorrelation to the listener's ears to create a sense of envelopment. Particularly

in rooms where lateral modes are weak, Griesinger found advantages in using two rather than one low frequency drivers and in positioning them to the sides of the listener.

He also reported that the in-head localization of low frequency sounds, a common characteristic of kick drum and bass signals in pop recordings, can be alleviated by phase-shifting the low frequency content of the left and right signals by 90 degrees. Griesinger concluded by reporting that the Lexicon Music Logic 7 surround processing system is designed to enhance envelopment and low frequency externalization through these and other signal processing techniques.

The evening closed with a series of audio demonstrations played through a seven-channel (L,C,R,2*LS,2*RS) surround system. Despite some not-unexpected difficulties in aligning and equalizing this ad-hoc setup, Griesinger used a series of pop and classical excerpts to illustrate certain recording techniques and also to demonstrate features of the Logic 7 processor.

In keeping with his report, right and left subwoofers were placed to the sides of the lecture hall. While the low frequency response of the hall itself made it difficult to evaluate the efficacy of phase-shifting the left and right low frequencies, several of the recorded examples produced a high degree of envelopment for this writer.

Many attendees also sampled the full Logic 7 surround system installed in Griesinger's Saab sedan. Broad grins were evident as listeners eagerly played musical chairs on the dark and chilly curbside!

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A Conversation on Mastering, Part 2: Bob Ludwig discusses artistic choices, loudness and monitoring levels

The November 11, 1998 meeting of the BAES coincided with the final event at Parsons Audio's Expo 98. Mastering engineer Bob Ludwig spoke with Mark Parsons and fielded audience questions in a wide-ranging presentation, first excerpted in the January 1999 BAES newsletter. More comments follow, as edited by Michael Fleming and Mark Parsons.

BL: "A lot of times we're the mediator between the record company A&R department and the artist. That can be difficult. Most times the A&R department wants more vocal level in a mix than the artist. It's a never-ending battle. For radio air play, A&R wants to hear all the diction, while the artist feels that if their voice is buried a little bit, then more of the impact of the song comes through."

"The record companies as a whole have been slow getting into the DVD thing. It's definitely starting, but all the artists without question, when they hear the 5.1, that's it! That's what they're really, really into. Their eyes really light up. To me it's a big difference between a DAT and a 96k, 24-bit sound—it's important and wonderful. But the artists are much more interested in the whole spatial aspect of it."

DIFFERENT POINTS OF VIEW

"Again, you have to realize that we're so blessed [at Gateway] to work with tapes made by some of the best engineers on the planet. To me it's a sacred responsibility. Does this in fact sound as good as it can, in which case I'm anxious to get out of the way and leave it alone."

"I remember years ago there was this group called The Call, from San Francisco. The lead singer, Michael Beans, was the bass player. Being the bass player, he just loved bass on the records. I was doing this record and he called me up and said to be sure not to cut any of the bass. In fact, he said, "You should boost it, because no one ever puts enough bass on my records.""

"OK. I'm thinking about radio play and stuff like that, so I put as much bass as I thought would sound proper on the radio and be commercially competitive with other records. He calls me back and says, "You're not even close.""

"So I do one with quite a bit more bass and he says, "No." He says, "I took your

last reference over to a hi-fi store where they've got an equalizer and here are the numbers I came up with." I look at these numbers and I think, "What's this?!" All this super subwoofer, all these lows, +6 at 30Hz, stuff like that. So I kind of blindly dial in these numbers and play the tape, and it sounds like rock and roll reggae, which is just what he wanted!

Suddenly I heard the record in a whole new way. I wouldn't have dreamed of going that far if left to my own devices. Obviously the guy mixing it for him didn't go nearly far enough for him. So he was happy. He had his vision. The problem was it wasn't very competitive on the radio, and it didn't sell at all." (Laughter.)

"On the other hand, I can't tell you the number of times that we've done a reference with our first instincts and given it to the artist and they say, "Oh no no no, we're very concerned about the highs. We need more highs.""

"We'll go several rounds, maybe, doing revisions. Then they're happy, they sign off on it and the record comes out. Then a year later they'll come up—this just happened with Elvis Costello, by the way—he says, "I just listened to that thing that I rejected that you send to me initially. I don't know why I rejected it. It was really much better."

"[He] finally got a little perspective on it. But there's no going back, of course. Unless you're Bruce Springsteen." "One advantage of going to a mastering studio is that by the time you've worked on a project for several months, you're really burnt out on it in a lot of ways. You don't have as much overview of it any more."

ON LOUDNESS

"I think it's just a travesty what has happened with the level of CDs, where people are trying to get it louder and louder than the next guy. I just thank my lucky stars that when the Beatles were around we didn't have digital compressors back then."

"Compression is a good thing. Compression is the key to rock and roll. How do you take something that is designed for a venue where it's played at the threshold of pain and make it sound like anything at all through a little boom box? Well, you just fill that thing up as much as you can."

"But you can see how the whole thing has really gotten out of hand. The price we pay for all of this is we can't listen to the records. Some of the records you can't listen to from beginning to end without getting tired. It's just this constant assault on your body, with everything always to the max."

"The only hope I have is that lately I've actually had some producers, almost for the first time, come in and say to me, first off, "I don't want to have this be the loudest record in the world. I want it to have dynamics.""

SPL IN THE STUDIO

"We keep a sound pressure level meter in the room, and we follow OSHA specs for sound pressure level exposure, which means 85 dB. At 90 dB you're only allowed eight hours maximum exposure to that. I love what I do. I intend to keep my hearing as much as I can. I don't listen loud. Period. If you like to go to rock concerts, it's not a good idea to be a mastering engineer."

"One thing I say to clients that really scares them off, and it's a true statement, is that if I listen even a little bit louder than my reference for a short period of time, my ears will become acclimated to it immediately, and then when I go back to my reference, it won't sound right to me any more. And they'll go, "Oh no, don't do that!" So I usually give them a pair of headphones and the volume control for that."

"In my opinion it's just pointless to listen too loud. If you start listening too loud, you won't have enough bass and you won't have enough high end."

"When clients listen too loud on headphones, maybe even to the point where the bleed of the headphones is so loud that it's annoying—maybe they're listening at 100 or 105 dB—I'll say, "Do you want to be in this business for a while, or just for today?" (Laughter.)

Question from audience: "Do you still claim that radio program directors trying to achieve their sound ruin work that you've done? Does that drive you crazy?"

BL: "Absolutely. Years ago in New York, WABC used to add echo to their records and speed them up. Do you make extra dry masters that you slow down so that when they...? (Laughter.)

BAS announces special offer

According to Boston Audio Society (BAS) President David Hadaway, the organization is offering a free sample package of articles from its newsletter, the *BAS Speaker*, as part of its anniversary celebration and membership drive.

To request the free articles by e-mail (92 kB), write to dbsystems@ibm.net or log-on to www.geocities.com/ResearchTriangle/Node/5480/.

You can also request a sample issue of the *BAS Speaker* for \$2 by writing to the BAS, P. O. Box 211, Boston MA 02126. An introductory annual membership rate of \$32 is currently being offered.

Editor's Note: Founded in 1972, the BAS is a Boston-based member-supported organization "devoted to the exploration and enjoyment of all aspects of audio." David Hadaway notes that "members have a wide range of interests and technical knowledge, but tend to prefer a scientific methodology in a field rich with fantasy and hyperbole." The BAES and BAS share a number of members and occasionally host joint meetings for the local audio community.

**Next Meeting:
Tuesday, March 9 or 23!**

By **ALEX CASE**

The Boston Section of the AES invites you to the campus of the Berklee College of Music in March for a joint meeting with the Berklee AES student section.

Trouble is, we're not sure for which date to invite you.

With top-rank pop music production and engineering talent come some rather nutty schedules. As a result, the meeting content and mystery guest have been subject to important music industry events like the Grammy Awards and when Steely Dan will be ready to mix.

So, despite heroic efforts from our friends at Berklee, at press time for this newsletter, the meeting details are not yet confirmed.

While a meeting may coalesce by Tuesday, 9 March (our regularly-scheduled "second Tuesday of the month"), it is more likely that we'll meet on Tuesday, 23 March, 1999. Berklee will send a separate flyer as soon as the (later) date and guest speaker are finalized.

But to keep abreast of the situation, we

Berklee to host surprise meeting

Location: Berklee College of Music
1140 Boylston Street, Boston
(617) 266-1400

Reception: 6:30 p.m.

Meeting: 7:00 p.m.

Visit www.dplay.com/aes

or call (617) 747-8215

to confirm date and speaker.

encourage you to check the BAES website before both dates. Log on to www.dplay.com/aes for the latest details.

If your phone prefers to call humans instead of computers, then call my office at (617) 747-8215. If you don't reach me there in person, the voice-mail announcement will give you the details.

We all may be pleasantly surprised together!



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