

# THE BAS SPEAKER

## The Publication of the Boston Audio Society

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# Letter From the Editor

We are slowly but surely getting closer to schedule in publishing the *Speaker*. Volume 18 No. 3 should be out shortly after this issue, and it should contain meeting summaries for the Boston Acoustics visit, the July Summer CES report, Desktop Loudspeaker meeting, and Al Foster's review of the Audio Control spectrum analyzer. If things go smoothly, it would be the first time in years that a meeting summary is published within two months of the event!

## March 1990 Meeting

### Open Forum

(Unless stated otherwise, "I" and "My" refer to PSH.)

This was the first meeting under the BAS's new president, E. Brad Meyer. Brad spent some time explaining the new schedule for BAS meetings. They would begin

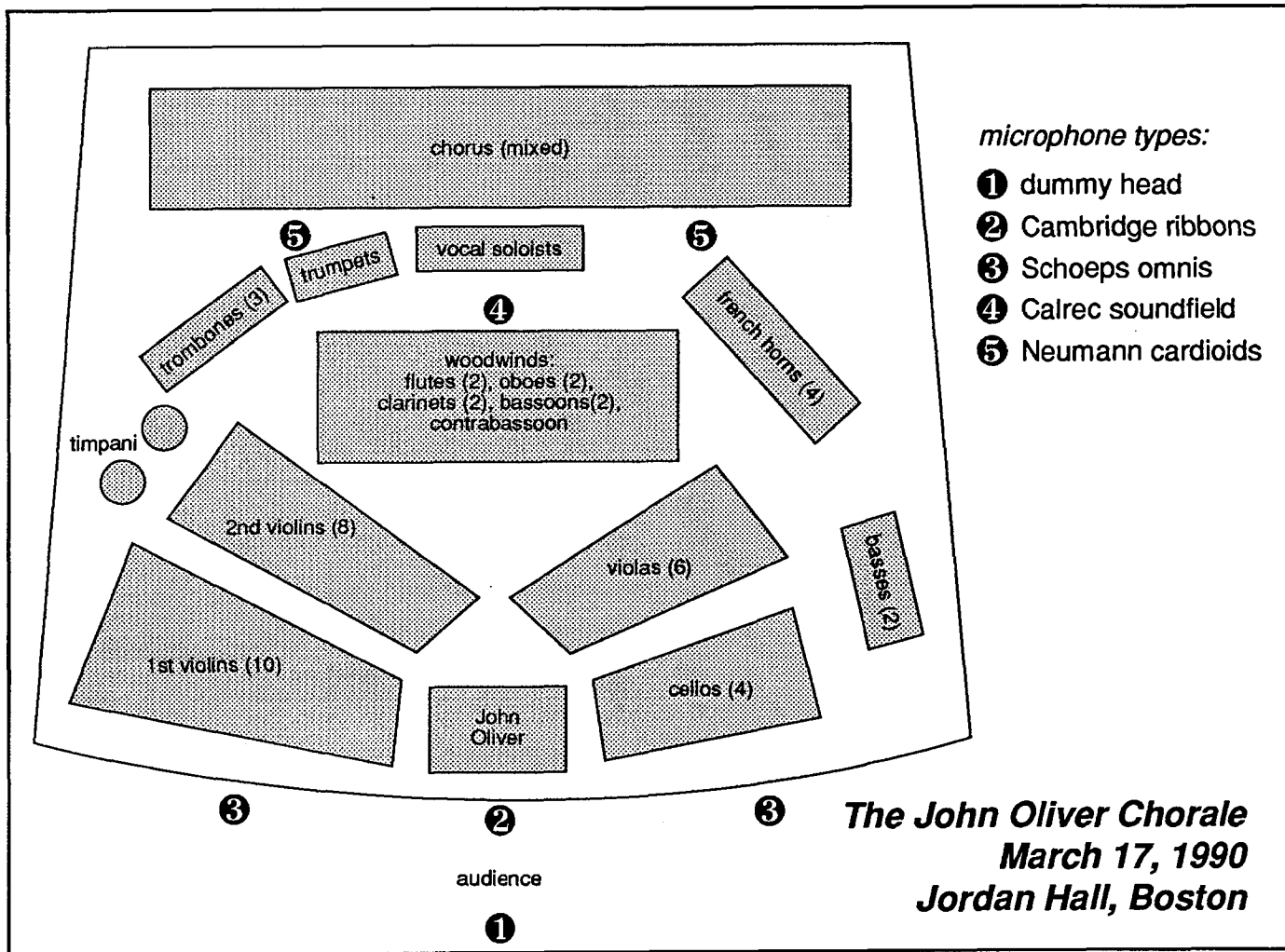
promptly at 6 p.m. ("actually about 6:20 now, shading back to 6:05 or so when I get people trained...") with Open Forum. The evening's main feature would begin at 7 and end at 9 to allow the guests to dismantle equipment and either go out to dinner or go home at a reasonable hour. The usual late-hour arguments and discussions will still be permitted, at least when we're at the Transportation Systems Center, as there is no deadline for clearing the room.

Because the meeting began earlier than usual, there were fewer people, and so less discussion during Open Forum.

### Live vs. Recorded Comparison of the John Oliver Chorale's Performance of Beethoven's *Missa Solemnis*

This was not exactly an A/B comparison test; the live performance was at 8 PM on March 17, 1990 at Jordan Hall, while the playback took place at our usual TSC (the Federal Transportation Systems Center in Kendall Square) location 23 hours later.

Steve Owades, past president of the BAS, is a member of the John Oliver Chorale, and was able to obtain tickets



to the concert at greatly reduced prices. Since the performance was the night before our meeting, and several members would be recording the session with very different microphones and setups, the concert presented a unique opportunity for BAS members to compare the sound of various recording setups with one another and with live music.

### The Live Performance

The concert played to a nearly full house. I sat on the right side of the main floor. It was a great performance, with superb precision and control. The soloists, Dominique Labelle (soprano), Allison Swenson, (mezzo-soprano), Mark Evans (tenor), and James Kleyla (bass), were nicely balanced from where I sat. Al Foster sat in the balcony and thought the soloists were too soft. My only complaint is that there was no bass—I am so used to Telarc's recording of the same work, where the organ shakes my house! [The JOC performance of the *Missa Solemnis* did not employ the optional organ part at all, due to the relatively small size of the performing forces and the decrepit condition of the Jordan Hall organ.—SHO] Musically, the John Oliver Chorale outperformed the Telarc artists. I was particularly impressed by Swenson's performance. Other BAS members I saw at the performance included Brad Meyer, Al Foster (Corresponding Secretary of the BAS), and Frank Farlow (ex-Corresponding Secretary).

There were many microphones hanging in the hall. Out in front of the entire ensemble were a dummy head (a Neumann head specially modified by engineer David Griesinger), a pair of Schoeps spaced omnis (belonging to BAS member Micha Schattnr), and a closely-spaced pair of Cambridge ribbon microphones, which have a figure-eight pickup pattern (also Micha's). Dave Griesinger also placed a Calrec Soundfield single-point stereo microphone over the woodwinds and two Neumann KMF 4i cardioid condensers pointing at the chorus (see the accompanying diagram.) Recorders used included PCM-F1s and both tabletop and portable DATs.

### Playback

Playback at the BAS meeting was via Brad's professional Panasonic 3500 DAT, a PCM-F1, and dbx 2500 Soundfield speakers. I brought Telarc's version along (Robert Shaw with the Atlanta Symphony and Chorus, soloists Sylvia McNair, Janice Taylor, John Aler, and Tom Krause; CD-80150) for comparison, while Steve Owades brought a Deutsche Grammophon release (Herbert von Karajan with the Berlin Philharmonic and Vienna Singverein, soloists Lella Cuberli, Trudeliese Schmidt, Vinson Cole, and José van Dam; 419166-2). [I brought this Karajan recording, his last of the work, as an illustration of particularly bad recorded sound, not as a recommendation! It was made simultaneously with a video production, and may have suffered sonically from the compromises required by the video project.—SHO]

Brad had spent Sunday afternoon transferring the same excerpt from various tapes of the session onto a

DAT tape and preparing forms for the listening tests. The DAT format is ideal for the demonstration since it is very easy and quick to skip from one selection to another. Brad performed a single-blind test: he did not mention the microphone setups used for each selection. He wanted us to comment on the sound, and guess which setup was used. His main objective was to minimize any prejudices. The forms included spaces to indicate preferences on a scale of 1–10 in the categories of sound quality and balance for chorus, soloists, strings, brasses/winds, and the overall recording. Each attendee was also asked to specify whether (s)he had attended the concert, and if so, where (s)he was seated. There were additional spaces for the proportion of CDs and LPs in the respondent's listening habits, and the brand and model of loudspeaker. Names were not required.

The last five minutes of the piece were played on each of the following setups, in this order:

- 1 a mix of all of Dave's microphones—the dummy head supplemented with the chorus mikes (Neumann cardioids) and solo array (the Calrec Soundfield microphone);
- 2 Micha's omnis alone;
- 3 the dummy head alone;
- 4 Micha's ribbons alone;
- 5 a mix of Micha's ribbons and omnis;
- 6 the Telarc CD; and
- 7 the DG CD.

It should be noted that #1 was *almost* David Griesinger's final product; Jordan Hall when full is very dry, so Dave planned from the beginning to add a touch of digital reverb to the recording (using the Lexicon 480L, which has digital inputs and outputs). The version we heard had *not* been through this final step.

The total of first choices among those who attended the concert was 1.5, 1.5, 0, 3, 1, 1, 0 respectively. (When someone ranked two versions equally, each was assigned 1/2 vote.) Twice the number of votes went to Micha's ribbons as to the next most popular.

Among those who did not attend the concert, the Telarc CD was the favorite (5 votes), followed by Micha's ribbons alone (3 votes). Both the DG and Micha's omnis alone got 2 votes, with the last vote going for Micha's mix.

With a greater weight for concert attendees, the tape made with Micha's ribbons alone was the favorite, followed by the Telarc CD.

Preferences, as it turned out, were partly dependent on where one sat in the playback room. Those sitting near the front (including me) preferred the more ambient recordings, while those sitting near the back of the room preferred the drier recordings. Those sitting near the back moved forward after the formal evaluation, and some changed their preferences.

My two favorites were the recording with Micha's ribbon microphones (#4), which has the least congested, most effortless sound (I correctly identified the selection as being recorded with the ribbon microphone), and Dave Griesinger's mix of dummy-head, chorus mikes,

and solo mike array (#1). The former is closest to the balance I heard in the concert hall. The Telarc recording did well in the comparison. My ranked preferences are very close to the weighted frequency-of-first-choice statistics above.

It was an enjoyable evening. This is the closest one can get to an A/B comparison between live music and various microphones and setups. We should all thank Brad, Micha, Steve, David Griesinger, Frank Cunningham (who collaborated with Dave on the on-site mix), David Moran, and Bob Brundage for making this meeting possible.

— *Poh Ser Hsu and E. Brad Meyer*  
(Massachusetts)

### Meeting organizer's addendum

I'd like to add a few words on the choices made by the recording engineers in this project and on the sound of the recordings we heard at the meeting.

Any recording is the product of a series of compromises arising from the complexities of the situation, and in a performance like this one, complexities are everywhere. Ideally, you'd like to use a single microphone array to pick up the orchestra, the chorus and the soloists; each element in the recording should have the right overall level, the correct timbre, the appropriate distance both absolutely and relative to all the other elements, and a consistent and plausible left/right location. Even a little experience with miking small ensembles will reveal that any of these requirements can be confounded if the microphone is a couple of feet away from where it should be, and that it's a lucky day when all criteria are met by a single placement for a single instrument or group. The chances that every instrument and voice in such a big production will sound right in every way from any single location is insignificant. (In other words, so-called "purist" techniques are fine if you can get away with them, but mostly you can't.)

The situation is made more difficult by John Oliver's insistence on arranging everything for the audience instead of the recordists. (Imagine!) To begin with, the engineer would prefer that the audience sit somewhere other than in the hall, where they soak up much too much reverberation. You can try moving the microphones back, but the sound may become murky, indistinct and cavernous, and there's still not enough of the "hall" sound you're looking for. That's why Dave Griesinger, who along with his colleagues designs what are widely regarded as the world's best digital reverberators, planned from the start to record up close with several microphones and add a touch of reverb later. We heard his tape "dry," so the recording was in his terms not finished. When we heard the final version at a subsequent meeting, the improvement, while quite subtle at first, came over time to sound much better (watch for details in Volume 18 Number 3).

Another complication is the chorus. The ideal miking distance for them is about the same as for the orchestra,

but in a concert they have to be either in front or behind. (In a recording session you can put them out in the hall, equidistant from vertically hung mikes—though you might prefer to have the mikes point upward rather than straight down, to capture the room more attractively, so that's another can of worms.) For decent recorded balance without accent mikes the soloists should be out near the podium, but here they were back with the chorus. Individual preferences sometimes clash, too: Micha's figure-eights would have been farther out in the hall but for Steve Owades's influence, which he will attempt to explain in his own separate note.

My impressions of the playback excerpts were atypical; not only did I sit in the front of the room, dead center between the speakers, but unlike the others I knew which tape was which. I most preferred the mix of all of Dave's mikes, despite writing in my notes that it was "very dry," because to me it captured the most elements in the best balance with the most realistic timbre. In second place was the mix of all of Micha's mikes, which sounded more natural both spatially and dynamically than the figure-eights alone. This is in contrast to a large figure-eight-only contingent, who may have found that the more distant and reverberant sound of the eights alone best solved the inevitable problem of the short reverberation time in the hall. To me, the eights-only tape suffered, as I find many such recordings do, from exaggerated depth and width. Now, Micha couldn't put them where he wanted to. But if he had, the soloists might have sounded even further away than they did live, which was already too far. As I say, it's complicated.

My notes on the dummy-head tape say that the chorus was slightly distant and hollow, the strings too close, and the winds just right. Dave used a Neumann *kunstkopf*, with some interesting modifications: it sported artificial pinnae molded from his own ears; it was equalized so that its response from the front was close to the Calrec Soundfield, and the outputs were shuffled (i.e., the L-R information was boosted below about 500Hz) to compensate for playback through speakers instead of headphones. Though this array as placed was less than optimal by itself, it served very well to add orchestral sound to Dave's mix. As I said (enough already!), it's complicated.

I found the Telarc CD at once too close—and bright, especially the soloists—and too cavernous, but the sound had both immediacy and lots of long decay, a combination much to be desired; to the spaced-omni partisans this was the only contender. (Only one of those who favored the Telarc attended the concert, so maybe they just preferred the sound of Telarc's hall. If so, I agree with them.) I might have liked it better had I not been so close to the speakers. Oddly enough, I and one other person thought (neither of us knowing yet that it was a Telarc; someone else loaded the CD) that the mix was constantly changing. Perhaps the editors were intermingling takes from different days, as no two setups sound exactly alike no matter how careful you

are. The extreme width of the speaker array from my listening position made the image of the Jordan Hall spaced-omni tape much too vague and lacking in the center.

Overall I was favorably impressed by how well all the tapes reflected what I heard at the concert; my ratings went strictly according to which version produced for me the closest facsimile to the sound I remembered from the night before. Of course, I sat about five times as far away as the farthest of the microphones. So we are still talking, *as we always are*, not about absolute realism, but about how well the engineers managed to compensate by closer placement for the loss of pinna cues, head shadow, and the marvelous neural processing that tells us where sounds are coming from.

— E. Brad Meyer (Massachusetts)

### A View From the Stage

As a musician and a performer, I am especially conscious of the need for clarity and proper balance in live and recorded music. I am often frustrated by the common audiophile preference for distant perspective over musical detail.

This is especially significant when dealing with vocal and choral music. Almost all composers pay a great deal of attention to the specific setting of text, and a recording (or a performance) that leaves the words fuzzy and indistinct does a great disservice to their intent.

Over several years, I have recorded the John Oliver Chorale concerts in which I have sung, sometimes on my own and on other occasions collaborating with Micha Schattner.

I am (at least theoretically) inclined to prefer recordings based on a single near-coincident pair of directional microphones. But when the performing body is fairly deep—a chorus behind a full orchestra—it's very tricky to create a successful two-mike recording. If the mikes are too close to the front of the ensemble, you end up with an exaggerated perspective, with strings too close and the chorus relatively indistinct. On the other hand, moving the mikes farther out into the concert hall equalizes the perceived distance, but everything will be too distant.

In this performance of the *Missa Solemnis*, the soloists stood behind the orchestra, just in front of the chorus. This makes the perspective issue especially complicated, since solo voices should be somewhat "up front" in a recording to compensate for the lack of visual cues.

On this occasion, I did not hang my own microphones. Instead, I persuaded Micha Schattner to place his main mikes close to the stage (indeed, almost over the conductor's head) and very high. This was an attempt to achieve a more equal distance from the soloists, chorus, and orchestra while avoiding excessive distance. In listening to the tapes at the BAS meeting, and at greater leisure at home, I concluded that the tape made from these main microphones was fairly successful.

However, when choosing a tape from which to make copies for my fellow performers, I chose the final version made by Dave Griesinger, using the "shuffled" dummy head with accent microphones for soloists and chorus, with digital reverberation added. This tape was quite good overall, and the extra clarity provided by the accent mikes made it the best representation of the performance.

— Stephen H. Owades (Massachusetts)

## April 1990 Meeting

### Open Forum

Channel Seven consumer reporter Phyllis Eliasberg started the open forum by asking if anyone had heard about painting CDs with green ink to improve their sound. She showed us an article from the *Sunday Herald* on this subject. David Moran, among many others, had heard of this idea, and a discussion ensued on how green ink and Armor-All, the other product recommended for improving the sound of CDs, were supposed to help. The green ink is supposed to absorb any scattered laser light, while Armor-All is supposed to fill voids in the surface of the disc. John Allen pointed out that there should be no audible effects if error rates do not decrease (or perhaps we should say "change"; they might well increase with the Armor-All—EBM).

Brad noted that some players can measure error rates, and he has observed about 4 to 5 errors per minute. He has yet to notice any differences between treated and untreated discs. Brad guessed that these effects are more imagined than real. John Allen cited a sound-reinforcement job in which he put in an unconnected microphone to satisfy the client, and was told the result was much better. Brad reminded us that the industry is selling pleasure, and people who believe they hear a difference are deriving pleasure from buying the product. In that sense, at least, these may be legitimate products.

Ira noted that the BAS and the local chapter of the AES would be visiting the new manufacturing facilities of Boston Acoustics, in Lynnfield, on May 15.

David Weinberg has accepted the post of membership secretary for the society, in place of Bob Zunner, who received a round of applause for his help.

Martin Polon noted that the annual NAB show is the largest pro audio show, with about 50,000 attendees. One reason is the papers are published, unlike the AES. This year's emphasis is on computerized audio post production, with lots of digital editing tools and effects.

Brad announced that we will in the future talk a bit about video as well, since video sound is now an important part of the audio market. For starters, S-VHS will shortly feature digital audio, in addition to the Hi-Fi tracks, and JVC hopes that the new system will permit six hours of digital sound on a T-120. Another new video item is the Pioneer LD-X1, a disc player with a chroma

noise reducer that allows, for the first time, quiet reds and blues. The US version will be the LD-S2, which is expected to sell for \$3500.

### **Meeting Feature: Atlantic Technology's Premiere Product—Pattern**

Lincolnwood, Ltd. of Norwood, Massachusetts distributes the well-known NAD electronics, and now also the products of a new company, Atlantic Technology. The president of Lincolnwood, Peter Tribeman, came in person to present Atlantic Technology's debut product, the Pattern. It is a 3-piece speaker system, comprising a woofer box and two satellites. The woofer box (18"×13"×8") holds two 6.5" acoustic-suspension woofers and three amplifiers. Each satellite has two 4" cubes, one on top of the other. Each cube contains a 3" full-range driver. The upper cube rotates, permitting a wide variety of radiation patterns. The amplifier accepts up to three line-level inputs and one loudspeaker input. The entire system lists for \$499.

The Pattern has several features that distinguish it from its competitors. It is a self-powered, biamplified system; it has active loudness compensation; and a limiter/compressor in the bass section prevents overload and/or driver damage on loud bass passages. The only other amplified three-piece system is the suitcase system from Cambridge Soundworks (Model 17, \$749).

The amplifiers are fairly low-powered, at 15 watts per channel for the satellites, and 30 watts (mono) for the bass. Thanks to the limiter/compressor in the bass section, biamplification, and high-efficiency satellites, very loud levels can be achieved without audible distortion.

#### **The Birth of a New Product**

Tribeman told us that the project started last summer, when an audio engineer called him and said that he had a three-piece system "that goes really deep, has built-in amplifiers, costs less than \$500 retail, and looks really nice." The engineer demonstrated the system in a hotel room, where the two talked, listened, and talked some more from 11 p.m. to 4:30 a.m. Peter could not believe the great sound he heard from such a small three-piece system.

#### **Biamplification**

Most music contains energy at many frequencies simultaneously. Bass drums and cymbals frequently go together, for example. In a normal system, a 20V peak may be needed for the cymbal, while the bass drum needs 25V peak. When the two peaks line up, the driving amplifier must supply 45V peak, or about 250W into 8 ohms. In a biamplified system, efficiency is higher, partly because there are no crossovers or attenuators to absorb energy. The tweeter and woofer amplifiers need handle only, say, 15V (which is 30 watts) and 22V (60 watts) peak respectively. Under such conditions, the Pattern system is equivalent to a passive system driven by a 100 watt-per-channel amplifier. Additionally, when

overdriven, clipping of the bass amplifier is less audible since the generated harmonics, normally clearly reproduced by the tweeter, are greatly attenuated by the woofer.

The bass section has a fourth-order (24dB/octave) 180Hz low pass, while the satellites have a second-order (12dB/octave) high pass at 200Hz. The latter, combined with the mechanical rolloff of the acoustic-suspension system, gives a fourth-order acoustic rolloff. The left and right bass signals are summed and fed to both woofers.

#### **Compressor/Limiter**

Tribeman said that his engineer found that bass clipping lasting less than 500 milliseconds is not audible. Based on this experience, he designed the Pattern so that when it is over-driven in the bass section, the bass amplifier's gain reduces sufficiently to prevent clipping within this time-frame. This not only reduces audible distortion, but also increases the reliability of the woofers.

#### **Radiation Pattern**

Peter said that the goal was to achieve narrow dispersion for each cube. [The dispersion is narrow only in the treble.—DRM] This design allows pinpoint imaging even in relatively live rooms when both cubes face the listener. If you rotate the cubes toward the wall, you get a more uniform but less precise image, or you can compromise by aiming one at you and the other outward.

#### **Listening and Audience Reactions**

Al commented that the Pattern satellites looked very much like the Bose system. Peter replied that the drivers are very different; among other differences, the Pattern satellite's driver has an unusual dust-cap shape, designed for better high-frequency response.

Peter played several orchestral pieces, as well as the Sheffield Amanda McBroom selection used by many speaker designers for fine tuning. Peter, Brad and the phantom engineer had used the latter, among other sources, to determine the balance of the system. The sound was impressively loud, with very good subjective bass extension. The balance in the meeting room, where the speakers were placed on either side of one of the corners about two feet out from the walls, was a little on the warm side. On some of the peaks, the satellite amplifiers clipped. (Perhaps if they incorporated NAD's soft-clipping circuit in the satellite amplifiers, the system could play even louder without audible distortion; as is, the system will play more loudly than I normally listen to music—PSH). Overall, everyone agreed that the system was an impressive achievement.

#### **A Preview of the Video System**

Atlantic Technology's video system comprises a Dolby Pro Logic unit with remote control, four channels of amplification, five sets of satellites, and a woofer box with two 8" woofers. The target price is \$1200 for the system (an outstanding price; most Dolby Pro Logic units alone will cost almost as much. The price has since risen to \$1499, but the system is still a good

value—PSH). There are color-coded wires to simplify setup. The small size of the satellites allows the center channel to be placed on top of the set (all speakers have compensated magnets), while the left, right, and surrounds go unobtrusively on stands or wall brackets.

Atlantic Technology went the Pro Logic route because almost all films on discs or tapes have surround information encoded; Pro Logic very closely mimics the decoders used in movie theaters.

Tribeman played some *Indiana Jones* excerpts, with video on an NAD 13" monitor. Unfortunately, the system was not functioning properly, with the surrounds at too high a level with quite a lot of distortion. This early prototype had developed a malfunction since earlier that day. But the system definitely seemed most promising, and should, like the Pattern, be an outstanding buy.

— Poh Ser Hsu (*Massachusetts*)

## An HPS-4000 Experience

David J. Weinberg

Sunday night, 17 June 1990, Mark Fishman and I went to the HPS-4000-equipped theater in the Shoppers World Cinema on Route 9 in Framingham, Massachusetts, to see *Gremlins II*. General Cinema owns the Shoppers World Cinema complex, and has made a special effort to install and maintain high-quality projection equipment and the HPS-4000 sound system in one of the theaters there. Neither of us had seen the film before.

The HPS-4000 is the theater sound system developed and installed exclusively by John F. Allen. Local BAS members may remember John's presentation of his HPS-4000 at a joint BAS/AES/SMPTE meeting in this theater last September, soon after it was installed.

The BAS has listened regularly to John's theater sound systems since he installed his first one in the Community Playhouse in Wellesley. Many of us have fond memories of this now-defunct theater. John told me that the Wellesley sound system has found a good home in the Elk Grove Theater in Elk Grove, Illinois.

The foundation of John's HPS-4000 is a specially designed Klipsch-manufactured horn speaker. Other speaker types are used where John feels they are appropriate. He uses BGW amplifiers, and generally makes few equalization adjustments in the setup of his system, endeavoring to generate the sound desired primarily through design and placement of the speakers. John can be credited with developing a geometric overlap algorithm for straightforward mathematical determination of where to place theater surround speakers for relatively uniform audience coverage.

The 35mm print we viewed Sunday night had been through the projector about 10 times. Both Mark and I were impressed by the incredibly high optical quality of the presentation; there was no apparent damage and no dirt, and the focus was equal to the best either of us has ever seen in a theater, including the special presentations

with which both John Allen and Tom Holman have spoiled us in the BAS and AES over the past several years. There was no discernible jitter, either, which is exceptionally rare. The print and optical presentation were so good that the movie scene which mimics the film jamming and burning fooled me briefly into believing they had actually occurred!

This print had a Dolby SR-encoded optical soundtrack. Intelligibility was excellent. Even some of the background dialog was understandable. Voices sounded natural, and details and subtleties of the sound effects were clearly audible. The music sounded quite good, too. While some might consider the overall level too high, the low distortion made the level seem lower than it probably was; I enjoyed it. Mark commented that whereas he usually feels movie sound is too loud, this presentation was just right. There didn't seem to be any deleterious peaks or dips in the frequency response; if it could be considered a negative comment, though, at times the bottom two octaves seemed a bit too strong, even disjointed from the overall sound. Since the music and other parts of the soundtrack were not bass-heavy, this must be a characteristic of the film-sound mix.

Which raises some questions: How do we decide how much of what we hear in the theaters, good or bad, should be credited to the mix or to the theater sound system? Should we care as long as we like it? How well standardized, and of what quality, are the sound systems on film studio mixing stages? The film studio has to mix movies to be intelligible and playable in *all* theaters, not just in those with top-quality sound systems. The problem is no doubt similar to that faced by popular-music recording studios that keep car-radio speakers around to hear whether the mix "works" in low-fi mono playback.

I have been told that some directors and producers have said that their movies have sounded better in certain theaters than on the mixing stage. What does this mean with regard to the effort to provide the mixing-stage sound to the theater or home viewer? Is it really possible, or desirable, to translate the acoustic characteristics of the mixing stage to movie theaters, given differences including their size, distance from the speakers to the listener, audience size and the presence versus absence of the mixing console?

It seems rational to try to bring the director's *intentions* to the film viewer; at least it seems so to those of us who make attempts, however feeble, to make a live sonic experience available to home listeners through recordings and stereo systems. It is not important how this is accomplished; there may be multiple approaches which work. Alternatively, for most viewers, as long as they enjoy the experience, does it even need to be faithful to the director's intentions? I don't have definitive answers, only my opinions. And remember, yours are valid, too, and will certainly be welcomed by the BAS Speaker editor.

I have not had the privilege of experiencing the mixing of the soundtrack of a film. I have no conception of



the adrenalin rush, the exhaustion, the thoughts and intentions, and the film "office" politics of the participants in the process. I have no real likelihood of finding out. Without this reference, it is impossible to determine how successfully a theater presentation of a film matches what was selected and implemented on the mixing stage. I can decide only if I like it; if I felt the sonic and visual impact were what I expected; if I could easily understand the dialog.

In the Shoppers World Cinema that Sunday night, I most certainly did like it. I most certainly enjoyed the sonic and visual impact. I easily understood the dialog. I don't think I can ask more of a trip to the movies. It was an HPS-4000 experience—plus.

## **Advertisement**

### **Wanted**

I am looking for old speakers ('60s or earlier) and tube power amplifiers (from the '70s or earlier). Speakers of interest include Jensen G610s, Altec 604s, EV 15WK, EV 18WK, Lowther PM4, and Bozaks. Non-functioning tube amplifiers are welcomed. Call or write Poh Ser Hsu, 2 Eden Street, Chelsea, MA 02150, telephone (617) 884-8250.